

GENI System Glossary

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GENI: Global Environment for Network Innovations

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Note to the reader: this document is a work in progress and continues to evolve rapidly. Certain aspects of the GENI architecture are not yet addressed at all, and, for those aspects that are addressed here, a number of unresolved issues are identified in the text. Further, due to the active development and editing process, some portions of the document may be logically inconsistent with others.

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Revision History

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Typographical Conventions

In the following definitions *italics* indicate a reference to another alphabetically listed headword. Each reference is only italicized once per entry. Headwords themselves are **boldface** and followed by a colon. Abbreviations are not italicized and all appear as headwords that expand the abbreviation.

Glossary

Access Network: Site network connecting a PEN to a set of PWCs or PECs. This is usually a LAN dedicated to GENI, though it may be multiplexed with or virtualized from a more conventional campus or enterprise network.

Active Sliver: A *sliver* that supports user-installed code.

Aggregate: A GMC object representing a group of *components*, where a given component can belong to zero, one, or more aggregates. Aggregates can be hierarchical, meaning that an aggregate can contain either components or other aggregates. Aggregates provide a way for users, developers, or administrators to view a collection of GENI nodes together with some software-defined behavior as a single identifiable unit. Generally aggregates export at least a component interface—i.e., they can be addressed as a component—though aggregates may export other interfaces as well.

Backbone Network: Nationwide network consisting of a set of PCNs connected by an underlying *fiber facility*.

Canonical Component: A reference implementation of a GENI *component*.

Canonical Management Aggregate: A reference implementation of a *management aggregate*.

Component: A GMC object representing a physical device in the GENI substrate. A component consists of collection of *resources*. Such physical resources belong to precisely one component. Each component runs a *component manager* that implements a well-defined interface for the component. In addition to describing physical devices, components may be defined that represent logical devices as well.

Component Manager: The entity responsible for allocating *resources* at a *component*. It exports a standard interface defined in the GENI architecture document. That interface is also exported by *aggregates*. Though it is intuitive to think of the component manager residing on the component it manages, this is not necessarily the case.

Execution Environment: The environment a *component* provides for user interaction. This can range from an operating system and virtualized services on a workstation to a network management interface to routing tables or measurement equipment.

Fiber Facility: The nationwide interconnection network that ties PCNs together. Though not necessarily constructed of optical fiber, this network is high capacity and broadly connected.

GENI Gateway (GGW): A device that connects a GENI *access network* to the Internet. Includes one or more of the following functions: routing (to GENI backbone and/or the legacy Internet) traffic shaping, packet filtering, and packet auditing. A GGW is not a component that can be sliced, and it is not required if these functions can be provided by the connected component itself.

GGW: *GENI Gateway*

MA: *Management Authority*

Management Aggregate: An *aggregate* that implements the control policies of the *management authority* responsible for the *components* that comprise the aggregate. A management aggregate typically implements two separable functions: *operations and management control* and *slice control*.

Management Authority (MA): The real-world entity responsible for managing a set of GENI *components*. Management Authorities oversee and set policies for *operations and management control* for a set of components that share an owner or administrator. This allows administrators to set subnet-wide or installation-wide policies or configurations. Additionally the MA may operate as a *slice controller* for components under its control, including participating in resource discovery and resource allocation for those components. The control tasks of a management authority are carried out by a *management aggregate*, a GMC object.

O&M Control: *Operations and Management Control*.

Operations and Management Control (O&M Control): The mechanism a management authority uses to boot, configure, operate, and manage components under its control. This mechanism is usually encapsulated as a GENI *management aggregate*.

Operations Portal: A *portal aggregate* tailored to support network operators.

PCN: *Programmable Core Node*.

PEC: *Programmable Edge Cluster*.

PEN: *Programmable Edge Node*.

Portal Aggregate: An *aggregate* that implements an external entry point, possibly in the form of a web-based GUI, through which some user community accesses a set of components. Multiple portal aggregates (or simply portals) are likely to exist, each tailored for a different user community. For example, an *operations portal* might support network operators, while a *researcher portal* might support researchers.

Programmable Wireless Node (PWN): GENI *component* available throughout wireless *access networks*.

Programmable Core Node (PCN): GENI *component* available throughout the *backbone network*. Typically configured to support high-speed links (e.g., using FPGAs) and including programmable elements at the framing layer.

Programmable Edge Cluster (PEC): GENI *component* available throughout wired *access networks*.

Programmable Edge Node (PEN): GENI *component* available at edge sites, connecting the local *access network* to the GENI *backbone network*.

PWN: *Programmable Wireless Node*.

Researcher Portal: A *portal aggregate* tailored to support a particular research community.

Resource: Abstractions of the sliceable features of a *component* that are allocated by a *component manager* and described by an *rspec*. Resources are divided into computation, communication, measurement, and storage.

RSPEC: Represents all GENI *resources* that can be bound to a *sliver* within GENI. An *rspec* describes both the resources available, advertised or allocated at a component and the relationships between those resources, and perhaps other resources in GENI.

SA: *Slice Authority*.

Slice: A GMC object representing a distributed, named collection of *slivers* that collectively provide the execution context for an experiment, service, or network architecture. A slice typically includes no more than one *sliver* per *component*, but this is not a requirement.

Slice Authority (SA): Entity responsible for the behavior of some set of *slices*. Participates in the slice naming hierarchy.

Slice Control: The mechanism a *management authority* uses to embed slices in the components under its control. This mechanism may involve coordinating the allocation of resources (e.g., wireless spectrum) shared across a set of components, as well as starting and stopping slices in a coordinated fashion across a set of components. This mechanism is usually encapsulated as a GENI *management aggregate*.

Sliver: A set of *resources* multiplexed between all *slivers* sharing a *component*. For example, over a PC server node, a *sliver* would be a virtual machine with associated resource container. An *active sliver* is a resource container that supports user-installed code. Such code is said to run in an *execution environment* provided by the *sliver*. Active *slivers* might be in “running” or “suspended” states; in the latter the *sliver* exists and with resources bound to it, but is prevented from executing any code.

Tail Circuit: Connects PENS and PECs to PCNs in the *backbone network*.