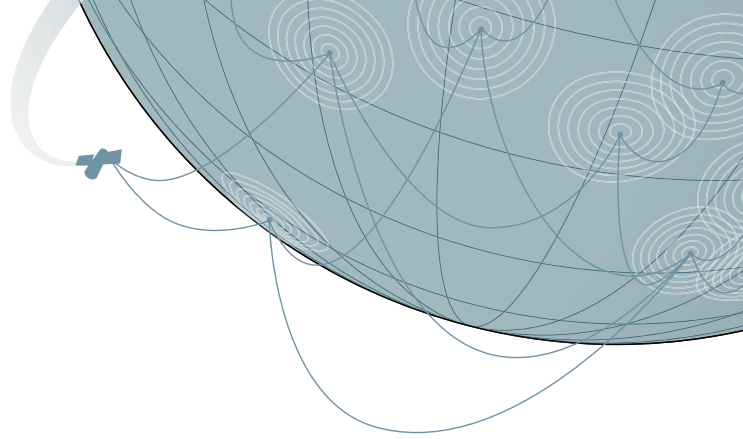


QualNet[®]

Product Family



QualNet Developer 5 is ultra high-fidelity network simulation software that predicts wireless, wired and mixed-platform network and networking device performance. It is designed for engineers who do research, testing, network design, modeling & simulation, and hardware and software development.

QualNet is the only modeling and simulation tool that can explore and analyze early-stage device designs and application code in closed, synthetic networks at real time speed or faster. Designed to take full advantage of the multi-threading capabilities of multi-core, multi-processor, cloud computing, cluster and 64-bit processor systems, QualNet supports over thousands of network nodes.

QualNet offers unmatched platform portability and interface flexibility. QualNet runs on sequential and parallel Windows, Linux, and Mac OS X operating systems, and is also designed to link seamlessly with other modeling and simulation applications.

What Sets QualNet Apart?

High Fidelity Simulation: QualNet delivers ultra-high fidelity simulations of network devices, transmitters, antennas, terrestrial characteristics, and human interactions, all at real time speed or greater. How? With a super-efficient parallel kernel and patent-pending, computationally-efficient code. You get the same accurate simulations of wireless and wired networks for 50, 500, or 5,000 nodes.

Eliminates the need for model abstraction: QualNet's fidelity and scalability makes abstraction for computational efficiency obsolete. You no longer need to be concerned about masking the very effects your simulations are meant to analyze.

Reduces simulation time from months to minutes: QualNet's high-speed parallel processing power enables you to run simulations that take months to calculate using sequential processing technology in a matter of minutes. Multiple analysis iterations in less time means you can solve more design and engineering problems faster than ever before.

QualNet Key Capabilities

- Real time evaluation of networks and network-centric systems
- Real time speed or faster
- Real network fidelity
- Real network results at a simulation price

The QualNet Product Family

The QualNet Product Family consists of QualNet Developer, which runs in sequential or parallel mode, plus a number of add-on model libraries.

QualNet Developer allows users to set up, develop, and run custom network models. A feature-rich visual development environment allows users to set up models quickly, efficiently code protocols, and then run models that present real-time statistics and helpful packet-level debugging insight.

QualNet Developer provides out-of-the-box support for dual-core processor systems. This means you can achieve faster simulation speeds, even real-time simulation, with the base QualNet product. For additional speedup and scalability through parallel execution, upgrade QualNet Developer to run on additional processors.

QualNet Developer runs on all modern computer platforms, from sequential computers to shared memory multiprocessors, including workstation clusters and supercomputers.

QualNet Model Libraries greatly extend the base capabilities of QualNet. From supporting specialized networks, such as WiFi, sensor networks, cellular, 3G/UMTS, MANET, WiMAX, and satellite, to enabling powerful 3-D visualization, Model Libraries add significant capabilities. They are delivered in source form (C/C++) and conform to a flexible OSI

architecture, allowing users to easily build custom protocol stacks, waveforms, devices and interfaces.

The QualNet Model Libraries consist of the following:

- Developer Library †,
- Wireless Library †,
- Multimedia and Enterprise Library †,
- Advanced Wireless Library,
- Cellular Library,
- Military Radios Library ‡,
- Network Security Library,
- Propagation Library: ALE/ASAPS**,
- Propagation Library: TIREM**,
- Propagation Library: Urban
- Satellite Library,
- Sensor Networks Library,
- Standard Interfaces Library, and
- UMTS Library.

For more details on the libraries, please refer to the sheet entitled *QualNet and EXata Model Libraries*.

† These libraries are included with QualNet Developer. All others are sold separately.

‡ These libraries are subject to export restriction under the International Traffic in Arms Regulations (ITAR) 22 CFR 120-130. International sales of these modules require authorization from the US Department of State.

** These libraries require code from a third party.

Key Features of QualNet Developer in Parallel Mode

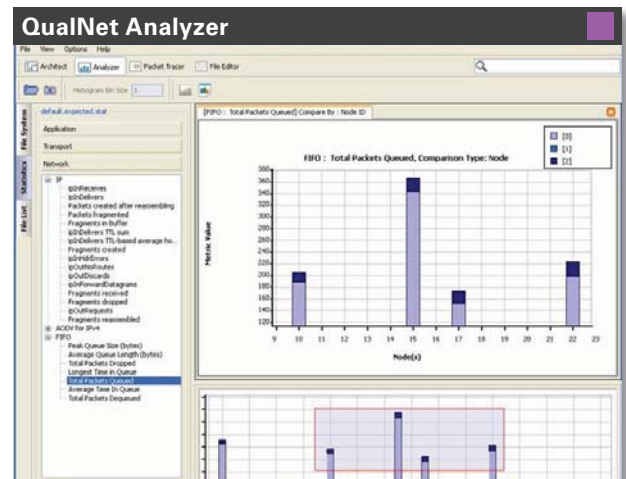
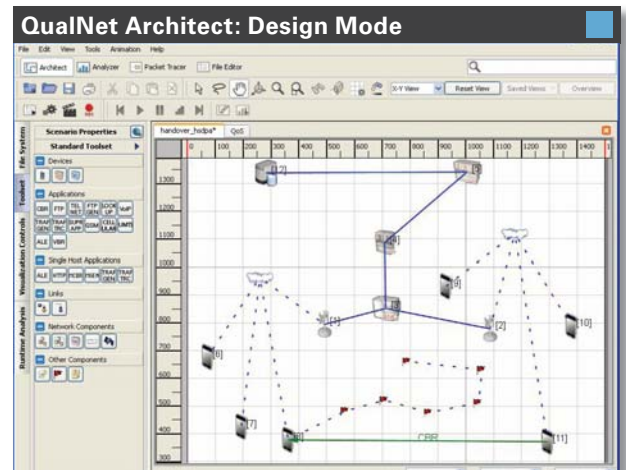
Real-time Simulation. Models can speed up and scale on parallel computing environments. For instance, a cluster of 16 dual 2GHz Opteron systems connected by an Infiniband switch achieved real-time speed for 3,500 nodes*.

Support for a Variety of Parallel Computing Environments. QualNet Developer with additional processor licenses runs on modern multi-core, multi-processor, cluster and 64-bit processor systems.

Protocol Models are Pre-optimized for Parallel. There's no need to re-write code for parallel execution; all models come optimized for small and mid-size parallel processors and supercomputers.

Parallel Since Day One. QualNet was designed for parallel execution since the first line of code was written in 1999. Parallelizing a legacy sequential simulator has been shown to be difficult and ineffective.

* This scenario was designed for optimum performance in terms of traffic, mobility, and partitioning.



Components of QualNet Developer

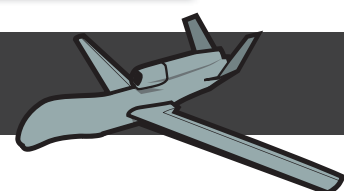
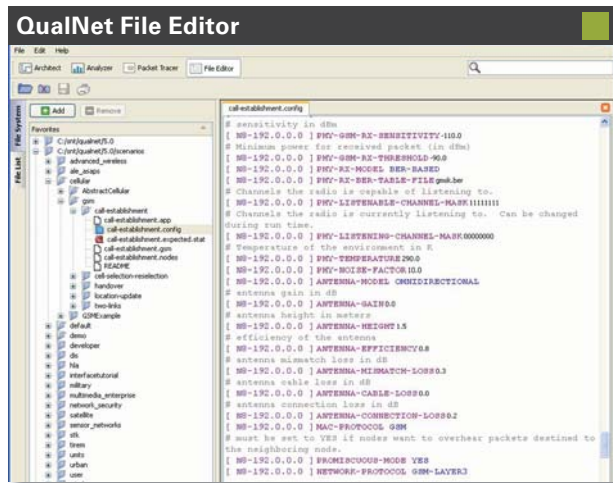
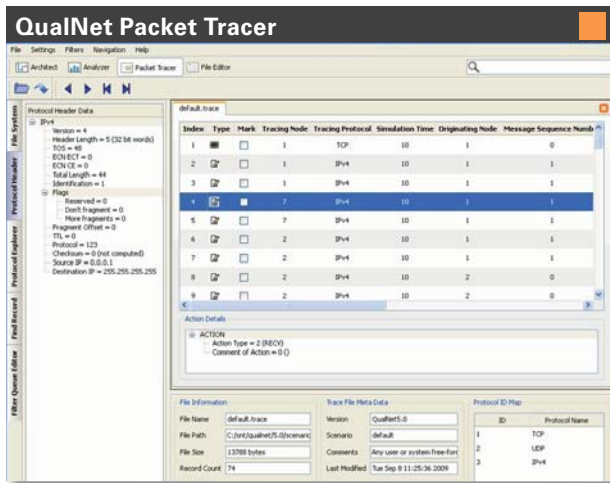
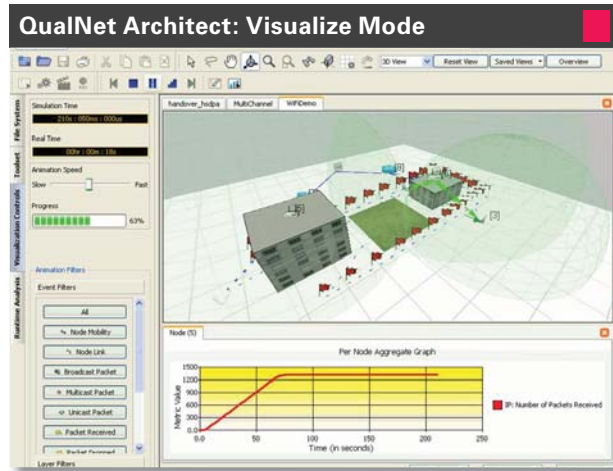
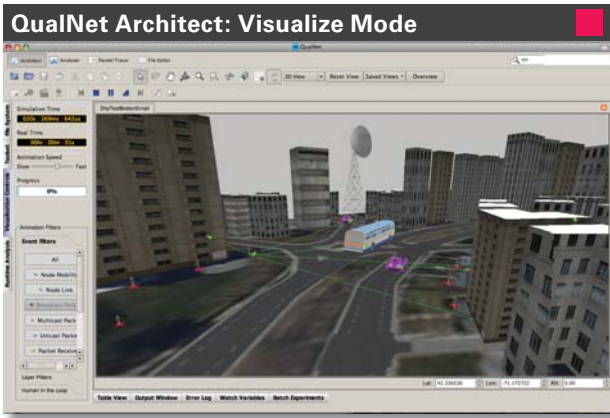
QualNet is a comprehensive set of tools with all the components for custom network modeling and simulation. QualNet Developer is ultra high-fidelity network evaluation software that predicts wireless, wired and mixed-platform network and networking device performance. Designed to take full advantage of the multi-threading capabilities of multi-core 64-bit processors, QualNet supports simulation of thousands of network nodes.

QualNet offers unmatched platform portability and interface flexibility. QualNet runs on parallel Windows, Mac OS X and Linux operating systems, and is also designed to link seamlessly with modeling/simulation applications and live networks.

Components of QualNet Developer:

QualNet Architect: Design Mode

QualNet Architect: Design Mode allows users to set up terrain, network connections, subnets, mobility patterns of wireless users, and other functional



parameters of network nodes. Users can create network models by using intuitive, click and drag operations. They also can customize the protocol stack of any of the nodes and specify the application layer traffic and services that run on the network.

QualNet Architect: Visualize Mode

QualNet Architect: Visualize Mode gives the user opportunities to perform in-depth visualization and analysis of a network scenario designed in Design Mode. As simulations are running, users can watch packets at various layers flow through the network and view dynamic graphs of critical performance metrics. Real-time statistics are also an option, where users can view dynamic graphs while a network scenario simulation is running.

QualNet Analyzer

QualNet Analyzer is a statistical graphing tool that displays hundreds of metrics. You can customize the graph display. All statistics are exportable to spreadsheets in CSV format.

QualNet Packet Tracer

QualNet Packet Tracer provides a visual representation of packet trace files generated during the simulation of a network scenario. Trace files are text files in XML format that contain information about packets as they move up and down the protocol stack.

QualNet File Editor

QualNet File Editor is a text editing tool that displays the contents of the selected file in text format and allows the user to edit files.

Minimum System Requirements for QualNet Developer 5.0

CPU

Windows

- 32-bit (x86 compatible) processor including Core Duo, Pentium, Xeon, and Athlon
- 64-bit (x86-64 compatible) processor including AMD Opteron, Athlon 64, Intel Core 2 Duo, and Pentium/Xeon EM64T

Linux

- 32-bit (x86 compatible) processor including Core Duo, Pentium, Xeon, and Athlon with SSE2 extension support
- 64-bit (x86-64 compatible) processor including Opteron, Athlon 64, Intel Core 2 Duo, and Pentium/Xeon EM64T with SSE2 extension support

MacOS

- 32-bit (x86 compatible) processor including Core Duo and Xeon

Operating Systems

Microsoft

- Microsoft Windows XP (Home and Professional) with service pack 3 (SP3)
- Microsoft Windows XP Professional Edition x64 Edition
- Microsoft Windows Vista (Home Basic and Business) 32-bit and 64-bit editions

Linux

The following Linux operating systems are supported:

- CentOS 5.3,
- openSUSE 10.2,
- openSUSE 11.1,
- Red Hat Enterprise Linux 5.3,
- SUSE Linux Enterprise Server 10 SP2,
- Ubuntu 6.06 (Dapper),
- Ubuntu 8.10 (Intrepid)

Apple

- Mac OS X version 10.5 (Leopard) on Intel processor systems

Memory

- 128 MB free for LAN-size simulations without GUI
- 512 MB free for LAN-size simulations with GUI
- 2 – 4 GB free for a large network (1000+ nodes)

Disk space

- 600 MB free disk space.

Video

- Discrete graphics card with at least 128 MB memory supporting hardware 3D acceleration
- Display with 1024 x 768 or better resolution

Compiler

Windows

One of the following C++ compilers is required to compile QualNet:

- Microsoft Visual Studio 2005
- Microsoft Visual Studio 2008
- Microsoft Visual C++ 2008 Express Edition

Linux

The expat development library is needed to compile QualNet on Linux systems. Install the expat development library from the Linux installation media or download site.

To recompile QualNet source code or custom additions, a C compiler (gcc) and C++ compiler (g++) are required. The following table describes the recommended version of gcc appropriate for a given Linux distribution:

Distribution	glibc Version	gcc Version
CentOS 5.3	2.5	4.1
openSUSE 10.2	2.5	4.1
openSUSE 11.1	2.9	4.3
Red Hat Enterprise Linux 5.3	2.5	4.1
SUSE Linux Enterprise Server 10 SP2	2.4	4.1
Ubuntu 6.06 (Dapper)	2.3	4
Ubuntu 8.10 (Intrepid)	2.8	4.3

For system requirements for parallel/distributed systems, see:

<http://www.scalable-networks.com/support/system-requirements/qualnet/#distributed>



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