Overview

As traffic intensity increases, network elements (including switches and transmission) can impart various impairments such as errors, excessive delay, congestion, blocking, loss, and degraded quality. Simulating traffic can be valuable to characterize the impairment as a function of traffic intensity and traffic types (e.g. Voice, Fax, Data, & Video).

Message Automation and Protocol Simulation (MAPS™) is a multi-protocol, multi-technology platform performs signaling and traffic generation for a vast array of communication protocols covering IP, Analog, TDM, and Wireless networks. MAPS™ can be used to test signaling over legacy networks (which use conventional signaling such as CAS, SS7, ISDN, PPP, ...), newer generation IP networks (such as SIP, MGCP, MEGACO, SIGTRAN, Diameter...), and also the Wireless networks including GSM, GPRS, UMTS, and LTE.

MAPS™ MAP (MTP2/ATM) is enhanced to simulate Location Services (LCS) over Lg and Lh interfaces connecting GMLC <-> MSC and GMLC <-> HLR entities. Supported LCS procedures includes Provide Subscriber Location, Subscriber Location Report, and Routing Info for LCS, as per 3GPP specifications.

GL’s MAPS™ products supporting various Traffic across IP, TDM, Wireless networks:
- Mobile Traffic Simulation (ETH101, ETH102, ETH103) over LTE (S1, eGTP), UMTS (GnP, IuPS), GPRS Gb interfaces
- RTP Traffic Simulation for IMS/IP Networks (PKS102, PKS106, PKS108, PKS200, PKS211) over SIP, SIP-I, MGCP, MEGACO, Diameter over IP interfaces
- RTP Traffic Simulation for Wireless Networks (PKS102, PKS108, PKS200) over UMTS IuCS & IuH, GSM A over IP interfaces
- TDM Traffic Simulation (xx610, xx620, xxFT0) over ISDN, SS7, CAS, GSM A interfaces
- TRAU GSM Traffic (xx646) over GSM A-bis interfaces

With MAPS™ Client-Server application, MAPS™ supports a Command Line Interface (CLI) such as the TCL, Python, VBScript, Java, and .Net scripting tools, to provide the capability of remote operation, automation, and multi-site connectivity. User can remotely perform all functions such as start test bed setup, load scripts and profiles, apply user events such as send digits/file/tones, detect digits/file/tones, dial, originate call, terminate call, start and stop traffic and so on.

For more details, visit www.gl.com/traffic-simulation.html webpage.

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### Features

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<td>ETH101</td>
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<td>Generate and verify user mobile data (Email, Web-HTTP, and FTP), gateway traffic, and packet traffic over (GTPv1 and GTPv2) GPRS Gb, UMTS (GnGp, IuPS), and LTE(S1, eGTP) network interfaces, 5G N3 (GTP), N6 (IP)</td>
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<td>GTP Mobile Traffic Core – Stateful HTTP traffic simulation</td>
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| **RTP Traffic Simulation**                        | PKS102    |
| over SIP, SIP I, MGCP, MEGACO, UMTS, GSM, Diameter, and LTE networks |           |
| 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 |           |

| **SMS Traffic Simulation**                        | PKS106    |
| over the GSM, UMTS, and MAP interfaces |           |
| 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)). |           |

| **TDM Traffic Simulation**                        | PKS108    |
| over ISDN, SS7, GSM, CAS interfaces |           |
| Simulation of **TDM Traffic** such as digits, voice file, single tone, dual tones, IVR, Dynamic VF | xx610, xx620 |
| Simulation of **TDM Fax Traffic** | xxFT0     |
| **TRAU GSM traffic** over GSM Abis interface | xx646     |
| Create, monitor, and terminate TRAU GSM traffic sessions |           |
Analog and TDM Traffic Simulation

With the purchase of additional license (xx610, xx620), MAPS™ supports transmission, detection and capture of various traffic such as, digits, voice files, single tones, dual tones, Dynamic VF, FAX, and IVR over established calls on TDM and Analog networks. The volume of calls can vary from few hundreds to thousands of calls depending on the T1 E1 or Analog platform of choice.

TDM traffic simulation using MAPS™ ISDN, MAPS™ SS7, MAPS™ GSM A, and MAPS™ FXO FXS

Short Message Service (SMS) Test Solutions

MAPS™ also supports sending and receiving SMS (Short Message Service) using signaling channel simultaneously with other voice and data services over a GSM, UMTS, or MAP interfaces. MAPS™ has the 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)). The short message service testing is available on the GSM, UMTS, and MAP interfaces. GL’s 2G, & 3G Wireless Lab setup supports end-to-end SMS calls simulation in Circuit Switch (CS) network.

This feature is supported in MAPS™ GSM A over IP, MAPS™ MAP and MAPS™ UMTS IuCS & IuH applications.
**FAX Simulation over T1 or E1 (XXFT0)**

Fax Simulator (XXFT0) is capable of transmitting and receiving bulk fax over many T1 E1 timeslots or through two-wire FXO and FXS lines. The software can emulate many "virtual fax machines" - transmitter as well as receiver. All variations of T.30 fax protocol are supported such as page size, resolution, min & max data rate, and codec type – including high speed fax such as V.34. This application works with MAPS™ TDM products simulating complete real-time single and bulk (100’s) fax calls.

**GSM TRAU Traffic Simulation**

For GSM, TRAU (Transcoder Rate Adapter Unit) traffic simulation (xx646) is included with options to create, monitor, and terminate TRAU GSM traffic sessions supporting transmit/receive DTMF digits, files, and tones over established GSM calls. TRAU traffic simulation is applicable for MAPS™ GSM Abis application only.
RTP Traffic Simulation (PKS102)

MAPS™ supports transmission and detection of various RTP traffic such as, digits, voice file, single tone, dual tones, FAX, Dynamic VF, IVR, Voice, and Video sessions over established calls. With the purchase of RTP Core license (PKS102), MAPS™ RTP traffic commands are available. These features are applicable for MAPS™ UMTS IuCS & IuH, MAPS™ GSM A over IP, MAPS™ GSM Abis over IP, MAPS™ SIP, MAPS™ SIP I, MAPS™ MEGACO, MAPS™ MGCP applications only. Currently, RTP Video simulation is supported only in MAPS™ SIP.

RTP Voice Quality Measurements (PKS108)

Using MAPS™ application, RTP based Voice Quality (MOS and R-Factor) measurement can be calculated and updated periodically for the received streams. Call quality metrics includes Listening MOS, Conversational MOS, PacketLoss, Discarded Packets, Out of Sequence Packets, Duplicate Packets, Delay and Jitter.
RTP Video Traffic Generation (PKS106)

With additional RTP Video Traffic Generation (PKS106) licenses up to 500 simultaneous video streams can be simulated using H.264 codecs. Transmit and receive pre-recorded video traces with video codecs like H.264, H.263 etc. H.263 provides video capture and video conference monitoring capability, while H.264 is an industry standard codec for video compression.

FAX Simulation over IP (PKS200, PKS211)

GL’s test tools supports FAX over IP (FoIP) simulation and monitoring with additional licensing RTP G.711 Pass Through Fax Simulation (PKS200) and T.38 Fax Simulation over UDPTL (PKS211).

GL’s RTP Fax Simulator simulates multiple fax calls over IP in T.30 pass through mode (using G.711 PCMU and PCMA). It can transmit pre-recorded Tiff image to DUT (Real-time Fax machine), receive Pass-Through fax from DUT, and record complete fax call messages as log file along with a Tiff image.

Fax over UDPTL transport using T38 protocol (compliant with ITU-T T.38 (03/2002)) operates at the maximum of 33.6 kbps speed. Almost all MAPS™ IP products support fax simulation – MAPS™ SIP, MAPS™ SIP-I, MAPS™ MEGACO, MAPS™ BICC, MAPS™ GSM, and MAPS™ UMTS.

Typical applications of our Fax Emulation software are load testing of fax servers, qualification testing of T.38 Gateways, testing of ATAs (Analog Terminal Adapters), testing of fax machines, and many more.
Mobile Traffic Simulation

Mobile Traffic Core - GTP (ETH101)
The module supports stateful user-plane packet transmission and reception services between any two nodes (GTP-U protocol entity) in UMTS (SGSN, GGSN, RNC), LTE (SGW, PDNGW) networks. It allows simultaneous simulation of multiple sessions per user. Currently, supports HTTP traffic simulation with the base requirements such as port number, server IP address, and pre-canned HTTP traffic file. This module can also support generation and verification of data traffic such as Email, FTP, HTTP, and more. This module is supported in MAPS™ GnGp, MAPS™ LTE S1, MAPS™ LTE eGTP-c, MAPS™ IuPS, MAPS™ IuH and 5G N3 and N6.

Figure: Mobile Traffic Server Log

Mobile Traffic Core - Gateway (ETH102)
The module allows simulation of Gateway and transfer user plane data from RNC to GGSN. It handles GTP tunnels on both direction of SGSN. It can also act as GGSN for user-plane traffic by encapsulating IP traffic over GTP. This module supported in MAPS™ GnGp, MAPS™ LTE S1, MAPS™ LTE eGTP-c and MAPS™ IuH.

???: any IP based protocol used to carry packet radio service
HTTP: Hypertext Transfer Protocol
GTP: GPRS Tunnelling Protocol
TCP: Transmission Control Protocol
UDP: User Datagram Protocol
IP: Internet Protocol

Figure: Packet Traffic Simulation (ETH100)
**Mobile Traffic Simulation - GPRS Gb (ETH103)**

The module allows simulation of Mobile traffic over Gb interface between BSC and SGSN. Currently, this module transmits the pre-canned HTTP file (*.txt) between BSC and SGSN nodes. It multiplexes both signaling and traffic over Gb interface. This module is supported in **MAPS™ GPRS Gb**.

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**Packet Load - HD Mobile Traffic GTP**

GL’s MAPS™ platform with Packet Load appliance provides high density (up to 4 Gbps) stateful TCP/HTTP, UDP, and PCAP Replay traffic simulation solution in UMTS (SGSN, GGSN, RNC), and LTE (SGW, PDNGW) networks. Packet Load is a 1U network appliance that includes 4 x 1GigE ports supporting total capacity of up to 4 Gbits/sec stateful packet traffic generation.

To verify bearer allocation bandwidth at the end points, the packet traffic can be generated with GL’s MAPS™ UMTS / LTE simulators along with Packet Load module that allow to encapsulate the generated packet data within GTP headers and transmit through the gateway points such as SGSN & GGSN, or SGW & PGW.

MAPS™ with Packet Load is used to verify the received data with the various statistics like Total packets transmitted and received, Latency, Delay, Bandwidth, No of TCP connection created, Successful connection, Packet loss, and so on.

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Automated Traffic Simulation using CLI

In addition to the GUI, MAPS™ can also be operated through a Command Line Interface (CLI). All the GUI based functionalities of the application can be controlled remotely.

Traffic simulation on a local network as well as from a remote location is possible with the client interface.

Figure: Traffic Simulation between IP to TDM

Buyer’s Guide

ETH100 - Packet Traffic Simulation - GTP
ETH101 - Mobile Traffic Core-GTP
ETH102 - Mobile Traffic Core-Gateway
ETH103 - Mobile Traffic - Gb
PKS102 - RTP Soft Core for RTP Traffic Generation
PKS103 - RTP IuUP Softcore
PKS106 - RTP Video Traffic Generation
PKS107 - RTP EUROCAE ED137
PKS108 - RTP Voice Quality Measurements
PKS200 - RTP Pass Through Fax Emulation
PKS211 - T.38 Fax Simulation
XX610 - File based Record/Playback (includes xx600)
XX620 - Transmit/Detect digits (Place Call/Answer Call)
XXF0 - WCS Fax Emulation Software
XXXFT2 - 2 Fax ports licenses
XXXFT3 - 8 Fax ports licenses
XXXFT4 - 30 Fax ports licenses
XXXFT5 - 60 Fax ports licenses
XXXFT6 - 120 Fax ports licenses
XX646 - Multi-Channel TRAU Tx/Rx Emulation and Analysis
XX624 - MAPS™ FXO FXS Emulator

Related Software

XX692 - MAPS™ GSM A
XX693 - MAPS™ GSM Abis
XX648 - MAPS™ ISDN
XX649 - MAPS™ SS7
XX651 - MAPS™ CAS
PKS120 - MAPS™ SIP
PKS122, PKS123 – MAPS™ MEGACO
PKS124 - MAPS™ MGCP w/ Conformance Test Scripts
PKS126 - MAPS™ SIP I
PKS166 - MAPS™ GnGp
PKS138 - MAPS™ GPRS SGSN & GGSN
PKS131 - MAPS™ GPRS Gb over IP
PKS132 - MAPS™ MAP over IP
PKS137 - MAPS™ GSM A over IP
PKS160 - MAPS™ UMTS IuCS & IuH
PKS164 - MAPS™ UMTS IuPS
VBA038 - FaxScan™ for T.30
PKV104 - FaxScan™ for T.38
FXT001 - GL Insight™ - Single Modem Analysis – TDM
FXT002 - GL Insight™ - Single Modem Analysis - IP