



What is GENI?

GENI, a virtual laboratory for exploring future internets at scale, creates major opportunities to understand, innovate and transform global networks and their interactions with society. Dynamic and adaptive, GENI opens up new areas of research at the frontiers of network science and engineering and increases the opportunity for significant socio-economic impact. GENI will:

- support at-scale experimentation on shared, heterogeneous, highly instrumented infrastructure;
- enable deep programmability throughout the network, promoting innovations in network science, security, technologies, services and applications; and
- provide collaborative and exploratory environments for academia, industry and the public to catalyze groundbreaking discoveries and innovation.

Understand global networks and their evolving interactions with society.

Innovate at the frontiers of network science and engineering.

Transform the science of network research and society at large.

Infrastructure Technology

The core concepts for the suite of GENI infrastructure feature:

- **Programmability** – Researchers may download software into GENI-compatible nodes to control how those nodes behave.
- **Virtualization and Other Forms of Resource Sharing** – Whenever feasible, nodes implement virtual machines, which allow multiple researchers to simultaneously share the infrastructure and each experiment runs within its own, isolated slice created end-to-end across the experiment's GENI resources.
- **Federation** – Different parts of the GENI suite are owned and/or operated by different organizations, and the NSF portion of the GENI suite forms only a part of the overall 'ecosystem'.
- **Slice-based Experimentation** – GENI experiments will be an interconnected set of reserved resources on platforms in diverse locations. Researchers will remotely discover, reserve, configure, program, debug, operate, manage, and teardown distributed systems established across parts of the GENI suite.

Who is Building GENI?

GENI is currently in a prototyping and design stage. Leading academic and industrial teams across the United States are now working together to build, integrate, and operate early prototypes of the GENI virtual laboratory, with project management and system engineering provided by the GENI Project Office (GPO). Many of these efforts are being funded by the GPO; others are contributing expertise, technology, and major infrastructure as partners.

Who's Involved?

GENI is supported by NSF under Award CNS-0714770. The NSF funds approximately 20 percent of all federally supported basic research conducted by America's colleges and universities.

The GENI Project Office (GPO)

The GENI Project Office is managed by BBN Technologies. Under the leadership of Chip Elliott, project director, the GPO provides system engineering and project management expertise to guide GENI's planning and prototyping efforts.

Researchers

As part of Spiral 1 participation, awards were made to 29 academic/industrial teams for various projects to build, integrate, and operate early prototypes of the GENI virtual laboratory.

Partners

Strong partnerships with Internet2 and National LambdaRail have been formed to build and test prototypes of the GENI system. Significant contributions of advanced services, technologies, infrastructure, and expertise will greatly accelerate GENI's success and help ensure its direct relevance to society and the economy.

Industry Participants

Corporations including Ciena, Cisco, CNRI, Fujitsu, Hewlett-Packard, Infinera, Microsoft Research, NEC, Netronome, SPARTA, and Qwest are working with GENI academic teams across the United States to help build, integrate, and operate early prototypes of GENI.

What's Happening Now: Spiral 2

In October 2009, NSF announced two major new rounds of National Science Foundation funding for the GENI project. The first award supports an additional 33 academic/industrial prototyping teams, and—for all the prototypes—speeds up federation and shakedown experiments that will guide future GENI system design.

The second award supports three collaboration sets of academic/industrial teams to integrate, operate, and host experiments on an end-to-end prototype GENI infrastructure built from GENI-enabled commercial hardware across 14 university campuses, linked by compatible buildouts through two U.S. national research backbones across an aggregate national footprint of 40 gigabits/second.

How to Get Involved

GENI offers unique opportunities to connect with many contributors working to transform the way research is performed with regards to network science and engineering. Researchers from academic and industrial backgrounds, students, network engineers and operators, and campus and corporate information technology staff are encouraged to participate. Opportunities to participate include:

- Join a working group or a mailing list
- Attend a GENI Engineering Conference
- Apply for an open position or internship
- Federate a network, equipment or software with GENI infrastructure
- Become a partner

Learn More

For additional information, please visit www.geni.net or contact Aaron Falk, Engineering Architect and Lead System Engineer for the GENI Project Office (GPO): 617-873-2575, afalk@bbn.com.

GENI Spiral 2



Project Name	Project Lead	Project Participants
1. CMUlab	● Carnegie Mellon University	● Columbia University
2. D Meas, LEARN	● University of Houston	● Corporation for National Research Initiatives (CNRI)
3. Digital Object Registry	● University of Massachusetts Amherst	● The Georgia Institute of Technology
4. CLOUD-CTL, DOME, ViSE	● The Georgia Institute of Technology	● Stanford University
5. DTunnels	● Stanford University	● Princeton University
6. EnterpriseGENI, OpenFlow	● Stanford University	● University of California, Berkeley
7. GENI4YR	● Langston University	● Clemson University
8. GMOC, netKarma, K-GENI	● Indiana University	● Georgia Institute of Technology
9. GpENI	● University of Kansas	● Indiana University
10. GushProto	● The University of Missouri-Kansas City	● Nicira Networks
11. INSTOOLS, ISM Infrastructure	● Williams College	● Princeton University
12. KANSEI, OTM	● University of Kentucky	● Rutgers University
13. MAX	● Ohio State University	● University of Wisconsin
14. MeasurementSys	● University of Maryland	● University of Washington
15. MillionNodeGENI, Security	● University of Wisconsin-Madison	
16. ORBIT, WIMAX	● University of Washington	
17. ORCA/BEN	● Rutgers University	
18. PlanetLab, Scaffold, Federation	● Rutgers University	
19. ProtoGENI	● Columbia University, NY, NY	
20. PROVSERV	● University of Utah	
21. ERM	● University of Arizona	
22. REGOPT	● Columbia	
23. SECARCH, Distributed Identity	● Pittsburgh Supercomputing Center (PSC)	
24. SPP	● SPARTA, Inc.	
25. TIED	● Washington University	
26. UB_OANets	● USC Information Sciences Institute	
27. UMLPEN	● SUNY Buffalo	
28. CR-GENI	● University of Massachusetts Lowell	
29. CRON-T	● University of Colorado Boulder	
30. Design of Information Subs	● Louisiana State University	
31. DSL, HIVE	● MIT	
32. EXP-SEC	● UC Davis	
33. FPGA-RADIO	● University of Alabama	
34. GENI IMF	● Clemson University	
35. iGENI	● North Carolina State University	
36. LAMP	● Northwestern University	
37. LEFA, Supercharged Planetlab	● University of Delaware	
38. NLR	● Internet2	
39. Open-CIRRUS	● Cypress, CA	
40. OKGems	● HP Labs, Palo Alto	
41. PIGEON-NET	● Oklahoma State University	
42. PrimoGENI	● Howard University	
43. QUILT	● Florida International University	
44. S3-GENI	● The Quilt	
45. SEC-POL	● Purdue University	
46. VMI	● University of Illinois (NCSA)	
	● University of Alaska Fairbanks	
	● Kansas State University	
	● University of Nebraska-Lincoln	
	● UC San Diego	
	● Wayne State University	
	● Boston University	
	● Colgate University	
	● UCLA, Los Angeles, CA	
	● University of Colorado, Boulder, CO	
	● University of Massachusetts, Amherst	
	● University of Wisconsin, Madison, WI	
	● Duke University	
	● Universite Pierre et Marie Curie (UPMC)	
	● University of California, Berkeley	
	● University of Illinois Chicago	
	● Internet2	
	● Brown University	
	● UCSD	
	● HP Labs	
	● The Renaissance Computing Institute (RENCI)	
	● Columbia University	
	● Batelle	
	● CA Labs	
	● Radio Technology Systems LLC	
	● Rutgers University	

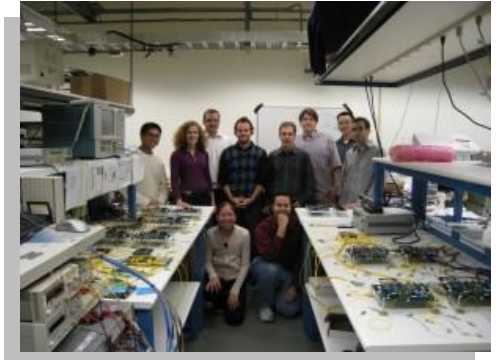
Some of the leading research teams prototyping GENI.



ViSE Team



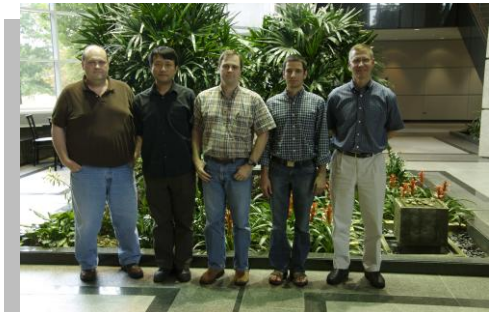
PlanetLab team



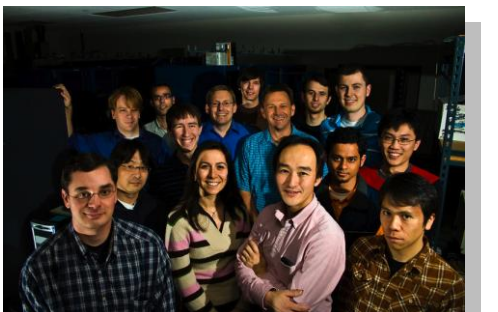
ERM Team



GUSH Team



ORCA/BEN Team



Enterprise GENI Team

