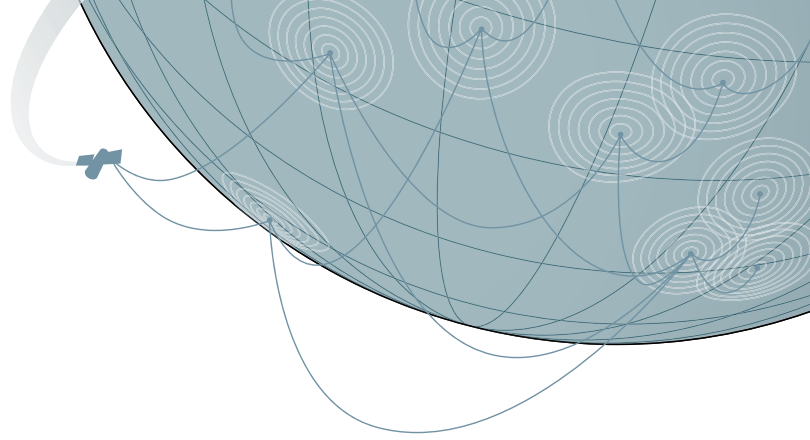


# QualNet<sup>®</sup>

## UMTS Library



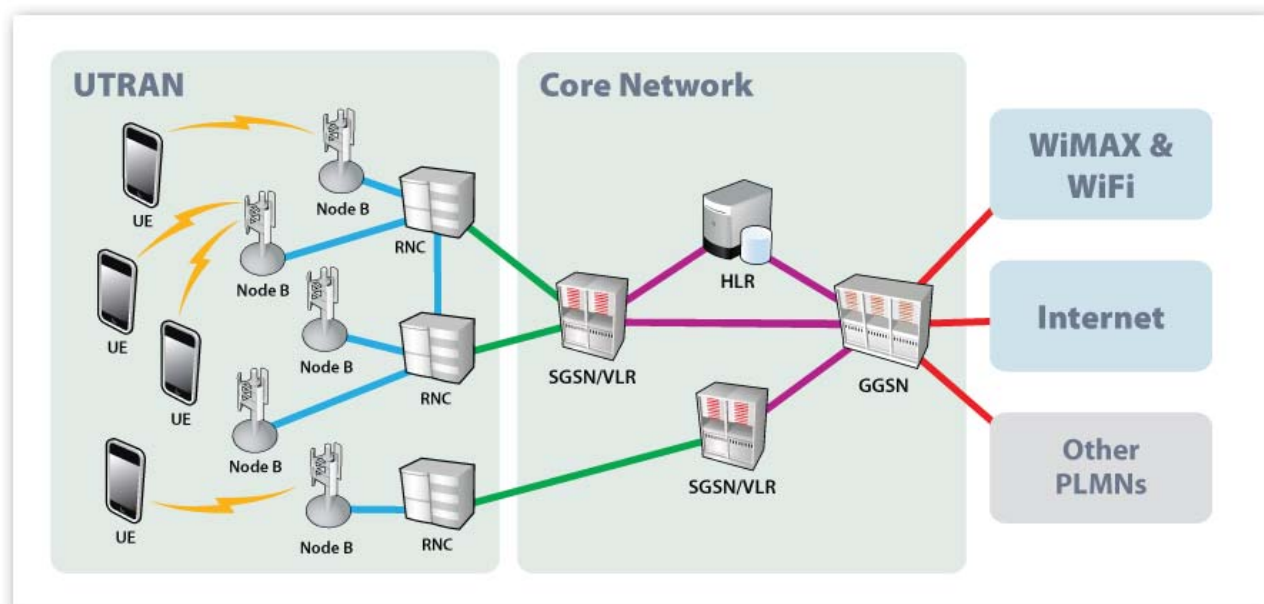
UMTS is a third-generation (3G) cellular technology that provides digital voice and high-speed data access to mobile users. The UMTS Library of QualNet is based on 3GPP Release 7 standards. It includes a detailed simulation model of the WCDMA air interface and end-to-end models of the UMTS protocol stack, including support for HSDPA.

The UMTS Library and QualNet together provide detailed simulation models of the radio and core network, radio propagation (pathloss, fading, shadowing), mobility effects, co-channel interferences, and application traffic. This enables estimation of application behavior and analysis of network performance under different settings of protocol stack parameters, air interface conditions, terrain and mobility. Users can evaluate the performance of various applications such as voice calls, streaming video, VoIP, web browsing and FTP over a UMTS network by monitoring the network's key performance indicators (KPI's).

Users of the UMTS Library can take advantage of the vast range of QualNet models from other libraries such as Wireless, Advanced Wireless (WiMAX) and Urban Propagation to build more complex networks that operate in urban terrain channel conditions.

### Key Features

- WCDMA PHY, HSDPA
- Models for UE, RNC, SGSN/VLR, GGSN and HLR
- Call Control (CC)
- Session Management (SM)
- Mobility Management (MM)
- GPRS Mobility Management (GMM)
- Radio Resource Control (RRC)
- Radio Link Control (RLC)
- MAC and GPRS Tunneling Protocol (GTP)
- Circuit Switched (CS) Voice Call
- Packet Switched (PS) Applications
- 3GPP Release 7



Example UMTS Network Topology that can be modeled in QualNet.

## Capabilities

The QualNet UMTS Library enables wireless network operators and network equipment manufacturers to proactively address the challenges of wireless networks by quickly and accurately identifying problems. This makes troubleshooting complex networks faster and more efficient than before. Capabilities with the UMTS Library include:

- Prediction and optimization of application performance,
- Analysis and optimization of network performance under varying conditions of mobility, traffic, QoS and protocol stack parameters,
- Simulation of realistic end-to-end UMTS network scenarios, and
- Flexibility to add vendor- and operator-proprietary algorithms and services.

The QualNet UMTS Library enables what if analysis for:

- Network upgrades and expansions,
- Changes in air interface and protocol stack configurations, and
- Additional users and new applications.

## Advantages

The UMTS Library leverages the speed, scalability and high fidelity of QualNet's simulation engine to enable faster time-to-market for UMTS devices and networks. The included C/C++ source code for the entire UMTS protocol stack enables researchers, operators and equipment vendors to customize algorithms and protocols. Customers can evaluate the impact of adding mobile users, increasing application traffic, and changing air interface configuration parameters in a safe and repeatable simulation environment at extremely low cost.

Because QualNet models all layers of the ISO network stack, users are able to model and control the entire UMTS protocol stack, on both the user and

## UMTS Statistics Generated

- Layer 3 for UE, Node B, RNC, SGSN, GGSN and HLR
- WCDMA and PDU, SDU statistics for Layer 2 (Node B and UE) (Node B and UE)
- TCP, UDP and Applications including bandwidth, retransmissions, latency and jitter
- Dynamic/Run-Time Charts for Key Performance Indicators (KPI's)
  - Transmission Power
  - CPICH RSCP
  - CPICH Ec/No
  - CPICH BER
  - Downlink and Uplink Throughput

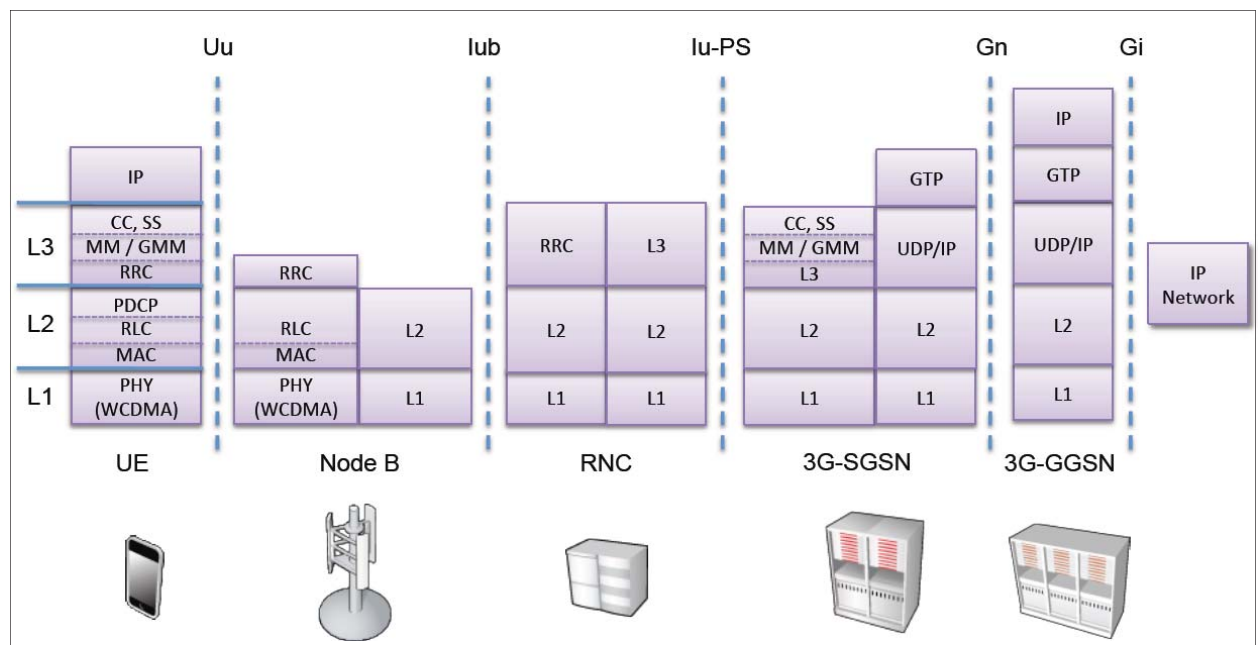
control plane level. Like all QualNet libraries, the UMTS Library includes full source code in C/C++ for development of proprietary algorithms and services.

## How to Buy

**The UMTS Library** is available for QualNet Developer 4.5 as a free-standing model library. Other model libraries that may complement the UMTS Library include:

- Wireless Library, for 802.11, MANET and terrain effects (included with QualNet Developer),
- Advanced Wireless Library for 802.16 and 802.16e, and
- Cellular Library.

For a free, 30-day evaluation of the UMTS Library visit our website at <http://www.scalable-networks.com>.



UMTS protocol stack and interfaces in QualNet.