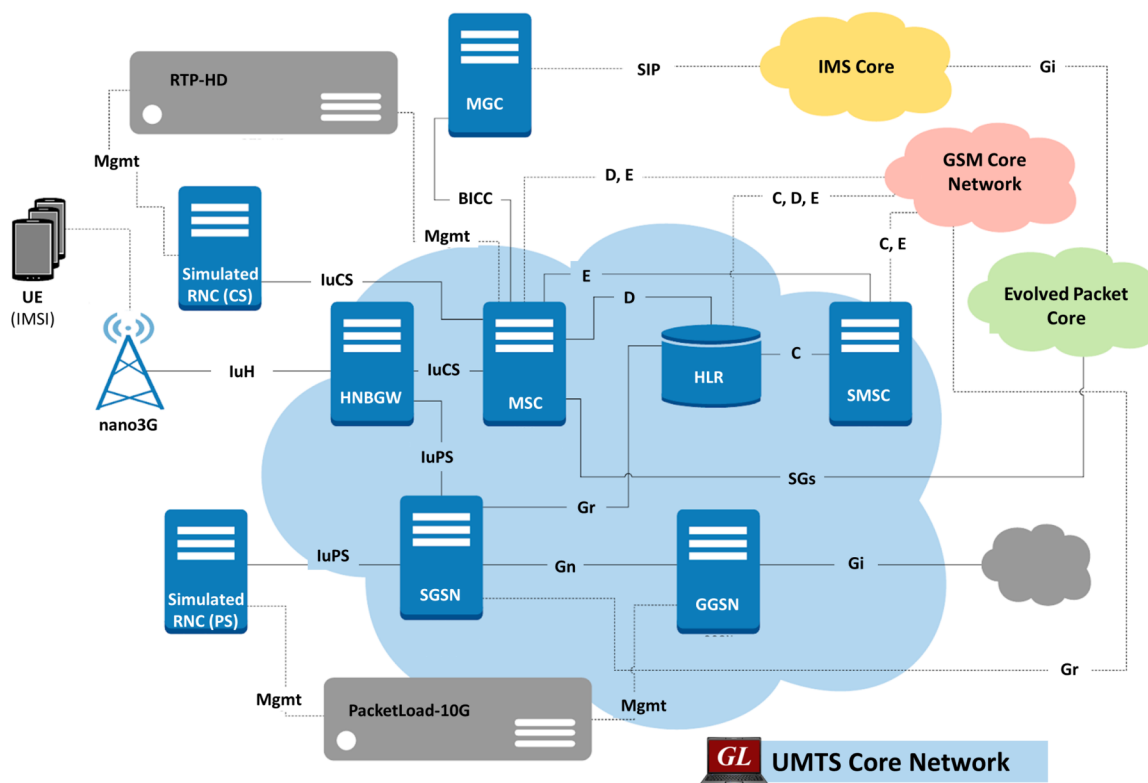


# 3G UMTS Wireless Network Lab Simulation



## Overview

GL Communications has enhanced its MAPS™ protocol emulation tool to simulate multi-protocol and multi-interface offering a complete range of test solutions, covering the entire 2G, 3G, and 4G network.

By mimicking real-world customer behavior in lab environments, our solutions allow mobile operators and equipment manufacturers to verify their wireless networks before deployment. In other words, one can setup a virtual real-time network simulating all the network elements using "MAPS™ 3G Wireless Lab Suite". The test suite supports simulation of LuH, LuCS, LuPS, C/D/Gr/Gd, and GnGp interfaces.

In addition, with MAPS™ HD RTP appliance you can generate high call intensity (hundreds of calls/sec) and high volume Voice and SMS calls (thousands of simultaneous calls/platform).

MAPS™ supports automated stress/load testing capabilities through Load Generation and Bulk Call Simulation features. To perform Bulk Call Generation, several UE/Subscriber configuration files are required. The UE/Subscriber configuration files can be created using regular Profile Editors (XML Based), using CSV based profiles, or using Auto Generation feature for simulating inter-networking calls, roaming calls, data sessions, and bulk GTP traffic generation.

Complete 3G UMTS lab simulation can be realized using GL's Remote MAPS™ feature, a client server module, designed for multi-node multi-interface simulation from a single GUI. The application has the ability to remotely control multiple MAPS™ Servers running on different PCs from a single remote client application.

For more details on 3G UMTS Wireless Lab Network Simulation, refer to [3G UMTS Communications Network Lab](#).



**GL Communications Inc.**

818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A

(Web) [www.gl.com](http://www.gl.com) - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) [info@gl.com](mailto:info@gl.com)

## Features

### Supported Procedures

#### Mobile Originated Call

- Channel request
- Authentication, ciphering, validation
- Call setup request
- Allocating dedicated voice channel over air interface

#### Mobile Terminated Call (MTC)

- Paging
- Identity & authentication, ciphering
- Location update
- Call setup request
- Allocating dedicated voice channel over air interface

#### Web Browsing Procedure

- Attach Procedures
- Identify Procedures
- Routing Area Procedures
- PDP Context Creation, Activation, Update, Deactivation, and Deletion Procedures
- Web Browsing Session
- Detach Procedures

#### Mobile Traffic and Web Access Procedures

- Attach procedures
- Identity procedures
- Routing Area procedures
- PDP Context Creation, Activation, Updation, Deactivation, and Deletion procedures
- Web Browsing GPRS Session
- Detach procedures

#### Traffic Types

- Voice/SMS calls using regular RTP core (low density)
- High Volume Voice/SMS calls using MAPS™ HD RTP core (high density)
- Supplementary IN Services
- Internet connectivity (HTTP)
- High density (up to 4 Gbps or 40 Gbps) mobile data traffic using MAPS™ PacketLoad™
- All Industry Standard Codecs

### Supported Call Scenarios

#### Voice, SMS

- Real-mobile <-> Real-mobile
- Simulated UE <->Real-mobile
- Simulated UE <->Simulated UE
- Real-mobile <-> Real-Mobile
- Bulk voice traffic simulation using [MAPS™ RTP HD](#)

#### Web Browsing

- Real-mobile
- Simulated UE
- Bulk mobile traffic simulation using [PacketLoad](#)

#### Inter-network Calls and Roaming Calls

- 2G user calling 3G user/4G user
- 3G user calling 2G user/4G user
- 4G user calling 3G user/2G user
- 2G user sending SMS to 3G user
- 3G user sending SMS to 2G user
- 4G user calling 3G user via CSFB
- 2G user calling 3G/4G roaming user
- 3G user calling 2G /4G roaming user
- 4G user calling 3G/2G roaming user

#### Interfaces

- 3G Interfaces
- Circuit Switched – luCS, luH
- Packet-switched - Gc, Gr, Gf, Gd, luPS, Gn Gp, Gi
- MAP Interfaces – B, C, D, E, F, H
- Inter-network Interfaces – BICC, CAP, INAP
- Location Services - Lg, Lh

#### Nodes

NodeB, HNB, HNBGW, RNC, MSC, SGSN, GGSN

### 3G CNL SYSTEM w/ Real Home NodeB

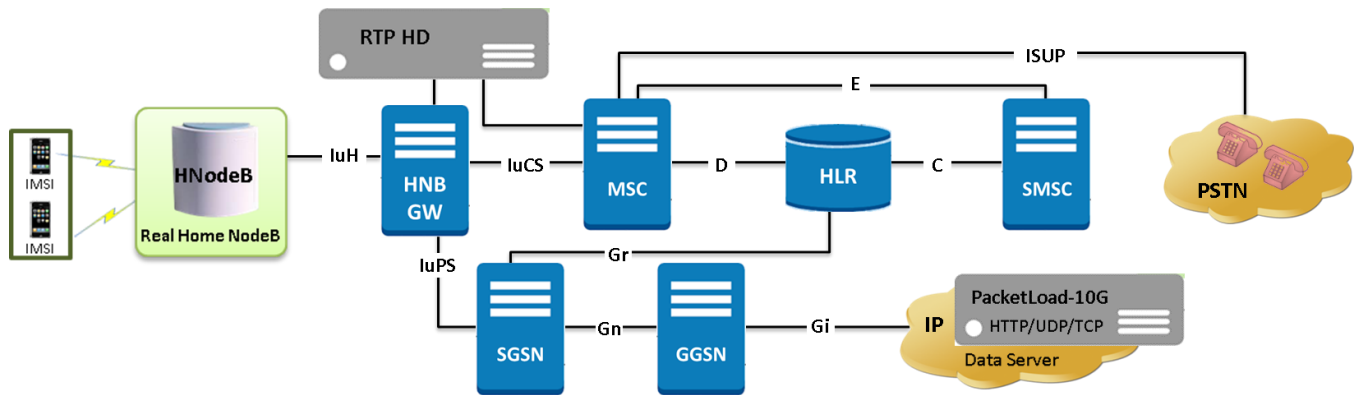


Figure: Complete 3G CNL with Real Home NodeB

The above lab setup is realized using the real-time User Equipment (with 2 registered SIMs) and the real HNB Node to generate the Voice/SMS traffic in CS network and HTTP (Web Access Emulation) traffic generation in PS network.

Supported procedures in CS and PS network -

- Mobile-to-Mobile Voice & SMS call
- Mobile Traffic and Web Access procedures

### 3G CNL SYSTEM w/ Simulated Home NodeB

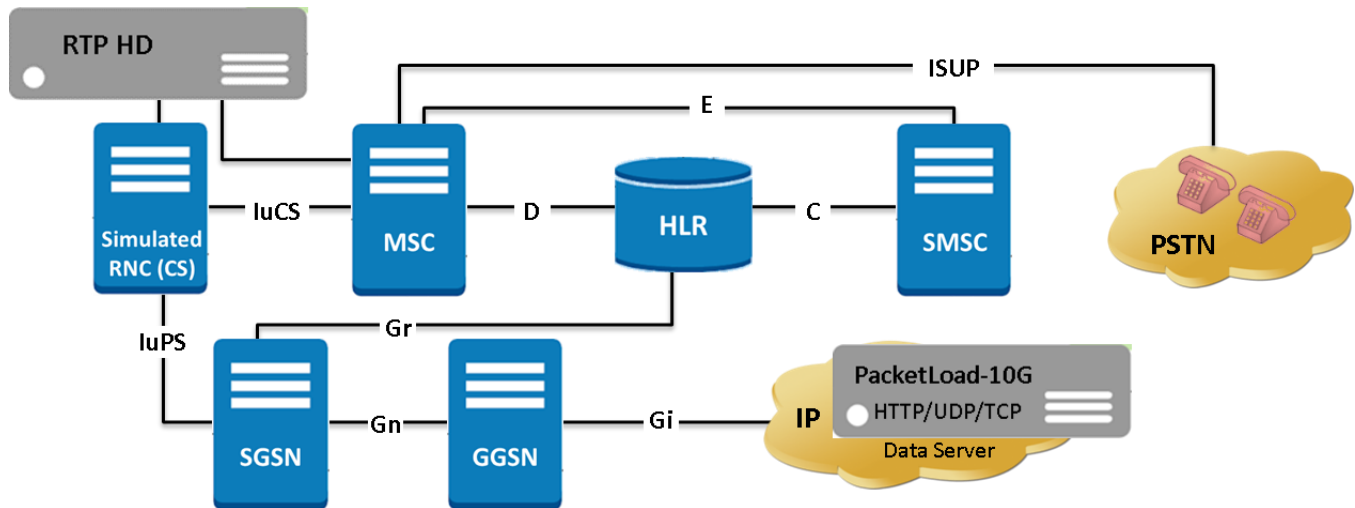


Figure: Complete 2G CNL with Simulated Home NodeB

The above lab setup is realized using the MAPS™ application to simulate both the User Equipment and the HNB node functionalities generating the Voice/SMS traffic in CS network and HTTP (Web Access Emulation) traffic generation in PS network.

Supported procedures in CS and PS network -

- Mobile-to-Mobile Voice and SMS call
- Mobile Traffic and Web Access procedures

## High Density RTP Traffic Simulation



GL's [MAPS™ HD](#) (PKS109) is a High Density 1U network appliance with integrated HD NIC (w/ 4x 1 GigE) that is capable of high call intensity (hundreds of calls/sec) and high volume of sustained calls (tens of thousands of simultaneous calls/1U platform) for a vast array of communication protocols covering IP and Wireless networks. MAPS™ HD network appliance is designed to easily achieve up to 20,000 endpoints per appliance (5000 per port).

The network appliance provides a modular and flexible solution to generate real voice calls using industry standard voice codecs such as G.711 A/μ-law, G.722, G.722.2 (AMR-WB), G.722.1, G.726, G.729A/B, GSM (EFR, FR and HR), AMR (Narrowband and Wideband), EVRC, EVRCB, EVRC-C, iLBC, Speex, SpeexWB, RFC 2833, and user-defined codecs for voice and tones.

### RTP Traffic Simulation:

- Create, manage RTP sessions and generate and receive RTP traffic over the sessions with complete automation capability
- Simulation of RTP Traffic such as Voice, Digits, Tones, IVR and Impairments
- Automate the IVR testing process (call establishment and traffic generation / detection) process through scripts
- Supports all standard Voice Codecs.

### SMS Traffic Simulation:

- Ability to push / pull Short Messages over the network as if sent by thousands of mobile phones (Short Message Mobile Originated (SMS-MO)). MAPS™ can also transmit a Short Message to a mobile phone (Short Message Mobile Terminated (SMS-MT)).

## High Density Mobile Traffic Simulation



**Figure: MAPS™ Server with PacketLoad 10G Appliance**

GL's MAPS™ Server with PacketLoad appliance provides high density (up to 40Gbps) stateful TCP/HTTP, UDP, and PCAP Replay traffic simulation solution over UMTS (SGSN, GGSN, RNC), and LTE (SGW, PDNGW) networks.

PacketLoad is a 1U/2U network appliance that includes 4 x 1/10 GigE ports supporting total capacity of up to 40 Gbps and also includes 2 Ethernet management ports.

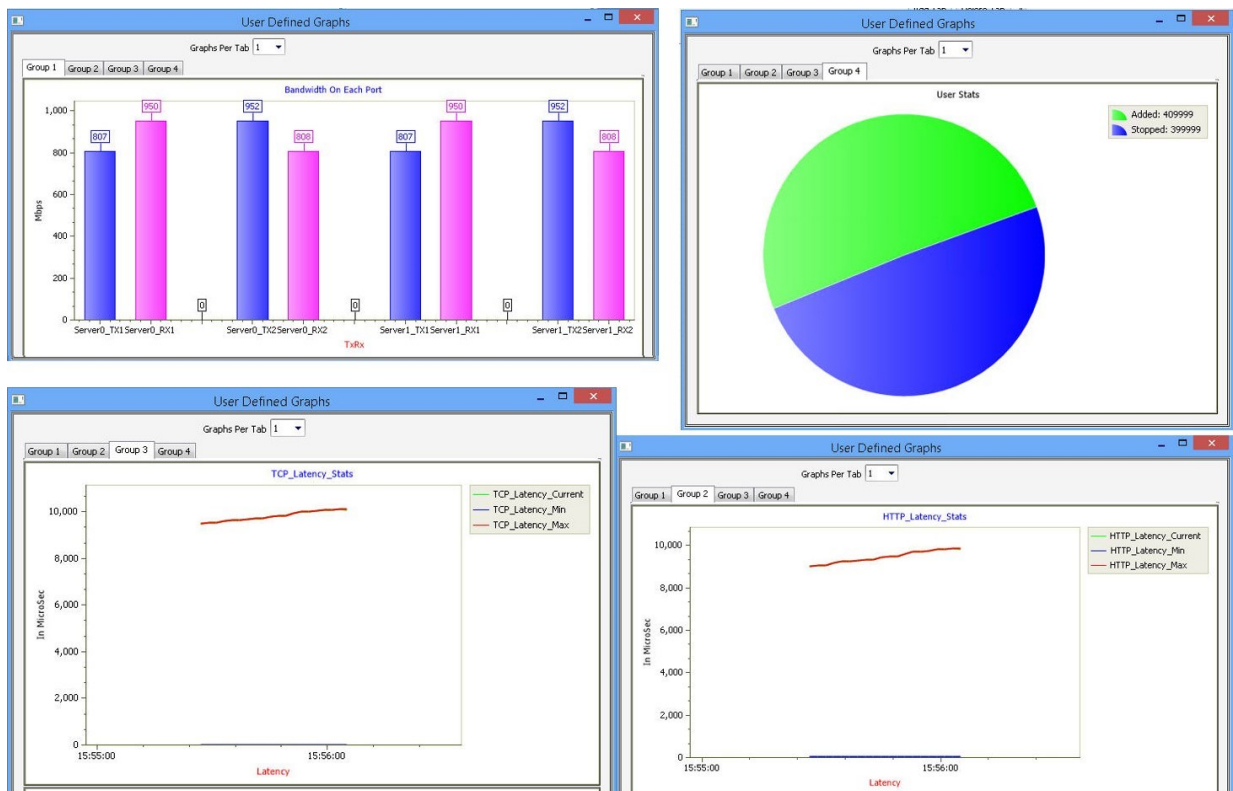
The solution allows to encapsulate the generated packet data within GTP headers and transmit through the gateway points such as SGSN & GGSN, or SGW & PGW. It allows simultaneous simulation of multiple sessions per user to verify bearer allocation bandwidth at the end points.

### Mobile Traffic Simulation –UMTS IuPS, GnGp:

GL's MAPS™ Server with PacketLoad appliance supports massive simulation of UEs (up to 500000) with high density mobile data traffic simulation for both UMTS, and LTE networks.

Generate and verify user mobile data (Email, Web-HTTP, and FTP), gateway traffic, and packet traffic over (GTPv1 and GTPv2) IuPS and GnGp network interfaces.

Call Graph uses the results from statistics to plot graphically the Bandwidth on each port, HTTP\_latency, TCP\_Latency, and UE related statistics in form Bar/Line/Pie charts.



## Protocol Stack Specification

MM CC RR SMS SS	MM CC RR SMS SS	SM GMM SMS
RANAP	RANAP	RANAP
RUA	SCCP	SCCP
HNABP	M3UA	M3UA
SCTP	SCTP	SCTP
IP	IP	IP
luH	luCS	luPS

MAP		INAP	BSSAP
TCAP		TCAP	
SCCP		ISUP	
M3UA	MTP3	GTP	MTP Level 3
	M2PA	UDP	
SCTP		IP	MTP Level 2
IP		L2	MTP Level 1
C, D, E, Gr, Gd		PHY	
	Gn Gp		SS7

## Buyer's Guide

Item No	Product Description
<a href="#">BTS001</a>	Real BTS Mobile Phones SIMs (Optional)
<a href="#">PKS160</a>	MAPS™ UMTS IuCS /IuH Emulator
<a href="#">PKS109</a>	MAPS™ High-Density Call Generator for IP & Wireless Networks
<a href="#">PKS102</a>	RTP Soft Core for RTP Traffic Generation
<a href="#">PKS164</a>	MAPS™ UMTS IuPS interface
<a href="#">PKS166</a>	MAPS™ UMTS Gn Gp Emulator
<a href="#">PKS166</a>	MAPS™ UMTS Gn Gp Interface Emulation
<a href="#">XX694</a>	MAPS™ MAP Emulator
<a href="#">XX696</a>	MAPS™ CAP Emulator
<a href="#">XX656</a>	MAPS™ INAP Emulator
<a href="#">PKS131</a>	MAPS™ Gb Emulator over IP for BSC & SGSN
<a href="#">PKS172</a>	PacketLoad™ 4 x 1Gig, Data Traffic Generator
<a href="#">PKS174</a>	PacketLoad™ 4 x 10Gig, Data Traffic Generator
<a href="#">ETH100</a>	Packet Traffic Simulation - GTP
<a href="#">ETH101</a>	Mobile Traffic Core-GTP
<a href="#">ETH102</a>	Mobile Traffic Core-Gateway

For more details, refer to [3G UMTS Communications Network Lab](#) webpage.



***GL Communications Inc.***

818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A  
 (Web) [www.gl.com](http://www.gl.com) - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) [info@gl.com](mailto:info@gl.com)