

## Comments on GENI future

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The most important feature of GENI is that GENI enables large-scale real (instead of simulation or emulation) networking experiments, so we can test new architectures and new protocols before real deployment. With GENI, we can reserve nodes (VMs or raw PCs), (layer-2 and layer-3) links as well as OpenFlow-enabled switches, which support large-scale experiments. GENI has been playing a very important role for our research on ProtoRINA.

In the future, we think GENI should be putting more efforts in the following:

(1) In our previous experiments, we found it very difficult to create a slice with more than 20 VMs, and more difficult with stitched VLANs. So it is important that GENI continues to expand its resources and their provisioning capability to support experiments of large scale. What's more, we think improving its algorithms for embedding users' topology on physical racks and links would also help with this.

(2) GENI should support specifying network conditions (such as throughput, delay, and loss rate) as well as node conditions (such as CPU and memory). Right now GENI lacks this support which makes it hard to study the performance and correctness of protocols, as the user needs to install emulation tools manually.

(3) Although GENI provides tools (such as Jacks) for users to build their own topologies, i.e., Rspec files, it is still very difficult for users to create a complicated topology. It would be better if GENI would provide a tool for generating Rspec files automatically from synthetically generated topologies.

(4) GENI should continue holding workshops (or conferences) such as GREE or CNERT, to encourage more usage of GENI in academia for either research or education purposes. Also it would be better to have git repositories for user-generated GENI tutorials and experiments so they are maintained and kept up-to-date.