



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 Meso-scale Deployment stage. Leading academic and industrial teams across the United States are now working together to deploy, operate, and improve prototypes of the GENI infrastructure on university campuses interconnected by national research backbones, 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 Awards CNS-0714770, CNS-0940805, and CNS-0944089. 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 January 2011, awards were made to 83 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 Lambda Rail 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 AT&T, Arista, Battelle, CA, Ciena, Cisco, CNRI, Cobham, Big Switch, Fujitsu, Hewlett-Packard, IBM, Infinera, Juniper, Microsoft Research, NEC, Netronome, Nicira 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 3

GENI Spiral 3 is the third phase of exploratory rapid-prototyping that is defining GENI's technical and operational plans. Spiral 3's primary goal is on supporting experimenter use of GENI, including growing the resources available for use and making them easier for experimenters to acquire, connect, and configure. The GENI "Meso-scale deployment" projects are in their second year and will continue their efforts to deploy, integrate, and begin operations of OpenFlow switches and WiMAX base stations on thirteen university campuses connected by two OpenFlow-enabled national backbones.

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 the development effort 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, falk@bbn.com.

GENI Spiral 3



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

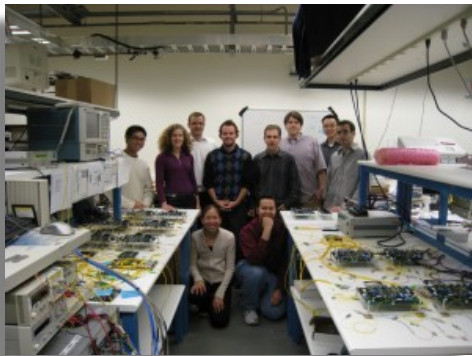
Some of the leading research teams prototyping GENI.



ViSE Team



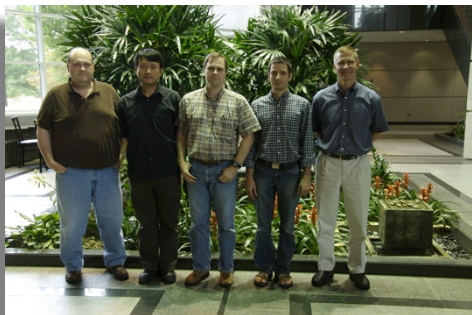
PlanetLab team



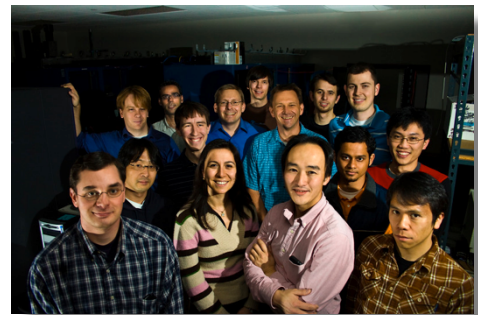
ERM Team



GUSH Team



ORCA/BEN Team



Enterprise GENI Team

