

The Global Environment for Network Innovations (GENI)

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	Innovate at the frontiers of network	Transform the science of network
society.	science and engineering.	research and society at large.

Mission

The GENI mission is to: open the way for transformative research at the frontiers of network science and engineering, and inspire and accelerate the potential for groundbreaking innovations of significant socio-economic impact.

Who's Involved?

National Science Foundation (NSF)

NSF is an independent federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense." The NSF funds approximately 20 percent of all federally supported basic research conducted by America's colleges and universities. GENI is supported by NSF under Award CNS-0714770.

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.

The Network Science and Engineering (NetSE) Council

The NetSE Council has been tasked with drawing up a research agenda for network science and engineering which identifies areas where research and innovation is necessary to act on the challenge of designing better networks. Their work to date has encompassed new mathematical tools and frameworks, new disciplinary innovations, new interdisciplinary conversations, and new experimental methods and capabilities.

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.



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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.



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.



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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.

The GPO issued its first prototyping solicitation in December 2007 and completed its review and selection process in April 2008. These teams were selected by a thorough, peer-driven review process from the 74 proposals received in response to the GPO's solicitation, with extensive review and (in many cases) project modifications from the GPO system engineering team. The GPO issued a second solicitation on December 15, 2008 for additional GENI development development, prototyping, and integration proposals. The solicitation closed on February 20, 2009.

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'; and
- 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.

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.

For additional information, please visit <u>www.geni.net</u> or <u>contact the GENI Project Office (GPO</u>).