

# Network R&D Solutions

for Network Equipment Manufacturers, Service Providers, and Research Organizations

OPNET Network R&D solutions provide high-fidelity modeling, scalable simulation, and detailed analysis of a broad range of wired and wireless networks.

## Accelerating Network R&D

OPNET Network R&D solutions enable organizations to optimize their investment in network R&D.

- Develop proprietary network protocols and technologies
- Evaluate enhancements to standards-based protocols
- Test and demonstrate technology designs in realistic scenarios before production
- Increase R&D productivity and accelerate time-to-market

## De facto Industry Standard for Network Modeling and Simulation

OPNET Modeler® features advanced capabilities for network modeling and simulation, including:

- Fastest discrete event simulation engine among leading industry solutions
- Hundreds of wired/wireless protocol and vendor device models with source code
- Intuitive, hierarchical modeling environment
- Scalable wireless simulations incorporating terrain, mobility, and path-loss models
- Discrete event, hybrid, and analytical simulation
- 32-bit and 64-bit fully parallel simulation kernel
- Integrated, GUI-based debugging and analysis
- Open interface for integrating external object files, libraries, and other simulators

## OPNET Modeler Workflow

### HIGH-FIDELITY MODELING

- Model network protocols, resources, algorithms, applications, and queuing policies in detail using Modeler's powerful object-oriented modeling approach
- Accelerate model design with more than 400 out-of-the-box protocol and vendor device models from Modeler's library, including BGP, IPv6, MPLS, Satellite technology, TCP, UMTS, VoIP, WiMAX, WLAN, and ZigBee
- Model all aspects of wireless communication, including RF propagation, antenna modeling, signal modulation, node mobility, and interference, using OPNET Modeler® Wireless Suite with real terrain data

### SCALABLE SIMULATION

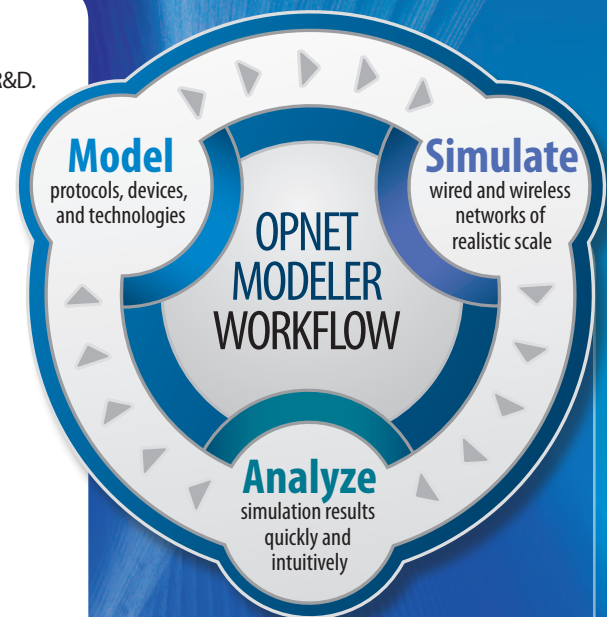
- Reduce simulation runtime by utilizing Modeler's parallel and distributed simulation capabilities
- Leverage three different simulation technologies to efficiently tradeoff simulation detail and speed

### SOPHISTICATED ANALYSIS

- Easily interpret simulation results using intuitive charts, tables, and graphs
- Quickly correlate graphical results with network behavior by replaying simulations

## Powerful Development Environment

- Eliminate the need for a third-party debugger by using Modeler's integrated debugging capabilities
- Visualize packet flow to quickly pinpoint and fix errors using the industry's only graphical debugger
- Simplify the execution of simulation excursions with Modeler's checkpoint/restart feature
- Easily upgrade custom models to new releases of Modeler using source code version control



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*By modeling our cutting-edge technology in OPNET Modeler we are able to cut costs and accelerate time-to-market. We can thus concentrate our R&D resources on the differentiating aspects of our projects where we can realize true competitive advantage.*”

**Project Leader**

NEC Network Laboratories

[www.opnet.com](http://www.opnet.com)

**OPNET**<sup>®</sup>  
Application and Network Performance

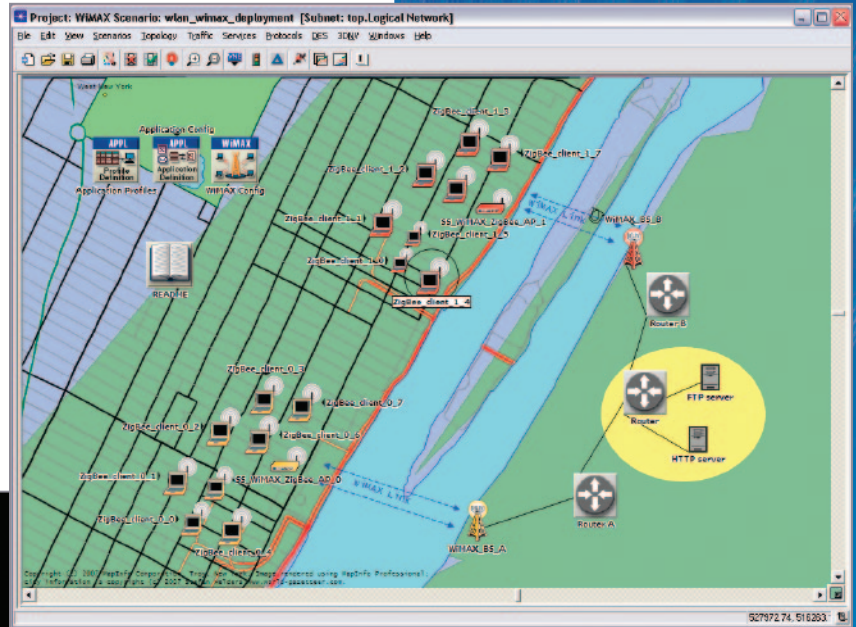
### Network R&D for Next Generation Technologies

OPNET Modeler Wireless Suite supports modeling and simulation of advanced network technologies, including UMTS, WiMAX, and LTE. Studies include, for example, designing next-generation network architectures, predicting application performance, and developing base station and subscriber station scheduling schemes.

### Integrating Live Network and Application Behavior

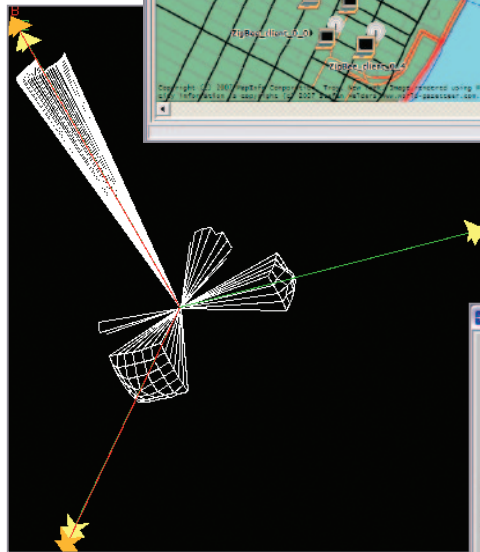
The ACE™ Analyst module enables users to define a more accurate application model within Modeler by using captured packet traces from a production or test environment.

The OPNET System-in-the-Loop (SITL) module provides an interface for connecting live network hardware or software applications to an OPNET discrete event simulation. SITL enables important studies, including interoperability, scalability, and conformance testing of prototype network hardware, studying the behavior of prototype applications on a simulated network infrastructure, and analyzing the performance of a new simulated protocol by injecting real network traffic.



### Advanced Antenna Modeling and Visualization

OPNET Modeler Wireless Suite provides an advanced antenna modeling interface, enabling users to accurately specify antenna position and orientation, incorporate dynamic antenna patterns into network scenarios, and visualize antenna location, orientation, and coverage in a rich, 3D environment. Studies include, for example, evaluating the performance of proprietary or customized antenna patterns, visualizing the signal strength from cellular base stations in a geographical area, and determining the variation in antenna gain due to terrain impairments.

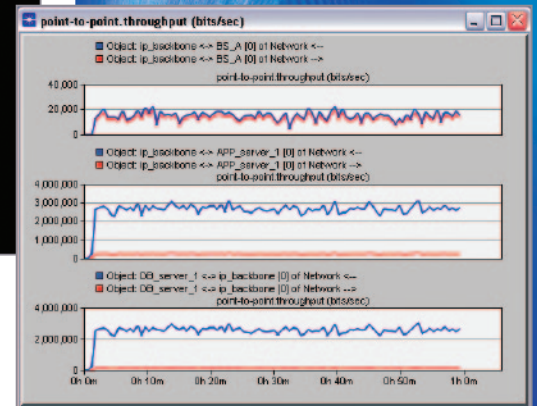


View antenna lobes in three dimensions

Design and evaluate hybrid ZigBee-WiMAX networks

### Accelerating Simulation Runtime

Aside from raw performance, Modeler incorporates numerous features to accelerate larger, more demanding simulations, including a 64-bit kernel, general parallel simulation, and grid computing support. Modeler's inherent parallel discrete event simulation kernel leverages multi-core processors or multi-processor machines to accelerate simulation runtime. In grid computing environments, Modeler can distribute a series of simulations to multiple machines for simultaneous execution. This feature is especially useful for validating simulation results and for parametric studies, where one or more model parameter values are varied to analyze their effect on overall network behavior.



Visualize simulation results in a rich, integrated environment

### LTE Model Development Consortium

The LTE Model Development Consortium will enable R&D organizations to collaborate with OPNET to develop a model for LTE network equipment design, planning, and analysis. Contact OPNET at [LTEcons@opnet.com](mailto:LTEcons@opnet.com) for more information about joining the OPNET LTE Consortium.

[www.opnet.com](http://www.opnet.com)

