The Software Tools for Networking column contains brief presentations of software tools that are freely available on the Internet and could be useful for the readers of this magazine. Each presentation is based on an extended abstract submitted by the authors of the tools that was copy edited and checked for accuracy against the version of the tool available on the Internet. Authors willing to have their tools presented in this manner should send a 300-word description of their tool in ASCII format with the URL of the tool by email to Olivier Bonaventure (bonaventure@ieee.org) with an indication that the description is submitted for the IEEE Network Software Tools for Networking column. Appropriate tools will be presented in this column.

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NCTUns 1.0
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http://NSL.csie.nctu.edu.tw/nctuns.html

The NCTUns 1.0 network simulator is a successor to the Harvard network simulator. The NCTUns 1.0 is a high-fidelity and extensible discrete event network simulator capable of simulating various protocols used in both wired and wireless IP networks. Its core technology is based on a kernel re-entering simulation methodology. In NCTUns 1.0, real-world TCP/IP protocol stacks are directly used to generate accurate simulation results, and all real-world application programs can directly run on any network simulated by this tool.

The NCTUns 1.0 is equipped with a GUI environment to help a user to quickly (1) specify network topologies, (2) edit protocol parameters, (3) control the execution of simulations, (4) plot logged performance curves, and (5) play back logged packet transfer animations. It uses a distributed architecture to support remote and concurrent simulations on multiple machines. A user can just download the GUI program, use it to specify his (her) simulation job, and then submit the job to a remote simulation server for execution. When the job is finished, the results will be automatically transferred back to the GUI program for further analysis. NCTUns' simulation engine uses an open system architecture to allow a user to easily add protocol modules. Adding a new protocol module into an existing protocol stack of a node or replacing an old one with a new one can be done via the GUI program's node editor.

Due to the kernel re-entering simulation methodology, NCTUns 1.0 needs to modify the kernel of the underlying operating system. Right now only FreeBSD 4.7 and 4.6 are supported; however, porting the simulator to the Linux platform is underway. The NCTUns 1.0 is written in C++. It is open-source, free for non-profit use, and has an active user community. The Web site provides the package, documentation (papers, GUI user manual, and protocol module developer manual), demo videos, mailing lists, and a free simulation center service.

Visualization Tool for Ad Hoc Networks
F. Fitzek, P. Seeling, M. Reisslein, and M. Zorzi
http://www.acticom.de/vitan.html

In the study of ad hoc wireless networks, researchers often face the problem of analyzing complex networks formed by nodes (terminals) that are placed in a wide variety of topologies. The placement of the nodes and their respective wireless transmission and reception capabilities typically give rise to a complex network graph consisting of nodes interconnected by wireless links (edges) of heterogeneous quality (capacity).

The Visualization Tool for Ad Hoc Networks (ViTAN) is a tool for visualizing this network graph of link qualities (capacities) between the terminals in wireless ad hoc networks. The tool takes the location of the terminals (specified as Cartesian coordinates) and the link qualities between the terminals (specified as positive integers) as input. The tool produces a visualization of the graph of the terminals' connectivities in the .fig format, which can easily be converted to any common graphic format. ViTAN does not evaluate the connectivities and link qualities in ad hoc networks. Instead, ViTAN takes the link qualities obtained from other tools, simulations, or analytical evaluations as input and graphically visualizes these link qualities and the resulting connectivities in the network. ViTAN facilitates the visual study of complex ad hoc networks by depicting higher link qualities with thicker edges and in darker gray shades. In addition, ViTAN draws the edges at different depth levels of the .fig format, depend-