



# QualNet 7.1 Release Notes

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# QualNet Release Notes

This document contains release notes for multiple versions of QualNet, which are described in the following sections:

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- [Section 2 “QualNet 6.1 Release Notes” on page 7](#)
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## 1 QualNet 7.1 Release Notes

This section lists release notes for QualNet 7.1 and are described in the following tables:

- [Table 1 - New Features for QualNet 7.1](#)
- [Table 2 - Model Library Changes for QualNet 7.1](#)
- [Table 3 - Updated and Enhanced Features for QualNet 7.1](#)
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- [Table 6 - Known Issues for QualNet 7.1](#)

[Table 1](#) lists the new features in QualNet 7.1.

**TABLE 1. New Features for QualNet 7.1**

New Feature	Area Affected	Description
IGMPv3 Support	Multimedia and Enterprise Model Library	Version 3 of IGMP(RFC 3376) adds support for "source filtering", that is, the ability for a system to report interest in receiving packets only from specific source addresses sent to a particular multicast address to support Source-Specific Multicast (SSM).
DHCP Model	Developer Model Library	Dynamic address allocation for IPv4 is added with support of DHCP (RFC 2131). DHCP is built on a client-server model, where designated DHCP servers allocate network addresses and deliver configuration parameters to DHCP clients. Major features are: <ul style="list-style-type: none"><li>• Permanent Allocation: DHCP server assigns a permanent IP address to a client.</li><li>• Dynamic Allocation: DHCP assigns an IP address to a client for a limited period of time.</li><li>• Manual Allocation: A client's IP address is assigned by the network administrator, and DHCP is used simply to convey the assigned address to the client.</li></ul>
DNS Model	Developer Model Library	Domain Name System adds support for Fully Qualified Domain Names (FQDNs). A hierarchical distributed database can now be configured which is used to store information for mapping Internet hostnames to IP addresses and vice-versa. Major features are: <ul style="list-style-type: none"><li>• Domain Name Space and Name Servers</li><li>• DNS Name Resolver</li><li>• Multiple DNS servers, i.e. primary DNS server and secondary DNS server</li><li>• DNS Updates</li></ul>

**TABLE 1. New Features for QualNet 7.1 (Continued)**

New Feature	Area Affected	Description
Fully Qualified Domain Names (FQDNs) in Applications	Developer Model Library, Architect	Several application models (CBR, FTP, FTP/Generic, HTTP, Super Application, TELNET, and Traffic Generator) have been enhanced so that the destination/server can be specified by its FQDN. These application models can be used if DNS is enabled.  A new toolbar (called Dynamic Address Applications) has been added in Architect for these applications (except HTTP). For HTTP, FQDNs can now be used to specify servers along with node IDs and interface addresses.
IPv6 Autoconfiguration Model	Developer Model Library	The IPv6 hosts using Stateless Address Autoconfiguration can configure the IPv6 (global) addresses automatically. The stateless autoconfiguration requires no special server and only minimal router configuration. Major features are: <ul style="list-style-type: none"> <li>• Creation of link local addresses</li> <li>• Duplicate Address Detection</li> <li>• Address delegation</li> <li>• Creation of global address and site-local addresses</li> <li>• Address categorization into preferred and deprecated address</li> </ul>
Channel Names	Cellular, LTE, UMTS, and Wireless Model Libraries	Channels can be given unique names using the <code>PROPAGATION-CHANNEL-NAME</code> parameter. This allows for the listening and listenable to be specified by using channel names. (Channel frequencies can also be used to specify listening and listenable channels).  Channel names can also be used to specify channels (in addition to channel indices) in LTE, UMTS, Satellite-RSV, Cellular Abstract, and GSM models.
Extractor	Federation Interfaces Library	Extractor is a GUI-based utility to extract scenario configuration from HLA/DIS federations.
HLA 1516	Federation Interfaces Library	In addition to HLA1.3, HLA1516 protocol (SISO DLC) is also supported.
RPR FOM 2.0017	Federation Interfaces Library	The HLA1.3 and HLA1516 interfaces also support RPR FOM 2.0017 (Draft 17) in addition to RPR 1.0.

[Table 2](#) lists the model library changes for QualNet 7.1.

**TABLE 2. Model Library Changes for QualNet 7.1**

Library	Changes
Standard Interfaces Model Library	The Standard Interfaces Model Library has been renamed the Federation Interfaces Library. It contains the enhanced HLA and DIS interfaces (see <a href="#">Table 3</a> ) and the Socket interface.
Satellite Model Library	The Satellite Model Library has been discontinued as a separate library. Models in that library have been moved to the Wireless Model Library and can be used with the base license.
TIREM Model Library	The TIREM Model Library has been discontinued.

Table 3 lists the updated and enhanced features for QualNet 7.1.

**TABLE 3. Updated and Enhanced Features for QualNet 7.1**

New Feature	Area Affected	Description
DIS Interface	Federation Interfaces Library	The DIS interface has been re-implemented using MAK's VR-Link. Additionally, 64 bit, parallel (shared memory) and distributed execution is now support for DIS.
HLA Interface	Federation Interfaces Library	The HLA interface has been re-implemented using MAK's VR-Link. Parallel (shared memory) and distributed execution is now supported for HLA.
New Attributes in GUI XML Configuration Files	GUI	Several new attributes have been added in GUI XML configuration files. See Chapter 5 of <i>QualNet Programmer's Guide</i> for details.
Architect Design Mode Features	GUI	The major enhancements in Architect are: <ul style="list-style-type: none"> <li>• In device insert mode, the mouse cursor will be the same as the icon of the selected device.</li> <li>• If the user tries to place a new device on top of an existing device, the GUI will switch to selection mode instead of adding a new device.</li> <li>• When in insert mode, right clicking will also switch the GUI to selection mode.</li> <li>• <b>Apply</b> and <b>Save as Default</b> buttons have been added in the Camera Settings wizard.</li> <li>• When adding mobility waypoints for a weather object, after selecting the waypoint tool and clicking on the weather object, a shadow of the weather object follows the mouse pointer to indicate the area that will be covered by the weather object.</li> </ul>
Architect Visualize Mode Features	GUI	The Play and Pause functionalities are now controlled by a single button which toggles between the two. The Stop button is now used only for stopping the simulation.

Table 4 lists the major configuration changes for QualNet 7.1.

**TABLE 4. Configuration Changes for QualNet 7.1**

Feature	Description
VERSION Parameter	The parameter VERSION, which was a required parameter in previous versions, is not required or supported.
HTTPD Application	An HTTP server (HTTPD) can now be explicitly configured in the GUI.
Global ATM Configuration	The ATM Configuration parameter group has been removed from the General tab of the Scenario Properties Editor. These ATM properties are configured at the node level.
LTE Measurement Parameters	The LTE Configuration parameter group has been removed from the General tab of the Scenario Properties Editor. The LTE measurement parameters are now configured at the subnet level.
Trace Parameters	When packet tracing is enabled for a layer in the GUI, all traceable protocols at that layer are displayed.

**TABLE 4. Configuration Changes for QualNet 7.1 (Continued)**

Feature	Description
Disabling Configuration Changes in GUI	If a scenario has parameter <code>GUI-CONFIG-LOCKED</code> set to <code>YES</code> , then the scenario can be opened and run using the GUI, but any changes made to the scenario in Architect's Design Mode can not be saved. (If the scenario is modified, it can be saved under a different name.)
<code>USER-STATUS-START-TIME</code> parameter for the User Behavior Model	The default value of this parameter has been changed to 10 seconds.
UMTS Call Application	The parameter to configure the UMTS Call Application has been changed from <code>PHONE-CALL</code> to <code>UMTS-CALL</code> .

Table 5 lists the bug fixes for QualNet 7.1.

**TABLE 5. Bug Fixes for QualNet 7.1**

Bug Fixes	Area Affected	Description
Architect Design Mode	GUI	<ul style="list-style-type: none"> <li>Fixed bugs in IP-addressing configuration for both IPv4 and IPv6.</li> <li>Fixed a bug such that weather component is correctly placed at mouse click location.</li> <li>Nodes can now be placed below the canvas if the node position file is changed manually.</li> </ul>
Architect Visualize Mode	GUI	<ul style="list-style-type: none"> <li>Fixed a bug such that when running a simulation for more than 24 hours, the real time clock does not reset itself back to zero every 24 hours.</li> <li>Fixed bugs related to rendering of foliage.</li> <li>Fixed a bug such that dynamic statistics for a model will be included in the list of dynamic statistics that can be selected for display in Visualize mode only if that model is enabled in the scenario.</li> </ul>
ARP Model	Developer Model Library	Fixed a bug in collecting interface level statistics.
802.11 PHY and MAC Models	Wireless Model Library	<ul style="list-style-type: none"> <li>Fixed a bug related to the cancellation of the CTS wait timer .</li> <li>The size of FCS in Short Control Frame has been correctly set to 4.</li> <li>If the listening channel mask is set to 11, then listening will start on first channel only as multiple channels are not supported in 802.11 PHY.</li> <li>Fixed a bug in ATIM window in 802.11 MAC.</li> </ul>
802.11e MAC Model	Wireless Model Library	Fixed a bug in the calculation of TXOP (Transmission opportunity).
Antenna Models	Wireless Model Library	Fixed a bug in the Antenna Model such that the correct antenna pattern is displayed in the GUI.
Abstract PHY Model	Wireless Model Library	Corrected the calculation of interference power in the Abstract PHY model.

**TABLE 5. Bug Fixes for QualNet 7.1 (Continued)**

Bug Fixes	Area Affected	Description
Multicast Protocols	Multimedia and Enterprise Model Library, Wireless Model Library	Fixed a bug such that the parameter MULTICAST-GROUP-FILE is read at global level for all multicast protocols.
VoIP Model	Multimedia and Enterprise Model Library	Fixed a bug in calculation of packetization interval in the VoIP model.
PIM-DM Model	Multimedia and Enterprise Model Library	Fixed a bug in the PIM-DM model in handling of loopback packets at multicast source.
ZigBee PHY and MAC Models	Sensor Networks Model Library	<ul style="list-style-type: none"> <li>Fixed a bug such that such that in 802.15.4 PHY, channel properties are initialized based on the listening channel and not the first channel.</li> <li>Fixed a bug in disassociation of nodes.</li> </ul>
LTE Models	LTE Model Library	<ul style="list-style-type: none"> <li>Fixed a bug in calculation of RA preamble reception power.</li> <li>Fixed a bug in calculation of Transmission power of RA. preamble when Random Access process is retried.</li> <li>Fixed a bug that NACK is not sent appropriately in RLC AM entity.</li> <li>Fixed a bug in packet error rate calculation.</li> <li>Fixed a bug in random access preamble transmission/reception power calculation.</li> <li>Fixed a bug in printing statistics related to handover.</li> </ul>
Scenario Statistics	Statistics DataBase	Fixed a bug to update promiscuous mode statistics in the statistics database.

Table 12 lists the known issues for QualNet 7.1.

**TABLE 6. Known Issues for QualNet 7.1**

Issue	Area	Description
Issues with Extractor	Federation Interfaces Library	If QualNet is recompiled using VC 9, Extractor will not work. In order to use Extractor, VC 10 must be used if QualNet is recompiled. (The pre-compiled executable included in the installation has been built using VC 10.)
Instability with some graphics cards	GUI	The GUI may exhibit instability when run on some editions of ATI video cards and versions of ATI drivers. If this is the case, it may be advisable to disable 3D acceleration in the operating system or switch to a system with a graphics card from another vendor.
Debugging on MPI platforms	Kernel	The debugging feature is not available for MPI platforms.



## 2 QualNet 6.1 Release Notes

This section lists release notes for QualNet 6.1 and are described in the following tables:

- [Table 7 - New Features for QualNet 6.1](#)
- [Table 8 - Updated and Enhanced Features for QualNet 6.1](#)
- [Table 9 - Features Removed from QualNet 6.1](#)
- [Table 10 - Features Changed in QualNet 6.1](#)
- [Table 11 - Bug Fixes for QualNet 6.1](#)
- [Table 12 - Known Issues for QualNet 6.1](#)

[Table 7](#) lists the new features in QualNet 6.1.

**TABLE 7. New Features for QualNet 6.1**

New Feature	Area Affected	Description
Socket Interface	Standard Interfaces	Added a new generic socket interface for driving the simulation. The major features are: <ul style="list-style-type: none"> <li>• Create and damage platforms</li> <li>• Platform mobility</li> <li>• Send communication</li> <li>• Logging</li> </ul>
Statistics Database	Scenario Statistics	In addition to the statistics file that is created when the simulation ends, scenario statistics are now also logged into a statistics database. Refer to <i>Statistics Database User's Guide</i> for details.
IEEE 802.11n Model	Wireless Model Library	IEEE 802.11n improves the effective throughput of end-user applications on 802.11 devices. The major implemented features are: <ul style="list-style-type: none"> <li>• Aggregate MSDU operation</li> <li>• Aggregate MPDU operation</li> <li>• Block ACK</li> <li>• Reduced Inter-Frame Space (RIFS)</li> </ul>
Inter-channel Interference Model	All PHY Models	The Inter-channel Interference model, has been added, which provides the capability to properly estimate both co-channel and inter-channel interference.
LTE Evolved Packet Core (EPC) Model	LTE Model Library	LTE Model Library has been enhanced. The major features implemented are: <ul style="list-style-type: none"> <li>• Mobility Support for UE</li> <li>• X2 Handover including "loss less" handover capability.</li> <li>• Basic MME/SGW models</li> </ul> <p>The LTE Model Library now supports UE, eNB, and MME/SGW nodes. It supports basic capabilities of the core network nodes.</p> <p>There is no support for HARQ.</p>

**TABLE 7. New Features for QualNet 6.1 (Continued)**

New Feature	Area Affected	Description
Guaranteed Time Slots (GTS) Support	Sensor Networks Model Library	GTS is a method of achieving QoS in the Zigbee MAC model which allows each device a specific duration of time in each superframe without contention or latency.
Finalization Status Dialog	GUI	A finalization status dialog box is added to show the current simulation status if statistics generation is taking more than 15 seconds. This dialog shows the current status of scenario finalization and remains active until the statistics file is generated.

Table 8 lists the updated and enhanced features in QualNet 6.1.

**TABLE 8. Updated and Enhanced Features for QualNet 6.1**

Updated/Enhanced Feature	Area Affected	Description
LTE MAC	LTE Model Library	The following features are now implemented in the LTE MAC model: <ul style="list-style-type: none"> <li>• Mobility support for UEs.</li> <li>• X2 handover including “loss-less” handovers.</li> <li>• Models for basic MME/SGW nodes.</li> </ul> HARQ is not supported.
Animation of Node/Interface Faults	GUI	When a scenario is run in Architect's Visualize mode, a symbols appear dynamically next to a node with one or more interface faults. A red circle with a diagonal indicates that all interfaces of the node have failed. An orange circle with a diagonal indicates that at least one of the interfaces of the node (but not all) has failed.
GUI Animation	GUI	Greatly improved the animation speed in the GUI.
Help Menu	GUI	The Documentation command in the GUI's Help menu has been replaced by two commands: <ul style="list-style-type: none"> <li>• Documentation HTML: Launches the product's web help in a browser.</li> <li>• Documentation Folder: Opens the folder where all documentation files (in PDF format) are located.</li> </ul>

Table 9 lists the features removed from QualNet 6.1.

**TABLE 9. Features Removed from QualNet 6.1**

Removed Feature	Area Affected	Description
ALE Call, ALE MAC, and ASAPS Propagation Models	ALE/ASAPS Advanced Propagation Model Library	The ALE/ASAPS Advanced Propagation Model Library is not supported in QualNet 6.1.
Rename and Upgrade Scenario Utilities	Kernel	The Rename and Upgrade Scenario utility programs are not supported in QualNet 6.1.

Table 9 lists the features changed in QualNet 6.1.

**TABLE 10. Features Changed in QualNet 6.1**

Changed Feature	Area Affected	Description
ANESAT and Satellite-RSV Models	Satellite Model Library	The Satellite Model Library is subject to ITAR restrictions and can only be purchased by authorized customers.

Table 11 lists bug fixes for QualNet 6.1.

**TABLE 11. Bug Fixes for QualNet 6.1**

Bug Fixes	Area Affected	Description
LTE Model	LTE Model Library	The following bug fixes apply to the LTE Model Library: <ul style="list-style-type: none"> <li>• Descriptions of some parameters on GUI are fixed.</li> <li>• Fixed a bug that LTE model crashes in a Linux environment.</li> <li>• Compiler warnings are fixed.</li> <li>• Existing sample scenarios are modified so that they can run with new LTE model features that were added this time.</li> </ul>
Architect	GUI	Fixed bugs in batch experiments, hierarchies, terrain loading, and channel configuration.
VOIP	Multimedia and Enterprise Model Library	Fixed a bug in printing of average jitter statistics.
802.16 MAC	Advanced Wireless Model Library	Fix done to drop an application flow if total rate is greater than 32 Mbps.
802.11 MAC	Wireless Model Library	Size of FCS in short control frames is fixed to conform to the RFC. Fixed bugs in Power Save mode.
IGMP	Developer Model Library	Corrected the behavior of the IGMP model when a node has multiple interfaces.
GUI Output Window	GUI	Limit of 2000 log messages added in GUI output window.
Architect	GUI	Fixed a bug that sometimes caused the value of NETWORK-PROTOCOL to not be saved properly in the scenario configuration (.config) file.

Table 12 lists the known issues for QualNet 6.1.

**TABLE 12. Known Issues for QualNet 6.1**

Issue	Area	Description
LTE Models are not backward-compatible	LTE Model Library	LTE scenarios created in the earlier versions of EXata/Cyber will need to be modified in order to use the latest LTE models.

**TABLE 12. Known Issues for QualNet 6.1 (Continued)**

<b>Issue</b>	<b>Area</b>	<b>Description</b>
Instability with some graphics cards	GUI	The GUI may exhibit instability when run on some editions of ATI video cards and versions of ATI drivers. If this is the case, it may be advisable to disable 3D acceleration in the operating system or switch to a system with a graphics card from another vendor.
Debugging on MPI platforms	Kernel	The debugging feature is not available for MPI platforms.

### 3 QualNet 5.2 Release Notes

This section lists release notes for QualNet 5.2 which are described in the following tables.

- [Table 13 - New Features for QualNet 5.2](#)
- [Table 14 - Bug Fixes for QualNet 5.2](#)
- [Table 15 - Known Issues for QualNet 5.2](#)

[Table 13](#) lists the new features in QualNet 5.2.

**TABLE 13. New Features for QualNet 5.2**

New Feature	Area Affected	Description
LTE Model	LTE Model Library	<p>A new library, LTE Model Library, has been added. The LTE Model Library models the basic framework of the 3GPP Long Term Evolution network. The major features implemented are:</p> <ul style="list-style-type: none"> <li>• Radio Resource Control</li> <li>• PDCP</li> <li>• RLC</li> <li>• MAC</li> <li>• ARQ and CQI</li> <li>• RR and PF scheduling models</li> <li>• OFDMA/SCFDMA PHY</li> <li>• MIMO model (Open Loop 2x2 MIMO, SFBC)</li> <li>• Channel model for MIMO</li> </ul> <p>The LTE Model Library just supports UE and eNodeB nodes and does not support the core network nodes. There is no support for mobility, handover, or HARQ.</p>
Web Help	Documentation	<p>In addition to PDF documents and context-sensitive help, browser-based help is also available. To access the browser-based documentation, go to Tools &gt; Documentation in the GUI.</p>

[Table 14](#) lists bug fixes for QualNet 5.2.

**TABLE 14. Bug Fixes for QualNet 5.2**

Bug Fixes	Area Affected	Description
DIS Interface	Standard Interfaces Model Library	<ul style="list-style-type: none"> <li>• Fixed a bug that caused the DIS interface to generate an error message if a hierarchy contains a subnet or another hierarchy.</li> <li>• Fixed a bug that caused the initial delay of packets to be equal to the initialization time.</li> </ul>
HLA Interface	Standard Interfaces Model Library	Fixed a bug that caused the initial delay of packets to be equal to the initialization time.
DTED	GUI	Fixed a bug that caused incorrect altitudes to be calculated and displayed for DTED terrain.
802.15.4 MAC	Sensor Networks Model Library	Acknowledgement packet format and wait for ACK timer have been modified to conform to the specifications.

**TABLE 14. Bug Fixes for QualNet 5.2 (Continued)**

Bug Fixes	Area Affected	Description
802.16 MAC	Advanced Wireless Model Library	<ul style="list-style-type: none"> <li>Fixed a bug to correct the inconsistent behavior of the protocol for fragmented and non-fragmented packets.</li> <li>Fixed a bug to properly fragment the first packet for a Subscriber Station when the packet size is greater than the available free space.</li> <li>Fixed a bug to correctly pass message info from the upper layers via 802.16 MAC for TCP-based applications.</li> </ul>
Urban Auto-Select Model	Urban Propagation Model Library	Updated the Auto-Select model to correctly use the URBAN_COST_WI_NLoS model instead of the Two-Ray model when the nodes do not have line of sight and neither of them is in a canyon.
Microwave Model	Wireless Model Library	Fixed the incorrect reading of configuration parameters LINK-TX-ANTENNA-POLARIZATION and LINK-RX-ANTENNA-POLARIZATION.

Table 15 lists the known issues for QualNet 5.2.

**TABLE 15. Known Issues for QualNet 5.2**

Issue	Area	Description
Instability with some graphics cards	GUI	The GUI may exhibit instability when run on some editions of ATI video cards and versions of ATI drivers. If this is the case, it may be advisable to disable 3D acceleration in the operating system or switch to a system with a graphics card from another vendor.

## 4 QualNet 5.1 Release Notes

This section lists release notes for QualNet 5.1 which are described in the following tables.

- [Table 16 - New Features for QualNet 5.1](#)
- [Table 17 - Updated and Enhanced Features for QualNet 5.1](#)
- [Table 18 - Removed Features for QualNet 5.1](#)
- [Table 19 - Bug Fixes for QualNet 5.1](#)
- [Table 20 - Configuration File Changes for QualNet 5.1](#)
- [Table 21 - API Changes for QualNet 5.1](#)
- [Table 22 - Known Issues for QualNet 5.1](#)

[Table 16](#) lists the new features in QualNet 5.1.

**TABLE 16. New Features for QualNet 5.1**

New Feature	Area Affected	Description
OSPFv2 Demand Circuit	Multimedia and Enterprise Model Library	Extended OSPFv2 to support Demand Circuits. Demand circuits refer to those network segments whose cost depends on either connect time and/or usage (expressed in terms of bytes or packets). Examples include ISDN circuits and X.25 SVCs.
OSPFv2 NSSA	Multimedia and Enterprise Model Library	Extended OSPFv2 to support not-so-stubby area (NSSA) feature. The NSSA feature is a non-proprietary extension of the existing stub area feature that allows the injection of external routes in a limited fashion into the stub area.
MDP Model	Developer Model Library	Implementation of the Multicast Dissemination Protocol (MDP).
Fixed Communications Model	Developer Model Library	Fixed Communications model has been added that models transmission of packets with a fixed delay and drop probability.
Automatic Generation of Default Routes for Links	Developer Model Library	Added a new parameter, LINK-GENERATE-AUTOMATIC-DEFAULT-ROUTE, that enables a default route to be added to the IP forwarding table for nodes connected by a link.
Satellite Models	Satellite Model Library	The satellite models have been enhanced to use separate QualNet channels for each of the satellite RF link (forward uplink, forward downlink, return uplink and return downlink). This allows separate propagation effects to be considered for each link. This change also allows the RSV satellite model to be used with STK/Connect in bent-pipe mode.
-version option	Kernel	A new way to retrieve the build and version information of the simulator. The format of the command is:  <b>qualnet -version</b>  This command will print out the version number, build number, build date, and effective QUALNET_HOME.
HITL Configuration File	Kernel	Human-In-The-Loop (HITL) commands can be simulated via an HITL configuration file which specifies the HITL commands and the time when each command is to take effect.

**TABLE 16. New Features for QualNet 5.1 (Continued)**

New Feature	Area Affected	Description
Generate statistics file when simulation is interrupted	Kernel	In earlier releases, a statistics file is generated only if the simulation runs for the configured simulation time (specified by parameter <code>SIMULATION-TIME</code> ). In this release, a statistics file is generated even when the simulation is terminated before the configured simulation time (for example, by typing Ctrl+C). The first two lines of the statistics file indicate the configured simulation time and the simulation time when the simulation actually ended. If the simulation is allowed to run for the configured simulation time, then these two entries are identical.
Installation of Acrobat	Installation	The Windows installer will check if Acrobat 9.0 or higher version is installed on the computer where QualNet 5.1 is installing. If not, it will install Acrobat 9.0 with user's permission.
Array Editor	GUI	An array editor is used to configure parameters with multiple instances (array parameters). This makes it both easier and faster to configure such parameters.
UMTS Toolbar	GUI	If the UMTS Model Library is activated by the license, a UMTS Toolbar is displayed in the Standard Toolset. The UMTS Toolbar contains icons for the pre-configured UMTS devices.
Satellite Devices	GUI	If the Satellite Model Library is activated by the license, icons for the pre-configured satellite devices are displayed in the Standard Toolset.
Documentation Portfolio	Documentation	A portfolio document is included in the installation. It includes all QualNet user documents. This allows users to search a keyword in all user documents at once.

Table 17 lists the updated and enhanced features in QualNet 5.1.

**TABLE 17. Updated and Enhanced Features for QualNet 5.1**

Updated/Enhanced Feature	Area Affected	Description
New OS Support	Kernel	Added support for Ubuntu 9.10, Windows 7, and MAC OS X 10.6 Snow Leopard.  Dropped support for VC8 and some old Linux distributions.  For a complete list of supported platforms, please refer to the QualNet 5.1 System Requirements.
802.3 MAC	Developer Model Library	Optimized the 802.3 MAC code to allow for larger parallel lookahead, resulting in faster runtime performance.
Antenna Model	Wireless Model Library	QA test. Made it easier to configure. Allow the configuration of patterned antennas in the main configuration file without using Antenna Model file.



TABLE 17. Updated and Enhanced Features for QualNet 5.1 (Continued)

Updated/Enhanced Feature	Area Affected	Description
BGP	Multimedia and Enterprise Model Library	Updated BGP to be RFC compliant.
ICMP	Developer Model Library	Updated ICMP to be RFC compliant.
OSPFv2	Multimedia and Enterprise Model Library	Updated OSPFv2 to be RFC compliant.
OSPFv2 Host Route	Multimedia and Enterprise Model Library	Updated OSPFv2 to support OSPFv2 routers with hosts attached.
SuperApplication	Developer Model Library	Updated to support more configuration parameters. Updated to support MDP
IGMP	Developer Model Library	Updated IGMP to be RFC compliant.
PIM-SM	Multimedia and Enterprise Model Library	Updated OSPFv2 to be RFC compliant.
PIM-DM	Multimedia and Enterprise Model Library	Updated OSPFv2 to be RFC compliant.
Terrain API	Kernel and Wireless Model Library	Rewrote the terrain API. Made it easy to use and extensible for new terrain format.
IP Fragmentation	Developer Model Library	The IP fragmentation is updated to support different IP fragmentation unit sizes for different interfaces.
AGI Interface	Developer Model Library	Updated to support animation in QualNet GUI, especially the node mobility.
Parallel Simulation	Kernel	Optimization of parallel kernel. Parallel performance for large numbers of CPUs on shared memory systems was optimized.
External Interface	Kernel	Updated to support for external interface threads. Each external interface can have one or more threads. These threads must use the "MT" versions of the Message API functions to allocate and schedule their events.
Link Animation	GUI	Corrected a missing feature from QualNet 4.x where a function call to GUI_SetEffect is allowed for setting colors of links added from later function calls to GUI_AddLink.
Super Application	Developer Model Library	Added end-to-end latency statistics for reliable (TCP) statistics.
Automatic Model Selection	Urban Propagation Model Library	Updated the auto-select feature for automatically selecting the most appropriate pathloss model. See section 2.1 of <i>Urban Propagation Model Library</i> for details.

**TABLE 17. Updated and Enhanced Features for QualNet 5.1 (Continued)**

Updated/Enhanced Feature	Area Affected	Description
Mobile IP	Wireless Model Library, Multimedia and Enterprise Model Library	The Mobile IP Model has been moved from Wireless Model Library to Multimedia and Enterprise Model Library.
Loading and Saving Scenarios	GUI	Loading and saving scenarios in the GUI is much faster now.

Table 18 lists the removed features in QualNet 5.1.

**TABLE 18. Removed Features for QualNet 5.1**

Removed Feature	Area Affected	Description
Network Security Models	Network Security Model Library	The Network Security Model Library is not supported in QualNet any more. These models are now part of the Cyber Model Library of EXata/Cyber.
SATTSM PHY Model	Satellite Model Library	The Satellite Technology Support Module Physical layer Model has been removed.
Pedestrian Mobility Model and Pedestrian Node Placement model	Wireless Model Library	The pedestrian node placement and pedestrian mobility model are removed.
Version.txt file	Kernel	Removed the QUALNET_HOME/Version.txt file. The version information is embedded into the binary executable now. One can use the following command to get the build information:  <code>qualnet -version</code>
Animation Filters	GUI	The Node Radio Range and Node Link filters have been removed from the Visualize mode of Architect.

Table 19 lists bug fixes for QualNet 5.1.

**TABLE 19. Bug Fixes for QualNet 5.1**

Bug Fixes	Area Affected	Description
802.11s	Wireless Model Library	Corrected an error that caused the beacon timer to be scheduled with a time that has already past, causing a crash.
802.15.4	Sensor Networks Model Library	<ul style="list-style-type: none"> <li>PHY properties are now set after checking the configuration for which channel to use. previously, channel 0 was used by default.</li> <li>Fixed the calculation of BER to conform with the specifications.</li> </ul>

TABLE 19. Bug Fixes for QualNet 5.1 (Continued)

Bug Fixes	Area Affected	Description
802.16	Advanced Wireless Model Library	<ul style="list-style-type: none"> <li>Fixed handling of RTG with respect to frame duration.</li> <li>The scheduling algorithm for DL-subframe was not in synchronization with the building of DL-subframe. This has been fixed.</li> </ul>
Switch	Multimedia and Enterprise Model Library	Fixed a bug where inapplicable parameters were being read for a switch.
AODV	Wireless Model Library	Corrected the Lifetime field initialization to correspond to the RFC.
AGI Interface	Developer Model Library	Corrected various API calls that were using phyIndex instead of interfaceIndex.
Bellman-Ford	Developer Model Library	Fixed a bug where the number of periodic update packets and the number of triggered update packets were being counted as one over all interfaces. Now they are counted separately for each interface.
HTTP	Developer Model Library	Fixed a bug that caused an error to be reported when packets from multiple HTTP sessions are interleaved.
PIM-SM	Multimedia and Enterprise Model Library	If PIM-SM-STATIC-NUMBER-OF-RP is set to 1, then PIM-SM-STATIC-RP-ADDRESS, PIM-SM-STATIC-RP-GROUP-RANGE and PIM-SM-STATIC-RP-PRIORITY are not required to be specified with an instance number.
PIM-SM and PIM-DM	Multimedia and Enterprise Model Library	Fixed a bug where some statistics parameters were not being initialized.
OSPFv2 Host Route Calculation	Multimedia and Enterprise Model Library	Fixed a bug where OSPFv2 routers were not calculating routes to their connected hosts.
Super Application TCP Close	Multimedia and Enterprise Model Library	Fixed a bug that caused SuperApplication to not close TCP connections at the end of a flow.
PIM-SM Control Packets Being Received on a PIM-DM Interface	Multimedia and Enterprise Model Library	When connected to an external router, it is possible to receive PIM-SM bootstrap packets from that router when configuration is only for PIM-DM. Handling for these PIM-SM packets has been added so that the packets are silently discarded instead of causing an error.
Weather Model	Wireless Model Library	Fixed a bug related to calculating the overlapped distance for 3D weather patterns.
TRACE	Developer Model Library	Fixed a bug where if TRACE-ALL is set to NO, the simulator does not read the layer level TRACE parameters.
IP	Developer Model Library	<ol style="list-style-type: none"> <li>IP fragment set packet length field in the IP header of the fragment as the length of original packet, instead of that of fragment. This is not correct per RFC.</li> <li>IP fragmentation does not properly handle virtual payload for subsequent fragments. It assumes either all real payload or all virtual payload, not mixed.</li> </ol>

TABLE 19. Bug Fixes for QualNet 5.1 (Continued)

Bug Fixes	Area Affected	Description
Pathloss Matrix Model	Wireless Model Library	The pathloss matrix is shared by multiple partitions in shared memory parallel simulation (non-MPI). However, its values are updated on the fly for each time point. Since different partitions have different simulation time, this will cause problems. It is fixed by moving the pathloss matrix to be per partition.
ATM	Developer Model Library	Added error check for the condition where an IP interface is trying to be created for an pure ATM switch.
CELLULAR	Cellular Model Library	The call to PhyCellularStartTransmittingSignal was put in a wrong #ifdef section.
MAC802.16	Advanced Wireless Model Library	<ol style="list-style-type: none"> <li>1. FTP throughput gets reduced due to corrupted packet in uplink transmission</li> <li>2. Fragments are not transmitted through ARQ blocks if ARQ is enabled</li> </ol>
MAC802.11	Wireless Model Library	Receiving isn't terminated at the event when channel listening is stopped
VoIP	Multimedia and Enterprise Model Library	VOIP cannot continue generating packets when generated random number is too small so that talk time becomes equal to packetization interval.
Terrain	Wireless Model Library	One potential memory issue in function getElevationArray() API. May access out of range when the number of samples to be taken is larger or equal to the maximum number of samples.
UMTS	UMTS Model Library	Change reading parameter PHY-UMTS-HSDPA-CAPABLE of NodeB and UE from RNC from node level to interface level (default interface) as GUI save PHY layer configuration at subnet or interface level
SuperApplication	Developer Model Library	Fixed a bug related to multicast support in SuperApplication. If there are multiple multicast sessions defined between same source and destination nodes, the client side and server side may mismatch each other.
Human-In-The-Loop (HITL) Interface	GUI	<ul style="list-style-type: none"> <li>• User-entered commands may cause receive buffer overflow or other error. This has been fixed.</li> <li>• Error-checking has been added to validate the user-entered commands.</li> <li>• Bug in the Deactiavte command has been fixed.</li> </ul>
GUI Usability and Robustness	GUI	Fixed several issues to improve the overall usability and robustness of the GUI.
Parallel Execution	Kernel	<ul style="list-style-type: none"> <li>• Fixed issues with new shared memory parallel code.</li> <li>• Fixed issues so that parallel execution works correctly on Windows 7.</li> <li>• Fixed issues that caused crashes when sending loose remote messages.</li> </ul>

Table 20 lists the configuration file changes for QualNet 5.1.

**TABLE 20. Configuration File Changes for QualNet 5.1**

Parameter	New/Updated	Description
IP-FRAGMENTATION-UNIT	Updated	This parameter is updated to support interface level configuration.
LINK-GENERATE-AUTOMATIC-DEFAULT-ROUTE	Added	Enables a default route to be added to the IP forwarding table for nodes connected by a link.
HITL-CONFIG-FILE	Added	Specifies the name of the Human-In-The-Loop (HITL) configuration file, which is used to simulate HITL commands.

Table 21 lists the API changes for QualNet 5.1.

**TABLE 21. API Changes for QualNet 5.1**

API	Updates/Changes	Description
Terrain APIs	Rewrote as C++ classes.	The terrain APIs are completely rewritten.

Table 22 lists the known issues for QualNet 5.1.

**TABLE 22. Known Issues for QualNet 5.1**

Issue	Area	Description
Instability with some graphics cards	GUI	The GUI may exhibit instability when run on some editions of ATI video cards and versions of ATI drivers. If this is the case, it may be advisable to disable 3D acceleration in the operating system or switch to a system with a graphics card from another vendor.

## 5 QualNet 5.0.2 Release Notes

This section lists release notes for QualNet 5.0.2 which are described in the following tables.

- [Table 23 - New Features for QualNet 5.0.2](#)
- [Table 24 - Updated and Enhanced Features for QualNet 5.0.2](#)
- [Table 25 - Bug Fixes for QualNet 5.0.2](#)

[Table 23](#) lists the new features in QualNet 5.0.2

**TABLE 23. New Features for QualNet 5.0.2**

New Feature	Area Affected	Description
AGI Interface	Developer Library	A new external interface is added for communicating with AGI's STK. This interface enables QualNet to use STK to model wireless signal propagation. It also uses STK to get antenna gain and node positions. To be able to use the AGI interface, STK 9.2 must be installed with the QualNet Interface module.
Wireless Propagation	Kernel	The wireless propagation kernel is updated to allow users to write a propagation module that calculates the effective received power at receiver nodes, bypassing the wireless propagation models. The API added to facilitate this is <code>PROP_CalculateRxPowerAndPropagationDelay()</code> in <code>QUALNET_HOME\libraries\wireless\src\propagation.cpp</code> .

[Table 24](#) lists the updated and enhanced features in QualNet 5.0.2.

**TABLE 24. Updated and Enhanced Features for QualNet 5.0.2**

Updated/Enhanced Feature	Area Affected	Description
Batch Experiment	GUI	The files associated with a batch experiment are stored in a sub-folder called BatchRun within the scenario folder. In QualNet 5.0.1 and earlier versions, these files were stored in the QualNet user preferences folder (e.g., <code>C:\Documents and Settings\&lt;username&gt;\.qualnetUserDir\qualnet_5_0\BatchRun</code> for Windows XP, <code>C:\Users\&lt;username&gt;\.qualnetUserDir\qualnet_5_0\BatchRun</code> for Windows Vista, and <code>~\.qualnetUserDir\qualnet_5_0\BatchRun</code> for Linux and Mac OS X).

Table 25 lists bug fixes for QualNet 5.0.2.

**TABLE 25. Bug Fixes for QualNet 5.0.2**

Bug Fixes	Area Affected	Description
IP	Developer Model Library, GUI	The following bugs are fixed: <ul style="list-style-type: none"> <li>The implementation of IP packet TTL decreasing functionality was not correct. This has been fixed.</li> <li>The maximum hold time for an IP fragment was not user configurable and used a non-standard value. A configuration file parameter IP-FRAGMENT-HOLD-TIME has been added to make this user configurable.</li> </ul>
ATM	GUI	In the GUI, some ATM parameters were configurable even if Adaptation Protocol was set to None. This has been fixed so that these parameters are dependent on Adaptation Protocol being set to AAL5.
ATM and H323/SIP	Developer Model Library, Multimedia Enterprise Model Library, GUI	Parameter SIGNALING-STATISTICS was used to configure statistics collection for both ATM and H323/SIP models. This has been replaced by two parameters: ATM-SIGNALING-STATISTICS for ATM and VOIP-SIGNALING-STATISTICS for H323/SIP.
Route Map	Multimedia Enterprise Model Library	Fixed a linked list handling bug.
Zigbee	Sensor Networks Model Library	Fixed a bug that causes failed CBR instantiation in a Zigbee network.
OSPFv2	Multimedia and Enterprise Model Library	Fixed a bug that causes OSPFv2 routes not getting populated in an ATM-IP network.
Message API	Kernel	Fixed a bug that incorrectly fetches the info field size.

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## 6 QualNet 5.0.1 Release Notes

This section lists release notes for QualNet 5.0.1 which are described in the following table.

[Table 26](#) lists the new features in QualNet 5.0.1.

**TABLE 26. New Features for QualNet 5.0.1**

New Feature	Area Affected	Description
License status	GUI and Kernel	Updated licensing code for node-locked and floating licenses, foreign language licenses, and some satellite models.



## 7 QualNet 5.0 Release Notes

This section lists release notes for QualNet 5.0 which are described in the following tables:

- [Table 27 - New Features for QualNet 5.0](#)
- [Table 28 - Updated and Enhanced Features for QualNet 5.0](#)
- [Table 29 - Removed Features for QualNet 5.0](#)
- [Table 30 - Bug Fixes for QualNet 5.0](#)
- [Table 31 - Configuration File Changes for QualNet 5.0](#)
- [Table 32 - QualNet API Changes for QualNet 5.0](#)
- [Table 33 - Known Issues for QualNet 5.0](#)

[Table 27](#) lists the new features in QualNet 5.0.

**TABLE 27. New Features for QualNet 5.0**

New Feature	Area Affected	Description
Support for new platforms	Kernel	Support has been added for many new platforms. For details, refer to <i>QualNet 5.0 Installation Guide</i> .
New installation packaging scheme	Installation	<p>In QualNet 5.0, significant changes have been made to the way model libraries are packaged in the installers. Most libraries are included in the base installer. Separate model library installers are not needed anymore. The base installer includes following libraries (including source code, scenarios and documentation):</p> <ul style="list-style-type: none"> <li>• Developer Library (including STK interface)</li> <li>• Multimedia and Enterprise Library</li> <li>• Wireless Library</li> <li>• Advanced Wireless Library</li> <li>• ALE/ASAPS Advanced Propagation Library</li> <li>• Cellular Library</li> <li>• Network Security Library</li> <li>• Satellite Library</li> <li>• Sensor Networks Library</li> <li>• TIREM Advanced Propagation Library</li> <li>• UMTS Library</li> <li>• Urban Propagation Library</li> <li>• Standard Interface Library (including both HLA and DIS)</li> </ul> <p><b>Note:</b> The Military Radios Model Library must be installed using a separate model library installer.</p> <p>However, in order to use a library, it must be enabled by the user's license. For details, refer to Appendix A of <i>QualNet 5.0 User's Guide</i></p>
Linux Installers	Installation	<p>QualNet 5.0 provides Linux installers which are binary executables. The Linux installer provides a GUI interface to guide the installation step by step.</p> <p>For details, refer to <i>QualNet 5.0 Installation Guide</i>.</p>

TABLE 27. New Features for QualNet 5.0 (Continued)

New Feature	Area Affected	Description
Precompiled Binary Executables	Installation	<p>All QualNet 5.0 base installation packages includes the precompiled binary executables (both simulator and GUI) of QualNet for all platforms supported by that installation package. The installer will setup the proper binary executable corresponding to the platform where it is installed during the installation procedure. The precompiled binary executables for platforms other than the one where the package is installed will be deleted after installation. Thus, if users move the installation folder to a different platform, they will need to rebuild the binary executable on that platform themselves. The Linux installer will setup the 32-bit binary executable (both simulator and GUI) for 32-bit Linux platforms and setup 64bit binary executable (both simulator and GUI) for 64-bit Linux platforms. However, Windows installer always setup the 32-bit binary executable for both 32-bit Windows and 64-bit Windows.</p> <p>The precompiled binary executable with following libraries enabled:</p> <ul style="list-style-type: none"> <li>• Developer Library (except STK interface)</li> <li>• Multimedia and Enterprise Library</li> <li>• Wireless Library</li> <li>• Advanced Wireless Library</li> <li>• Cellular Library</li> <li>• Network Security Library</li> <li>• Satellite Library</li> <li>• Sensor Networks Library</li> <li>• UMTS library</li> <li>• Urban Propagation Library</li> </ul> <p>“A library enabled in the binary executable” means users will be able to run scenarios using models belonging to that library with the precompiled binary executable without the need to rebuild QualNet. However, they will still need a valid license for that library.</p> <p>Following libraries are not enabled in the precompiled binary executable although the source files of these libraries are included and installed:</p> <ul style="list-style-type: none"> <li>• STK Interface (part of Developer Library)</li> <li>• ALE/ASAPS Advanced Propagation Library</li> <li>• TIREM Advanced Propagation Library</li> <li>• Standard Interface Library (including both HLA and DIS)</li> </ul>

TABLE 27. New Features for QualNet 5.0 (Continued)

New Feature	Area Affected	Description
Precompiled Binary Executables (cont.)	Installation	<p>These libraries are not enabled in the precompiled binary because they require third-party software to be installed. These third-party software are not provided by SNT. Users have to get/purchase them separately. Once users installed the required third-party software, they have to rebuild QualNet binary executable (only simulator) with the model library enabled themselves in order to simulate scenarios using models belonging to that library.</p> <p>Following library is not enabled in the precompiled binary executable and their source files are not included in the base installer. A separated model library installer is provided to qualified customers.</p> <ul style="list-style-type: none"> <li>• Military Radio Library</li> </ul> <p>Above information is for the QualNet simulator. QualNet GUI has support to all libraries. However, only model library with valid license will be available while designing scenarios in GUI.</p> <p>For details, refer to Appendix A of <i>QualNet 5.0 User's Guide</i>.</p>
New QT-based GUI	GUI	<p>New QT-based GUI is also a cross -platform interface as old Java based GUI, but has much better performance, since it's implemented in C++.</p> <p>For details, refer to <i>QualNet 5.0 User's Guide</i>.</p>
Modified Parameters Wizard	GUI	<p>The Modified Parameters dialog provides a running list of all modified simulation parameters applied to a scenario.</p> <p>For details, refer to Section 3.4.8 of <i>QualNet 5.0 User's Guide</i>.</p>
Dynamic Parameters	GUI	<p>Support for displaying values of dynamic parameters in a tabular format (in Watch Variables panel).</p> <p>For details, refer to Section 5.5.4 of <i>QualNet 5.0 User's Guide</i>.</p>
Dynamic Parameters	GUI	<p>Support for modifying dynamic parameters during the run time.</p> <p>For details, refer to Section 5.4.4.2 of <i>QualNet 5.0 User's Guide</i>.</p>
Configurable signal propagation speed	Wireless Model Library	<p>Previously, QualNet assumed that signal propagation speed is always the speed of light. Now, it allows users to specify the propagation speed for each wireless channel.</p> <p>For details, refer to Section 4.2.7 of <i>QualNet 5.0 User's Guide</i>.</p>
Support for ESRI shapefile	Wireless Model Library	<p>Incorporated ESRI shapefile support for urban terrain and foliage into wireless library. GUI support for these files is also available.</p> <p>For details, refer to Section 10.4 of <i>QualNet 5.0 Wireless Model Library</i>.</p>

**TABLE 27. New Features for QualNet 5.0 (Continued)**

New Feature	Area Affected	Description
shptoxml	Utility Tool	A utility tool called shptoxml is added into QUALNET_HOME/bin folder. This utility converts ESRI shapefiles into QualNet terrain format XML files. For details, refer to Appendix D of <i>QualNet 5.0 User's Guide</i> .
Print out license and library status at command-line	Kernel	In a command-line window, one can pass the option "-print_libraries" to the simulator executable to print out the license and status of each libraries. Example: qualnet.exe -print_libraries For details, refer to Appendix A of <i>QualNet 5.0 User's Guide</i> .
Scenario upgrade tool	Kernel	A utility tool called "upgrade_scenario" is added to QUALNET_HOME/bin folder. This tool is generated when you compile QualNet. It can be used to upgrade QualNet scenarios created by previous QualNet versions. For details, refer to Appendix D of <i>QualNet 5.0 User's Guide</i> .

Table 28 lists the updated and enhanced features in QualNet 5.0.

**TABLE 28. Updated and Enhanced Features for QualNet 5.0**

Updated/Enhanced Feature	Area Affected	Description
Propagation code	Kernel	Updated private propagation code to provide more information. A few APIs are changed to allow more parameter, which gives users a chance to implement more complicated propagation models without requiring access to QualNet's private code.
IP Optimization	Developer Model Library	Removed unnecessary duplicate/free message when delivering unicast packets.
Parallel switched ethernet, optimizations	Developer Model Library	Added parallel support for switched Ethernet. Also implemented a significant optimization for large subnets.
Animation	GUI	Animation of queues is improved.
Scenario creation	GUI	Scenario creation is supported in both 2D and 3D views.
Node Orientation Display	GUI	Added support for display Node Orientation on two different ways: Icon Orientation and Arrow Orientation.
Human-in-the-loop Interface	GUI	For the human-in-the-loop interface, the option to enable and disable nodes from the canvas is added to the right click menu.

**TABLE 28. Updated and Enhanced Features for QualNet 5.0 (Continued)**

Updated/Enhanced Feature	Area Affected	Description
Scenario Components and Parameters	GUI	Components of the scenario are displayed in a tabular form, instead of in a tree view of the old Java-based GUI (in Table View panel). Parameters are set in Properties Editors of the components, which can be accessed from the Table View panel or from the canvas. Parameters of components of the same type can be set to the same value in a Group Properties Editor. Global parameters are set in the Scenario Properties Editor.  Many parameters that could be set at the global level in the old Java-based GUI can no longer be set at the global level in the new GUI. These parameters can be set at the node, subnet, or interface levels.
Promiscuous mode in 802.15.4	Sensor Networks Model Library	Updated 802.15.4 to support Promiscuous mode.
Update the configuration of H323-GATEKEEPER and SIP-PROXYLIST; support node level configuration	Multimedia and Enterprise Model Library	Updated H323/SIP to support node level configuration of H323-GATEKEEPER and SIP-PROXYLIST; each client can have different a SIP-PROXY and H323 GATEKEEPER.
Support interface level configuration of OSPFv2 parameters	Multimedia and Enterprise Model Library	Updated OSPFv2 to support interface level configuration of OSPF parameters.
Support interface level configuration of OSPFv3 parameters	Multimedia and Enterprise Model Library	Updated OSPFv3 to support interface level configuration of OSPF parameters.
Support more levels of control for TRACE capability	Developer Model Library	Updated to support multiple levels of control for trace capability.
Urban file format	Wireless Model Library	A Foliage item can be created in the terrain file. This is equivalent in format to a Building tag.
Support more flexible configuration of pathloss matrix propagation model	Wireless Model Library	Updated to support more flexible configuration of pathloss matrix propagation model.

Table 29 lists the removed features in QualNet 5.0.

**TABLE 29. Removed Features for QualNet 5.0**

Removed Feature	Area Affected	Description
Some platforms are removed from the supported platforms	Kernel	Some old platforms are not supported any more. We have stopped supporting Solaris platform as well as Visual C++ 2003 and Visual C++ 2005 Express. For a complete list of QualNet 5.0 supported platforms, refer to <i>QualNet 5.0 Installation Guide</i> .
IPNE	IPNE	The IPNE addon library is removed. Users who need IPNE capabilities will need to switch to EXata.
3DVisualizer	GUI	The tool as a separated application was removed. All the capabilities of the tool are integrated into the new QT-based GUI.

**TABLE 29. Removed Features for QualNet 5.0**

Removed Feature	Area Affected	Description
Java based QualNet GUI	GUI	The old Java-based QualNet GUI is removed.
setqpath.exe	Utility Tool	This utility tool that was located in QUALNET_HOME/bin directory has been removed. It is broken and not very useful.

[Table 30](#) lists bug fixes for QualNet 5.0.

**TABLE 30. Bug Fixes for QualNet 5.0**

Bug Fixes	Area Affected	Description
Memory leak in Kernel	Kernel	<p>The following bugs have been fixed:</p> <ul style="list-style-type: none"> <li>Fixed a bug which causes QualNet to crash in a parallel simulation when the number of nodes is smaller than the number of partitions.</li> <li>Fixed a bug that causes QualNet to crash when invalid values are specified for the SIMULATION-TIME parameter. After the fix, QualNet will print out an error message then quit, instead of simply crashing.</li> <li>A small bug where some dynamically allocated memory is not freed during the initialization of the simulation.</li> <li>A minor memory leak in parallel code.</li> <li>A minor memory leak in CalendarQ scheduler. The CalendarQ scheduler was not freed at the end of simulation.</li> <li>Fixed minor bug in the info field code where re-used info fields do not have their size updated in some cases.</li> <li>Fixed a minor bug in MESSAGE_RemoveInfo. It will crash if the specified info field is not found.</li> <li>Fixed a small bug where the 'clean' target would fail on 64-bit Vista platforms.</li> </ul>
MAODV	Contributed Models	<p>Change the MAC protocol from Legacy 802.11 to MACDOT11.</p> <ul style="list-style-type: none"> <li>Fixed a bug that allows route pruning even when a repair request is proceeding.</li> </ul>

TABLE 30. Bug Fixes for QualNet 5.0 (Continued)

Bug Fixes	Area Affected	Description
SuperApp	Developer Model Library	<p>The following bugs have been fixed:</p> <ul style="list-style-type: none"> <li>Crash when its default interface address is different than the address specified. Updated the method to tell whether a node is a client.</li> <li>Fixed a memory leak occurring when DELIVERY-TYPE is RELIABLE.</li> <li>Fixed a bug during random seed generation process</li> <li>Update the jitter calculation to follow the RFC.</li> <li>Fixed a bug that handles TCP connection close event erroneously.</li> <li>Fixed a bug that causes packets not to be forwarded in certain chain scenario.</li> <li>Fixed a bug that misses checking CHAIN-ID at the forwarder in case of chained super-application.</li> </ul>
LINK	Developer Model Library	Fixed a bug which may cause the model to crash in some situations especially when on 64bit platforms. The model tries to use a info field without allocating it.
TrafficGen	Developer Model Library	Fixed a bug that causes Parameter dataLen and dataIntv not to be assigned when traffic generation probability is less than produced random number.
SATCOM	Developer Model Library	<p>The following bugs have been fixed:</p> <ul style="list-style-type: none"> <li>Fixed a bug that causes SATCOM protocol to be able to transmit 1 Mbps traffic on a 200 Kbps link.</li> <li>Fixed a bug that causes FAULT configuration does not work on satellite link.</li> </ul>
IPv4	Developer Model Library	<p>The following bugs have been fixed:</p> <ul style="list-style-type: none"> <li>Fixed a bug in IP to correctly set IP packet length for fragmentation.</li> <li>Fixed a bug to correctly update parameter originatingNodeid, instanceid, and naturalOrder while fragmentation.</li> </ul>
DualIP	Developer Model Library	Fixed a bug which may cause some DualIP scenarios to crash. The number of host bits of a virtual interface (of a tunnel) is set as 0. Due to this, it is returning the interface address of the virtual interface as the broadcast address on that interface. The bug has been fixed by returning 255.255.255.255 as broadcast address of the virtual interface.

TABLE 30. Bug Fixes for QualNet 5.0 (Continued)

Bug Fixes	Area Affected	Description
802.16	Advanced Wireless Model Library	<p>The following bugs have been fixed:</p> <ul style="list-style-type: none"> <li>Fixed a bug to update "TxPowerAdjst" when RSS received at BS from any SS is less than receive sensitivity.</li> <li>Fixed bug to set variable "isMgMsg" to TRUE if the message is received on basic CID while the ranging response is handled at SS.</li> <li>Fixed a bug causing scenario crash when precedence of FTP/Generic is set as 7.</li> <li>Fixed a bug causing scheduler queue size is not updated while the packet is shrunk.</li> <li>Fixed a bug to make MAC802.16 work with IPv6.</li> <li>Changed all calls to MESSAGE_InfoAlloc with info size as 0 to use MESSAGE_RemoveInfo. This is due to an API change. Previously, MESSAGE_InfoAlloc with info size as 0 means to remove the info. This is not supported anymore. One has to use MESSAGE_RemoveInfo.</li> <li>Fixed a bug that caused SS not able to register with BS if RANGING-TYPE was CDMA.</li> <li>Fixed a bug related to Idle mode in IPv6.</li> <li>Fixed a bug related to FTP throughput issues.</li> <li>Improved the Bandwidth allocation procedures in case of ertPs flows.</li> <li>Fixed bugs related to CDMA based Bandwidth request and initial ranging.</li> </ul>
Generic MAC	Wireless Model Library	<p>The following bugs have been fixed:</p> <ul style="list-style-type: none"> <li>Fixed a memory leak problem in some scenarios.</li> <li>Fixed a bug causing GenericMac to freeze in some scenarios.</li> <li>Fixed a bug leads to Sequence number mismatch in a lossy environment.</li> </ul>



TABLE 30. Bug Fixes for QualNet 5.0 (Continued)

Bug Fixes	Area Affected	Description
802.11	Wireless Model Library	<p>The following bugs have been fixed:</p> <ul style="list-style-type: none"> <li>Fixed a bug that causes an assertion error when a nodes calls function "MacDot11ManagementChangeToChannel()" during the transmission of a packet.</li> <li>Two calls to function "MacDot11StationhasMangementFrameToSend" in both if/else branches are reduced into one call.</li> <li>Fixed a bug parameter MAC-DOT11-SCAN-MAX-CHANNEL-TIME is not configurable by users</li> <li>Fixed a bug that causes a node that keeps sending RTS packets after the retransmission limit has exceeded.</li> <li>Fixed a bug that caused a station (that has missed beacon more than the set limit) to start new scanning only when it has a frame to send.</li> <li>Fixed multiple memory corruption bugs in 802.11 Model.</li> <li>Fixed a bug in 802.11 PS Mode Model Bug regarding an STA CCA before starting the transmission.</li> <li>Fixed a bug in 802.11 PS Mode Model regarding calculation of beaconExpirationTime.</li> <li>Fixed a bug in 802.11 PS Mode Model regarding calculation of beacontimeStamp.</li> <li>Fixed a bug in 802.11PS Mode Model that causes STA to receive more TIM beacons then expected.</li> <li>Fixed a bug to set MoreData Field at AP while transmitting a broadcast or unicast data for STA.</li> <li>Fixed a bug related to calculation of CFP End Time.</li> </ul>
TDMA	Wireless Model Library	Fixed a bug that scenarios using TDMA models will crash if the QualNet executable is compiled using Visual C++ 2008. The TDMA scenario crash only happens when running in parallel simulation.
AODV	Wireless Model Library	Fixed a bug that AODV buffer checking for pending packets is missing when a RREQ message is received at a node.
Weather model	Wireless Model Library	Fixed a bug in weather model that takes Z direction into consideration.
OLSR	Wireless Model Library	<p>Fixed the bugs in function OlsrForwardMessage().</p> <ul style="list-style-type: none"> <li>the count incremental is not right;</li> <li>OlsrSetDuplicateForward is not executed in some conditions</li> </ul>
MICROWAVE Link	Wireless Model Library	Fixed a bug which may cause MICROWAVE link to crash in parallel simulation.

TABLE 30. Bug Fixes for QualNet 5.0 (Continued)

Bug Fixes	Area Affected	Description
MobileIP	Wireless Model Library	<p>The following bugs have been fixed:</p> <ul style="list-style-type: none"> <li>Fixed Memory corruption in function MobileIPUpdateVisitorList by Updating Agent Advertisement timer timeout value with advMsgTimerVal interval and Resetting solicitation count of host interface structure.</li> <li>Fixed a bug which will cause the model to crash in parallel simulation if the agent node of a node is in different partition than the node itself</li> </ul>
802.15.4	Sensor Networks Model Library	<p>The following bugs have been fixed:</p> <ul style="list-style-type: none"> <li>Fixed a bug that function "Csma802_15_4CanProceed" may return incorrect CSMA status for a coordinator when BO &amp; SO are different and active periods of sending and receiving superframes are non-overlapping.</li> <li>Fixed a bug where function "convertMacAddrToVariableHWAddress()" uses junk values to set variable lastHopHWAddr</li> <li>Fixed a bug that in scenario with multiple coordinators, no data packets are received at the destination even after routes are established.</li> <li>Fixed a bug that function "Phy802_15_4getChannelNumber()" uses a wrong way to calculate channel number.</li> <li>Fixed a bug that state is not correctly checked before calling function Phy802_15_4SignalEndFromChannel(...) is called, and that the interference power is not correctly calculated.</li> <li>Fixed a bug that some variable is not properly reset in function Mac802_15_4mcps_data_request(...).</li> <li>Fixed a bug due to the wrong sequence of MAC cleanup and a remedy measure.</li> <li>Fixed a bug causing QualNet crash in a scenario.</li> <li>Fixed a bug causing CBR server not being able to be established in a scenario.</li> <li>Fixed a bug causing 802.15.4 to send two signals to PHY simultaneously</li> <li>Fixed a bug that use 8 as symbol length for all modulation schemes; after fix the value is set properly based on the modulation scheme.</li> <li>Fixed a bug of 802.15.4 non beacon PAN that causes crash in a user scenario.</li> </ul>

TABLE 30. Bug Fixes for QualNet 5.0 (Continued)

Bug Fixes	Area Affected	Description
VoIP	Multimedia and Enterprise Model Library	<p>The following bugs have been fixed:</p> <ul style="list-style-type: none"> <li>Fixed a bug to make the jitter calculation follow the RFC.</li> <li>Fixed a bug regarding the initialization of H323</li> <li>Scenarios using H323 models will crash if the QualNet executable is compiled using Visual C++ 2008. This bug has been fixed.</li> <li>Fixed a bug which may cause a second VoIP call unable to start if its start time is same as the end time of a previous VoIP call.</li> <li>Fixed a memory corruption bug in VoIP model.</li> </ul>
DiffServ	Multimedia and Enterprise Model Library	Fixed a bug causing a compilation error with debug option DIFFSERV_DEBUG_MARKER enabled.
OSPFv2	Multimedia and Enterprise Model Library	<p>Fixed a bug that put MaxAge LSA into neighbor's database summary list instead of neighbor's link state retransmission list.</p> <p>Fixed a bug that OSPFv2_ADVRT_SELF_INTF is replaced by OSPFv2-ADVRT-SELF-INTF.</p>
ALE/ASAPS	ALE/ASAPS Model Library	Fixed a bug causing ALE verification scenarios to crash.
UMTS	UMTS Model Library	Scenarios using UMTS models will crash if the QualNet executable is compiled using Visual C++ 2008. This bug has been fixed.
PIM-SM	Multimedia and Enterprise Model Library	<p>The following bugs have been fixed:</p> <ul style="list-style-type: none"> <li>In function RoutingPimSmHandleExpiryTimerExpiresEvent() grp addr was set to 0 which was incorrect</li> <li>In function "RoutingPimSmHandleDownstreamStateMachine(..)" source address passed in Prune pending timer when downstreamListPtr-&gt;joinPruneState == PimSM_JoinPrune_NoInfo was pim-&gt;interface[interfaceId].ipAddress instead of src address.</li> <li>Tree state "ROUTING_PIMSM_SGrpt" was not handled in following functions: <ul style="list-style-type: none"> <li>-RoutingPimSmHandleExpiryTimerExpiresEvent(..)</li> <li>-RoutingPimSmHandleJoinTimerExpiresEvent(..)</li> </ul> </li> <li>Condition for NULL "treeInfoBaseRowPtr" was not handled in function "RoutingPimSmSendJoinPrunePacket(..)"</li> <li>Fix added to correctly align structure "RoutingPimSmEncodedUnicastAddr".</li> <li>Fix added to support unnumbered interface in wireless environment.</li> </ul>

**TABLE 30. Bug Fixes for QualNet 5.0 (Continued)**

Bug Fixes	Area Affected	Description
PIM-SM (cont.)	Multimedia and Enterprise Model Library	<ul style="list-style-type: none"> <li>Fixed the bug to make fragment tag of 2 bytes and BSRPriority of 1 byte in Bootstrap message.</li> <li>Fixed bug to transmit Bootstrap packet periodically.</li> <li>Fixed the bug where the source should broadcast multicast packet to attached broadcast network in place of unicasting to DR.</li> <li>Fixed the bug where the number of Bootstrap Packet Forwarded was incremented even if the message was not forwarded.</li> <li>Fixed the bug if the source node is having multiple interfaces then packet should be broadcasted on all interfaces of node.</li> </ul>
PIM-DM	Multimedia and Enterprise Model Library	The upstream neighbor address in join/prune packet in PIM-DM was defined as "NodeAddress", but it should be defined as "Encoded Unicast Format".
Antenna Model	Wireless Model Library	Fixed a Bug for PATTERNED Antenna Type regarding calculation of azimuth of BoreSight Angle.
Abstract Cellular	Cellular Model Library	Fixed a memory leak bug in the Abstract Cellular Model.
GSM	Cellular Model Library	Fixed a memory corruption bug in the GSM Model.
ANODR	Network Security	Fixed a memory corruption bug in the ANODR Model.

Table 31 lists the configuration file changes for QualNet 5.0.

**TABLE 31. Configuration File Changes for QualNet 5.0**

Parameter	New/Updated	Description
PROPAGATION-SPEED Scope: Global Instance: ChannelIndex	New	This parameter can be used to specify the signal propagation speed on a specific wireless channel.
LINK-PROPAGATION-SPEED Scope: All Instance: No	New	This parameter can be used to specify the signal propagation speed on a wireless point-to-point link or microwave link.
Removed all .scn files	Remove	All .scn files located in the folder and subfolders of QUALNET_HOME/scenarios are deleted.

TABLE 31. Configuration File Changes for QualNet 5.0 (Continued)

Parameter	New/Updated	Description
Removed QUALNET_HOME/ scenarios/gui folder	Remove	<p>The folder and its subfolders QUALNET_HOME/scenarios/gui has been removed. Most of its sub-folders have been moved to proper model library folders. Detailed info is as below:</p> <ol style="list-style-type: none"> <li>1. Remove the scenarios/gui folder and all its subfolders.</li> <li>2. Add the following scenarios for ZigBee model: <ul style="list-style-type: none"> <li>* scenarios/sensor_networks/BattlefieldMonitoringwithSensors <b>Description:</b> Demonstrates data collection from ground sensors using mobile vehicles.</li> <li>* scenarios/sensor_networks/ZigBee-AutoHome Shows an application of ZigBee technology for Home Automation. It demonstrates the monitoring and control capability that can be achieved with ZigBee.</li> </ul> </li> <li>3. Added following scenarios for File Based Mobility Model: <ul style="list-style-type: none"> <li>* scenarios/developer/file-mobility/HighSpeedMobility <b>Description:</b> To show how to specify mobility using file based mobility model.</li> </ul> </li> <li>4. Added following scenarios for DEM terrain format: <ul style="list-style-type: none"> <li>* scenarios/wireless/terrain-dem/MobileScenario <b>Description:</b> To show the use of DEM terrain files.</li> </ul> </li> <li>5. Added following scenarios for QualNet Terrain Format model: <ul style="list-style-type: none"> <li>* scenarios/wireless/terrain-feature/UrbanEnv <b>Description:</b> To show how to use terrain files which are in QualNet terrain format.</li> </ul> </li> <li>6. Added following scenarios for Weather Model <ul style="list-style-type: none"> <li>* scenarios/wireless/weather/WeatherExample <b>Description:</b> To show how to configure the weather model.</li> </ul> </li> <li>7. Added following scenarios for DTED terrain model <ul style="list-style-type: none"> <li>* scenarios/wireless/terrain-dted/dtedtest <b>Description:</b> Demonstrate QualNet's support to DTED terrain files.</li> </ul> </li> <li>8. Added following scenarios for TCP model <ul style="list-style-type: none"> <li>* scenarios/developer/tcp/bottleneck-TCP <b>Description:</b> To show multiple TCP flows share the same bottleneck link.</li> </ul> </li> </ol>
OSPFv2_ADVRT_SELF_INTF	Replaced by OSPFv2-ADVRT-SELF-INTF	OSPFv2_ADVRT_SELF_INTF is changed to OSPFv2-ADVRT-SELF-INTF

**TABLE 31. Configuration File Changes for QualNet 5.0 (Continued)**

Parameter	New/Updated	Description
H323-GATEKEEPER	Changed	H323-GATEKEEPER configuration Change from H323-GATEKEEPER {nodeId1, nodeId2...,nodeIdn} To [nodeId1] H323-GATEKEEPER YES [nodeId2] H323-GATEKEEPER YES ..... [nodeIdn] H323-GATEKEEPER YES
SIP-PROXY	New	[proxyId1] SIP-PROXY YES [proxyId2] SIP-PROXY YES ..... [proxyIdn] SIP-PROXY YES
SIP-PROXYLIST	Removed	Replaced by SIP-PROXY
LINK16-GATEWAY-ENABLED LINK16-GATEWAY-STATISTICS LINK16-GATEWAY-FORWARD-CONFIG-FILE LINK16-STATISTICS	Changed	LINK-16-GATEWAY-ENABLED LINK-16-GATEWAY-STATISTICS LINK-16-GATEWAY-FORWARD-CONFIG-FILE LINK-16-STATISTICS

Table 32 lists the API changes for QualNet 5.0.

**TABLE 32. QualNet API Changes for QualNet 5.0**

API	Updates/Changes	Description
COORD_ChannelPropagationDelay	Replaced with new API PROP_CalculatePropagationDelay(...)	The COOR_ChannelPropagation() is replaced by a new API called PROP_CalculatePropagationDelay. The new API passes in more parameters which allow customized users code to calculate propagation delay based on channel, sender and receiver locations, simulation time etc.
COORD_CalcDistanceAndAngle	Removed one parameter	Originally, this function also calculate the propagation delay. However, since we want to pass in more parameters, it is not proper for function to calculate the propagation delay anymore. As the name suggested, this function is mainly for calculating the distance and angle. One should use the API PROP_CalculatePropagationDelay to calculate the propagation delay.
PARALLEL_SendRemoteLinkMessage	Updated the parameters.	Due to the change for configurable signal propagation speed, we need to pass in more parameters into this API to indicate the propagation speed.

TABLE 32. QualNet API Changes for QualNet 5.0 (Continued)

API	Updates/Changes	Description
struct PropRxInfo	Added some new fields	<p>Added four new fields that give the receiver more information. The four fields are:</p> <ul style="list-style-type: none"> <li>• double pathloss_dB;</li> <li>• float fading_dB;</li> <li>• double channelReal;</li> <li>• double channellmag;</li> </ul> <p>pathloss_dB stores the pathloss that the signal experienced from transmitter to this receiver.</p> <p>fading_dB stores the fading value that the signal experienced from transmitter to this receiver.</p> <p>channelReal and channellmag are added for bring some channel properties for cooperative communication models. They are not used in existing QualNet code. They are provided as placeholders for some customized propagation models.</p>
PROP_CalculateFading	Updated to pass in more parameters	<p>A few new parameters are added to this function. They are:</p> <ul style="list-style-type: none"> <li>• Message* signalMsg,</li> <li>• double* channelReal,</li> <li>• double* channellmag</li> </ul> <p>The "signalMsg" is passed in for customized code to access any info fields that this signal brings from the transmitter. Thus, customized radio models can add some customized info fields at the transmitter and then update this function to utilize them.</p> <p>channelReal and channellmag are passing for this function to return values. The returned values will be copied to the corresponding field of PropRxInfo structure associated with the signal. This gives the customized a chance to calculate and return the values for channelReal and channellmag.</p>
MESSAGE_InfoAlloc	Requires the info size to be larger than 0	<p>Previously, info size as 0 means to free the specified info field if it exists. This is not supported anymore. One needs to use MESSAGE_RemoveInfo instead. If you want to remove the default info field, use MESSAGE_RemoveInfo with info type as INFO_TYPE_DEFAULT.</p>

[Table 33](#) lists the known issues for QualNet 5.0.

**TABLE 33. Known Issues for QualNet 5.0**

<b>Issue</b>	<b>Area</b>	<b>Description</b>
GUI configuration of models in the Satellite Model Library	Satellite Model Library	The ANESAT, SATTSM-PHY, and Satellite-RSV models of the Satellite Model Library can not be configured from the GUI. They must be configured using the command line interface.
GUI configuration of models in the Military Radios Model Library	Military Radios Model Library	The Threaded App model of the Military Radios Model Library can not be configured from the GUI. It must be configured using the command line interface.



## 8 QualNet 4.5.1 Release Notes

This section lists release notes for QualNet 4.5.1 and are described in the following tables:

- [Table 34 - New Features for QualNet 4.5.1](#)
- [Table 35 - Updated and Enhanced Features for QualNet 4.5.1](#)
- [Table 36 - Bug Fixes for QualNet 4.5.1](#)
- [Table 37 - Known Protocol and Model Issues in QualNet 4.5.1](#)

[Table 34](#) lists the new features in QualNet 4.5.1.

**TABLE 34. New Features for QualNet 4.5.1**

New Feature	Area Affected	Description
UMTS	UMTS Model Library	<p>A new UMTS library is added. The UMTS library models the basic framework of the Universal Mobile Telecommunication System (UMTS) network. In addition, it also models High Speed Downlink Packet Access (HSDPA). The major protocols/procedures implemented are:</p> <ul style="list-style-type: none"> <li>• Call Control (CC)</li> <li>• Session Management (SM)</li> <li>• Mobility Management (MM)</li> <li>• GPRS Mobility Management (GMM)</li> <li>• Radio Resource Control (RRC)</li> <li>• RLC</li> <li>• MAC</li> <li>• WCDMA PHY</li> <li>• GPRS Tunneling Protocol (GTP)</li> </ul> <p>The UMTS model is capable of supporting both CS and PS traffic flows. A new application, Phone Call, is added to simulate CS-based voice phone calls.</p>

[Table 35](#) lists the updated and enhanced features that are part of QualNet 4.5.1.

**TABLE 35. Updated and Enhanced Features for QualNet 4.5.1**

<b>Updated/Enhanced Feature</b>	<b>Area Affected</b>	<b>Description</b>
802.11 MAC	Wireless Model Library	802.11 MAC has been updated to work with Abstract PHY.
Abstract PHY	Wireless Model Library	Abstract PHY has been updated to support 802.11 MAC.
Animator	GUI	Antenna pattern animation has been improved.
Animator	GUI	Error message display has been improved.
Scenario Designer	GUI	Loading of a scenario with a large number of interfaces has been improved.
Information Assurance/ Network Security Model Library	Information Assurance/ Network Security Model Library	This library has been renamed "Network Security Model Library".
Parallel Support	Kernel	The limit on number of partitions has been increased from 64 to 512.

Table 36 lists the bugs that have been fixed for QualNet 4.5.1.

**TABLE 36. Bug Fixes for QualNet 4.5.1**

Model/Feature	Area Affected	Description
802.11 MAC	Wireless Model Library	When MAC-PROPAGATION-DELAY is greater than the maximum value that can be represented by the duration field, the model crashes. It has been updated to detect such cases and truncate the value to the maximum representable value.
802.15.4 MAC	Sensor Networks Model Library	<p>The following bugs have been fixed:</p> <ul style="list-style-type: none"> <li>• The value of parameter “mac-&gt;isCoor” flag remains FALSE for coordinator in non-beacon network.</li> <li>• The flag “mpib.macRxOnWhenIdle” for coordinators is not set to TRUE.</li> <li>• Data rate is used everywhere instead of symbol rate.</li> <li>• Beacon Rx timer is not synchronized correctly.</li> <li>• Tx-Rx turnaround time is included in calculation of packet transmission duration.</li> <li>• The beacon Tx timer clock has a drift of 12 symbols.</li> <li>• No broadcast data are received after clock synchronization.</li> <li>• The node fails to associate if the entire association process cannot be performed in current superframe.</li> <li>• Data from the network layer is not dequeued if the device re-aligns itself with its coordinator after an orphan scan.</li> <li>• The coordinator uses indirect transmission to transmit frames to the PAN coordinator, instead of using direct transmission.</li> <li>• In non-beacon PAN, number of Acks sent is not counted correctly.</li> <li>• The configuration parameter “MAC-802.15.4-POLL-INTERVAL” of ZigBee model is not configurable for FED and coordinator.</li> </ul>
802.16 MAC	Advanced Wireless Model Library	<ul style="list-style-type: none"> <li>• If there is a data grant or unicast bandwidth request opportunity grant, contention-based bandwidth requests are cancelled. This bug has been fixed.</li> <li>• Unicast polling opportunities for rtPS and nrtPS flows are not generated correctly. This bug has been fixed.</li> </ul>
Abstract PHY	Wireless Model Library	<ul style="list-style-type: none"> <li>• The radio fails to reset the antenna to omni-directional mode after the last directional reception. Thus, it would use the last pattern for its next transmission, which may point in a wrong direction. The bug has been fixed by setting the antenna model to omni-directional mode before transmission.</li> <li>• The carrier sensing code has been updated to work with directional antennas.</li> </ul>
Angle Calculation	Kernel	The angle calculation LAT-LON coordinate system was not correct. This has been fixed.

**TABLE 36. Bug Fixes for QualNet 4.5.1 (Continued)**

Model/Feature	Area Affected	Description
Coordinates Calculation	Kernel	Utility functions have been added to coordinates/mobility code such that nodes use the shortest path between two waypoints in LAT-LON space, even if that means going outside the defined terrain area.  <b>Note:</b> This only affects waypoints that are more than 180 degrees apart.  The function that forces coordinates in the terrain area to consider the world as a sphere, not a plane, has been fixed.
Documentation	<i>QualNet 4.5 Wireless Model Library</i>	The Radio Energy Models section was missing configuration parameters for the Generic radio energy model. These have been added.
IGRP, EIGRP	Multimedia and Enterprise Model Library	IGRP and EIGRP may crash when running on top of virtual interfaces (i.e., the routing protocols are enabled for interfaces that have tunnels in Dual IP scenarios). This has been fixed.
Radio Models	Wireless Model Library	When an unrecognized radio model is configured, the simulator stops without any error message. It has been updated to print an error message.
Satellite RSV	Satellite Model Library	Reduced the default sensitivity by 30 dB since it is specified in dBm not dBW.
Scenario Designer	GUI	The display of a device icon when a new device uses the same icon as an existing device has been fixed.
Scenario Designer	GUN	The bug in creating inter-hierarchy links has been fixed.
Structure Definition	Kernel	In the file <code>Maine</code> , the definition of the structure <code>kneader</code> has been modified to contain the same members as the Linux structure <code>/usr/include/netinet/in.h</code> .

[Table 37](#) lists the known protocol and model issues for QualNet 4.5.1.

**TABLE 37. Known Protocol and Model Issues in QualNet 4.5.1**

Issue	Model Library	Description
Assert error in UMTS model	UMTS Model Library	Three large scenarios (> 500 nodes) have been found to terminate with assert errors.
Small memory leak in UMTS model	UMTS Model Library	A small memory leak (~ 20K) has been found in one large scenario (> 500 nodes).

## 9 QualNet 4.5 Release Notes

This section lists release notes for QualNet 4.5 and are described in the following tables:

- [Table 38 - New Features for QualNet 4.5](#)
- [Table 39 - Updated and Enhanced Features for QualNet 4.5](#)
- [Table 40 - Features Removed from QualNet 4.5](#)
- [Table 41 - Bug Fixes for QualNet 4.5](#)
- [Table 42 - Known Issues in QualNet 4.5](#)

[Table 38](#) lists the new features in QualNet 4.5.

**TABLE 38. New Features for QualNet 4.5**

New Feature	Model Library or Area Affected	Description
<b>GUI New Features</b>		
Cartesian Terrain Support	GUI	Allows the user to load and display terrain files in Cartesian terrain format in 3D Visualizer.
Host Name Display	GUI	Host name for a node can be displayed in the GUI.
Print Support	GUI	Enables the user to print the canvas.
Urban Terrain Support	GUI	Allows the user to load and display terrain files in Urban terrain format in 3D Visualizer.
<b>Kernel New Features</b>		
Default Event Scheduler	Kernel	A new event scheduler was added, giving approximately 10% performance boost over the previous event scheduler. The new scheduler is enabled by default, or by setting SCHEDULER-QUEUE-TYPE Calendar. Other options are SPLAYTREE and STDLIB.
Multithread Support	Kernel	To better support interfacing external programs to QualNet, thread-safe versions of the Message API have been added. These functions are identified by the optional isMT parameter on many functions. When accessed by an external thread, this parameter should be set to true.
<b>Model Library New Features</b>		
ANODR Secure Routing	Information Assurance/Network Security Model Library	The ANonymous On-Demand Routing (ANODR) model is designed to provide an anonymous and untraceable routing scheme for mobile ad-hoc networks.
Battery Model	Wireless Model Library	Accurately models the non-linear battery discharge rate and recovery effect during sleep mode. It can also accurately estimate the service life of a commercial battery.
Dead Reckoning	Standard Interfaces	Dead reckoning is a method whereby nodes continue to move along a given trajectory when moved by an external program through the HLA or DIS interface.

**TABLE 38. New Features for QualNet 4.5 (Continued)**

New Feature	Model Library or Area Affected	Description
Eavesdropper Model	Information Assurance/Network Security Model Library	An adversary model for passive threat. Eavesdroppers are able to intercept wireless traffic in the network.
Energy Model	Wireless Model Library	Measures the energy consumption of wireless radios. QualNet 4.5 has implemented two detailed models (MICA and MICAZ for sensor radios) and an abstract model for all other radios. The energy model reports energy consumption to the battery model, if it is enabled.
IEEE 802.11 WEP and 802.11i CCMP	Information Assurance/Network Security Model Library	Implements the security features for IEEE 802.11 MAC including WEP, which is defined in IEEE 802.11 specification, and CCMP which is defined in the IEEE 802.11i specification. They provide link level protection.
IEEE 802.11s MAC	Wireless Model Library	Models the multi-hop mesh networking extension to the IEEE 802.11 MAC defined in IEEE 802.11s specification. It can expand the coverage of the access points.
IEEE 802.15.4 (ZigBee) MAC and PHY	Sensor Networks Model Library	Models the MAC and PHY defined in the IEEE 802.15.4 specification. They can be used to model sensor networks and WPAN.
IP over MPLS	Multimedia and Enterprise Model Library	Implements the ability to inter-connect normal IP subnets with the MPLS backbone.
ISAKMP	Information Assurance/Network Security Model Library	Internet Security Association and Key Management Protocol (ISAKMP) defines procedures and packet formats to establish, negotiate, modify and delete a pair-wise secure connection that can be instantiated by other protocols like IPsec.
JTRS-WNW PHY	Military Radios Model Library	Joint Tactical Radio System-Wideband Networking Waveform (JTRS-WNW) is designed to deliver long-range high-bandwidth communication to WIN-T tactical mobile nodes. TDMA and TDMA-USAP will be used as the medium access protocol.
Link16 and IP Bridge	Military Radios Model Library	Implements the ability to connect IP networks and Link 16 networks. A Link16-IP gateway functions as an application layer proxy that connects Link 16 networks to IP networks.
Parallel Support	Developer, Standard Interfaces	Scenarios using DIS or HLA interface to other simulations can now be run using parallel QualNet. In QualNet 4.0 and earlier versions, SATCOM subnets required manual partitioning to ensure that all nodes were assigned to the same partition for parallel execution. Now SATCOM subnets can be split onto multiple partitions, and can therefore benefit from parallel execution.

TABLE 38. New Features for QualNet 4.5 (Continued)

New Feature	Model Library or Area Affected	Description
Secure Neighbor Model	Information Assurance/Network Security Model Library	The Secure Neighbor models authentication of neighboring nodes. Every mobile node authenticates its neighbors on the move. After secure neighbor authentication, network traffic to or from unauthenticated neighbors can be blocked, according to the security policies.
Suburban Model	Urban Propagation Advanced Propagation	The Suburban propagation model supports foliage. See <i>QualNet 4.5 Urban Propagation Advanced Propagation Model Library</i> for more information about the model's usage.
USAP MAC	Military Radios Model Library	Unifying Slot Assignment Protocol (USAP) is a multiple-access protocol that is widely used in military packet radio networks such as the Soldier Phone. USAP is basically a TDMA based MAC protocol capable of efficiently utilizing multiple channels.
Wormhole Attacker	Information Assurance/Network Security Model Library	This is an adversary model for active threat. Wormhole attacker tunnels messages received in one location in the network over a low-latency high-bandwidth link and replays them in a different location.
WTLS Certificate	Information Assurance/Network Security Model Library	Wireless Transport Layer Security (WTLS) certificate is one type of certificate used by security-related protocols.

Table 39 lists the updated and enhanced features that are part of QualNet 4.5.

**TABLE 39. Updated and Enhanced Features for QualNet 4.5**

Updated/Enhanced Feature	Model Library or Area Affected	Description
<b>GUI Update or Enhancement</b>		
Antenna Pattern	GUI	Antenna Pattern animation improved.
Background Image	GUI	Display is improved.
Colors in background, links, and broadcast	GUI	Colors improved.
Dynamic Statistic Display	GUI	Display is improved.
IPv6 Addressing	GUI	Changed from TLA - NLA to proper format.
Terrain	GUI	Terrain rendering and positioning of nodes on terrain surface improved.
<b>Model Library Update or Enhancement</b>		
Abstract Cellular Model	Cellular Model Library	Improved the runtime performance. Performed QA test.
Abstract PHY	Wireless Model Library	Updated to support directional antenna.
ARP	Developer Model Library	Enhanced the ARP model to work with most MAC protocols including wireless MAC protocols. Changed major MAC protocols to use 48-bit 802 MAC addresses.
DiffServ	Multimedia and Enterprise Model Library	Updated to support IPv6.
Dual IP	Developer Model Library	Enhanced the capability to support both IPv4 and IPv6 at the interface level. Enhanced the tunnel capability. Updated most routing protocols to work over tunnels.
DYMO	Wireless Model Library	Updated to conform to the latest IETF draft.
IEEE 802.11 MAC (MAC DOT 11)	Wireless Model Library	Updated to include all features supported by legacy 802.11 MAC (MAC802.11). Major new features include PCF, Directional Antenna support, support to ARP, and IPv6 support. It has also been enhanced to support BSS management procedures.
IEEE 802.16 MAC and PHY	Advanced Wireless Model Library	Added more features including PDU packing/unpacking, fragmentation/reassembly and CRC, ARQ, CDMA-based ranging and bandwidth request, admission control, Sleep Model, Idle mode and paging.
IPSec transport mode	Developer Model Library	Models the transport mode of IPSec. Transport mode provides endpoint-to-endpoint protection, which is suitable for mobile wireless networks.
Link 16 MAC	Military Radios Model Library	Added following features: 1) Contention access modes; 2) Multiple nets; and 3) Dynamic packet packing schemes.
OLSRv2	Wireless Model Library	Updated to support multiple interfaces, and attached networks. Upgraded to conform to the latest IETF draft.



**TABLE 39. Updated and Enhanced Features for QualNet 4.5 (Continued)**

Updated/Enhanced Feature	Model Library or Area Affected	Description
OSPFv2	Multimedia and Enterprise Model Library	Stands for Open Shortest Path First protocol. Updated OSPFv2 routing to support IP unnumbered interfaces, which are widely used in networks. It enables IP processing on a point-to-point interface without an explicit IP address.
Packet Trace	Several model libraries	Added packet tracing capability for more protocols: IPv6 (including NDP), ICMP, ICMPv6, OLSR-INRIA, OSPFv3, AODV, DYMO, RIPng, BELLMANFORD, MOSPF, CBR, FTP/GENERIC, TRAFFIC-GEN, and SuperApplication.
Removal of Bit Fields	All model libraries	Updated the header definitions of many protocols to eliminate bit fields.
RTP	Multimedia and Enterprise Model Library	Decoupled from the VoIP model. Updated to support IPv6.
Satellite Models	Satellite Model Library	Made the following improvements to satellite models: <ul style="list-style-type: none"> <li>• Cleaned SAT TSM model. Deleted non-necessary parts. Refined it to a PHY model for SAT RSV MAC.</li> <li>• Re-organized SAT RSV PHY to follow QualNet PHY architecture.</li> <li>• Added multiple channel support to SAT RSV MAC.</li> <li>• Added downlink traffic conditioning for SAT ANE.</li> <li>• Fixed GUI configuration issues.</li> </ul>
TrafficGen traffic generator	Developer Model Library	Updated to support IPv6.

Table 40 lists features removed from QualNet 4.5.

**TABLE 40. Features Removed from QualNet 4.5**

Feature Removed	Model Library or Area Affected	Description
EPLRS	Military Radios Model Library	The Enhanced Position Location Reporting System model has been removed from QualNet 4.5. Please contact our sales office for more information about how to get this model.
Legacy 802.11 MAC (MAC802.11)	Wireless Model Library	This model is removed. All its features are supported by 802.11 MAC (MACDOT11).

Table 41 lists features removed from QualNet 4.5.

**TABLE 41. Bug Fixes for QualNet 4.5**

Model/Feature	Area Affected	Description
Antenna Model	Wireless Model Library	<ul style="list-style-type: none"> <li>The bore-sight angle value of antenna was set to the angle of maximum gain incorrectly. Bore-sight angle is set to 0 when ANTENNA-PATTERN-TYPE is TRADITIONAL. The global antenna model is indexed using pattern name. If two antenna models have the same pattern name, only one model is created, even if their azimuth files are different.</li> <li>The default elevation resolution in QualNet should be "360" and not 180. It should be in the range of -180 to 180, not -90 to 90.</li> </ul>
BGP	Multimedia and Enterprise Model Library	BGP has an assert check to make sure the received item from TCP is larger than BGP_MIN_HDR_LEN. This is wrong as TCP is stream based. It doesn't guarantee the boundary of application payloads and could pass up data in any size.
Detailed Switch	Multimedia and Enterprise Model Library	The priority of the packet may be wrongly reset under some conditions. Now, it only resets when necessary.
DYMO	Wireless Model Library	The implementation failed to check whether a route is invalid in the DYMO routing table before sending the packet through the route.
Fading Model	Wireless Model Library	PROPAGATION-FADING-MAX-VELOCITY should be read per channel. It is only required for the channel that has a fading model.
Generic MAC	Wireless Model Library	Memset function uses an incorrect value for the size parameter when called to initialize a data structure.
Group Mobility Model	Wireless Model Library	When initially placing nodes, we didn't check whether the node exists or whether it is configured with group mobility. A check is added now. Nodes that don't exist or are not configured with group mobility will be skipped.
GSM	Cellular Model Library	For the GSM layer3 model, the rand_disc field of the Channel Request message (size 1 byte) should be set with a randomly generated number modulo 256. Previously, node Id was used.
IEEE 802.3 MAC	Developer Model Library	The MAC_RunTimeStat function was calling Mac802_3_Finalize, which was causing the simulator to crash when runtime statistics were enabled.

TABLE 41. Bug Fixes for QualNet 4.5 (Continued)

Model/Feature	Area Affected	Description
IEEE 802.11 MAC	Wireless Model Library	<ul style="list-style-type: none"> <li>Failed to cancel some timers which may cause certain scenarios to abort.</li> <li>While waiting for data if the DOT11_WF_DATA timer expires, the state should be set to idle before going to fetch another packet in the function.</li> <li>Due to the inconsistent configuration between the parameter MAC-DOT11-STA-CHANNEL and PHY-LISTENING-CHANNEL-MASK, initial channel remains in listening mode after channel switch.</li> <li>In structure "DOT11_ChannellInfo" an array "channellist" size 14 was declared. Due to this, the maximum number of channels that can be configured in a scenario was limited to 14. There was no safety check if a user configures more than 14 channels in the scenario. Now, the limit has been increased to 96 and an assert message is displayed if user configures more than 96 channels.</li> <li>Fixed a warning in MACDOT11 about the use of an uninitialized variable.</li> <li>First listenable channel was getting scanned twice before being associated with an AP. Therefore, STA was taking more time in association. STA was not getting switched to the AP channel, when best AP was found.</li> </ul>
IEEE 802.11e MAC	Wireless Model Library	<ul style="list-style-type: none"> <li>While increasing CW, in EDCA mode of MAC DOT11 protocol, it should use the previous value of CW for the current AC. Instead, it is using the CW of the node.</li> <li>This bug causes MAC802.11e to retry RTS infinitely if CTS is not received, hence preventing users from sending any further data.</li> <li>HCCA code has its lower priority set to 4. It is defined as a MACRO. However, many places still use the number 4 instead of the MACRO, which make adjusting of the value difficult.</li> </ul>
IP	Developer Model Library	<ul style="list-style-type: none"> <li>Fixed a bug that prevents statistics being collected in IPv4 when a multicast packet is dropped in the function RouteThePacketUsing-MulticastForwardingTable.</li> <li>Fixed compilation errors and warnings caused by uncommenting the macro D_LISTENING_ENABLE in dynamic.h. Fixed a compilation warning in dynamic_vars.h.</li> </ul>
Kernel	Kernel	Added better error message if there is an error while creating the temp files for statistics or trace.
MCBR	Developer Model Library	Updated MCBR to accept TOS/DSCP/PRECEDENCE field for setting the priority of its packets similar to other applications such as CBR.

TABLE 41. Bug Fixes for QualNet 4.5 (Continued)

Model/Feature	Area Affected	Description
Microwave Link	Wireless Model Library	While configuring asymmetric frequencies for TX and RX for a microwave link at link level, what GUI writes into the .config file is wrong. It writes the same TX and RX frequencies for both end nodes. The correct configuration is that the TX frequency of one end node should be the RX frequency of the other end node and vice versa. The configuration of TX and RX frequencies is only available at interface level now.
MPLS	Multimedia and Enterprise Model Library	MPLS didn't send out certain messages such as label request messages immediately. There was a long delay for setup the label switched path (LSP), which causes the TCP connection setup to fail. MPLS has been updated to send out such message immediately
Node Placement	Developer Model Library	For file based node placement, we added a sanity check to print an error message when the movement from one waypoint to the next one is too fast, resulting movement interval is less than 1 NS.
ODMRP	Wireless Model Library	On-demand Multicast Routing protocol piggybacks data packets in the join query packet. This may cause out of order delivery as the join query packet is a control packet which may be processed earlier before previous packets still in queue. We fixed this by defining a macro to allow users to disable piggyback.
OSPFv2	Multimedia and Enterprise Model Library	When OSPFv2 receives multiple hello packets with the same router ID but different IP addresses (i.e. from different interfaces of the same node) it is not handled properly.
Radio Range Utility	Kernel	The radio_range utility tool crashes if the scenario refers to external BER files.
SuperApplication	Developer Model Library	<ul style="list-style-type: none"> <li>While parsing the SuperApplication configuration, the application name was not read. Hence, in the stat, the application name was blank even when it was mentioned in the configuration.</li> <li>Scenarios crash when configuring SuperApplication with Trigger and Chained features.</li> <li>Situations where more than 1 chain is defined for the same pair of nodes are not handled correctly. The intermediate node gets confused about the chain ID</li> </ul>
TCP	Developer Model Library	When a TCP receiver receives a packet containing a data segment that was already received earlier, it discards the data segment but processes the ACK. These ACKs also get counted as duplicate ACKs. Statistics should only display the number of duplicate data packets. The number of these packets should be subtracted from the count of duplicate acks.
Urban Propagation	Advanced Propagation Model Library - Urban	Fixed a memory leak bug in the Urban Propagation model,
User Behavior Model	Cellular Model Library	Fixed several bugs during the QA test together with the abstract cellular model.

Table 42 lists known issues in QualNet 4.5.

**TABLE 42. Known Issues in QualNet 4.5**

Issue	Area Affected	Description
Import Feature	GUI	Scenarios with .scn files are known to work with the GUI. Other scenarios can be run in the GUI (by using right-click > Run scenario) but it may not be possible to import a scenario into the GUI (by using right-click > IMport scenario). Import is a beta feature.
Differences in statistics on different platforms	All Model Libraries	Different platforms may have different rounding rules for floating point calculations. In very rare cases, a small difference in SNR or BER values may cause PHY models to drop or accept a packet which may cause differences in simulation results.
Differences in statistics between sequential and parallel simulations	All Model Libraries	A few test cases give different results for parallel simulation and sequential simulation. In some rare cases, the order of some events (for the same node with same type and same expiration time) may be different in sequential simulation and in parallel simulation, which may cause different simulation results.
Pedestrian mobility model may give different statistics for sequential and distributed parallel simulations	Wireless Model Library	The scenario "QUALNET_HOME/scenarios/cellular/AbstractCellular/UBEE/MultipleTrafficPatternFiles" will give different statistics under sequential simulation and distributed parallel simulation.
VoIP application may stop generating traffic in a lossy environment	Multimedia and Enterprise Model Library	VoIP application puts a special tag in the last packet of a talk spurt to indicate the end of a talking period of one end. If such a packet gets lost, the other end may not know the end of talking period. It will not start talking which cause the traffic flow to stop generating packets.
One 802.11s stress test scenario aborts on the Mac platform	Wireless Model Library	One stress test scenario of the 802.11 model causes an assert error on the Mac platform.
Results of the Satellite ANE MAC may not be repeatable when the model running in distributed mode	Satellite Model Library	The Satellite ANE MAC has two modes: centralized mode and distributed mode. When it is running in the distributed mode, its results may vary in different runs due to the order in which the OS schedules multiple threads. This is a trade off for faster simulation speed and results repeatability. However, the results are still valid and reasonable. If you want to repeat the exact same results in multiple runs, please configure the Satellite ANE MAC to operate in the centralized mode.

