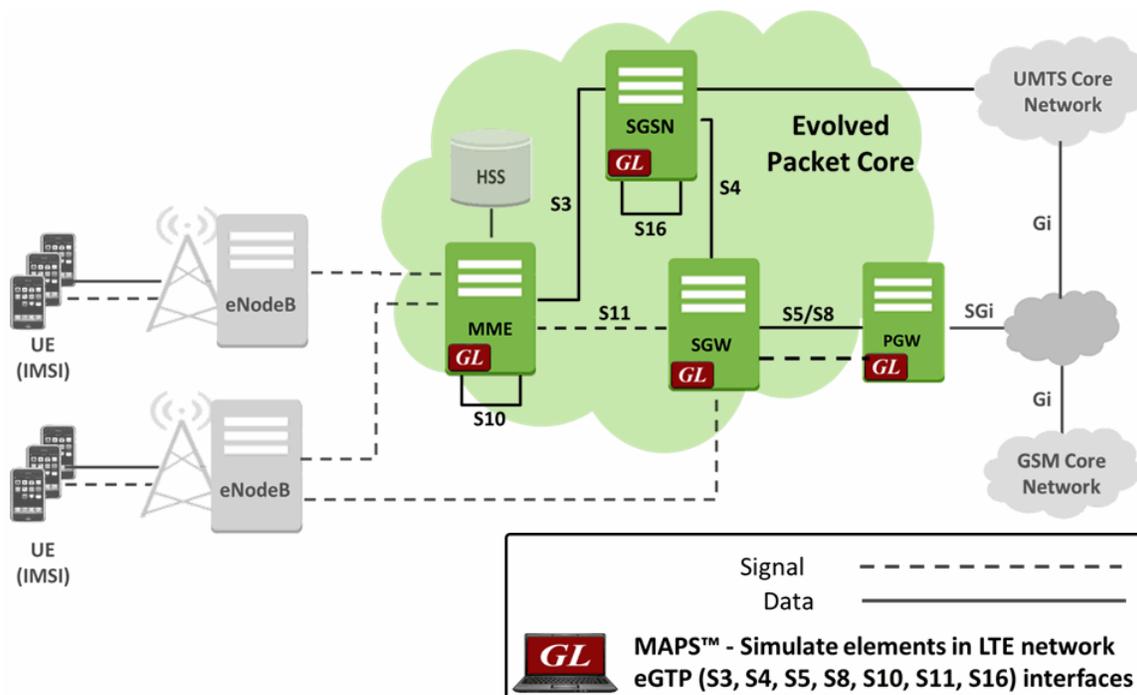


MAPS™ Long Term Evolution (LTE) –(eGTP) Interfaces

(S3, S4, S5, S8, S10, S11 and S16)



Overview

GL's **Message Automation & Protocol Simulation (MAPS™)** LTE-eGTP emulator is enhanced to test LTE S11, S5/S8 eGTP interfaces that can emulate MME (Mobility Management Entity), SGW (Serving Gateway), and PGW (Packet Data Network Gateway) network elements. The messages exchanged between MME and SGW (S11 Interface) is same as the messages exchanged between SGW and PDN Gateway (S5/S8 Interface), which are as defined in specification 3GPP TS 29.274 Evolved GPRS Tunneling Protocol for Control Plane (eGTP-c).

Additionally, MAPS™ LTE eGTP can support emulation of user-plane packet (GTPv2-U) traffic in LTE network with support of [Mobile Traffic Core - GTP](#) (ETH101) application and user-plane Gateway traffic with support of Mobile Traffic Core – Gateway (ETH102) application.

The application gives the users an unlimited ability to edit eGTP-c messages and call control scenarios (message sequences).

By mimicking real-world behavior in lab environment, our solutions allow mobile operators and equipment manufacturers to verify wireless networks prior to live deployment. Further, to emulate all the network elements using '[MAPS 4G Wireless Lab Suite](#)', user can setup a virtual real-time LTE network in lab.

For more information, please refer to [MAPS™ LTE eGTP](#) webpage.



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Main Features

- Emulates MME, SGW and PDN GW
- Supports emulation of eGTP-c (Control Plane); generate and process GTP-C valid and invalid messages
- Massive UE emulation (up to 500000) with Auto generation feature for high density load testing
- Supports large number of subscribers with CSV based profiles for bulk call generation
- Handles Retransmissions
- Supports eGTP-u (User Plane) traffic emulation which includes: verification like BERT testing, HTTP traffic generation capability - requires additional licensing 'ETH101'
- High-volume eGTP-u (User Plane) traffic emulation possible with support of '[Packet Load](#)' appliance; both 4Gbps and 40Gbps variants are available to suit customer needs
- Option to offload GTP traffic to Gateway (GGSN)- requires additional licensing 'ETH102'
- Generates and responds to hundreds of UE Signaling (Load testing)
- Supports simulation of entire real-time LTE network using "[MAPS 4G Wireless Lab Suite](#)"

Test Bed Configuration

The testbed setup window allows users to setup the required test environment with SCTP configuration in eGTP interfaces. SCTP Configuration parameters consist of source / destination IP address, and port numbers to configure MAPS™ to emulate MME, SGW and PGW entities in eGTP interface. MAPS™ can then generate GTP-C (valid and invalid) messages in LTE network.

Auto Generated Users Info configuration required to emulate multiple calls. End user configuration profile used to configure MAPS™ LTE eGTP with supported MME, SGW and PGW parameters.

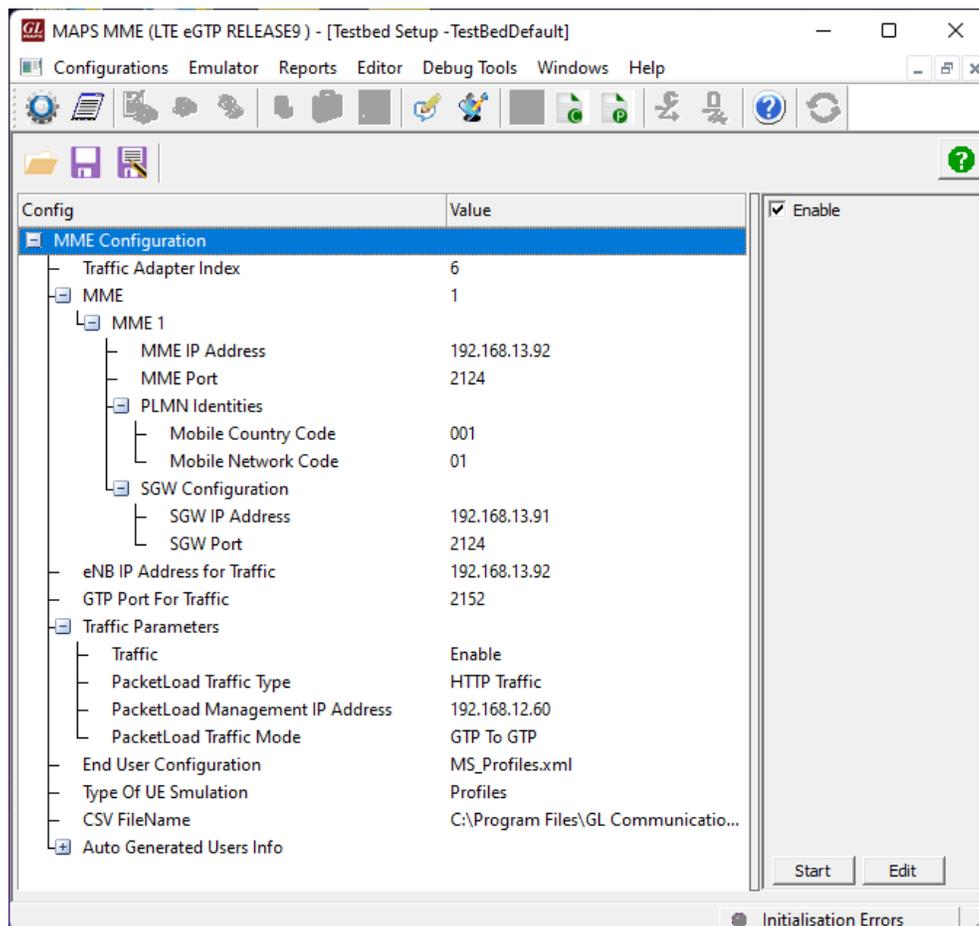


Figure: Testbed Setup

Pre-processing Tools

Profile Editor

This feature allows loading profile to edit the values of the variables using GUI, replacing the original value of the variables in the message template. An XML file defines a set of multiple profiles with varying parameter values that allow users to configure call instances in call generation and to receive calls.

The MS_Profiles includes LTE eGTP paramters, that is required to configure multiple UEs to emulate Signaling, Traffic. User can configure Mobile Traffic parameters, allowing emulation of offline HTTP Traffic using Mobile IP Core TCP Client Server connections.

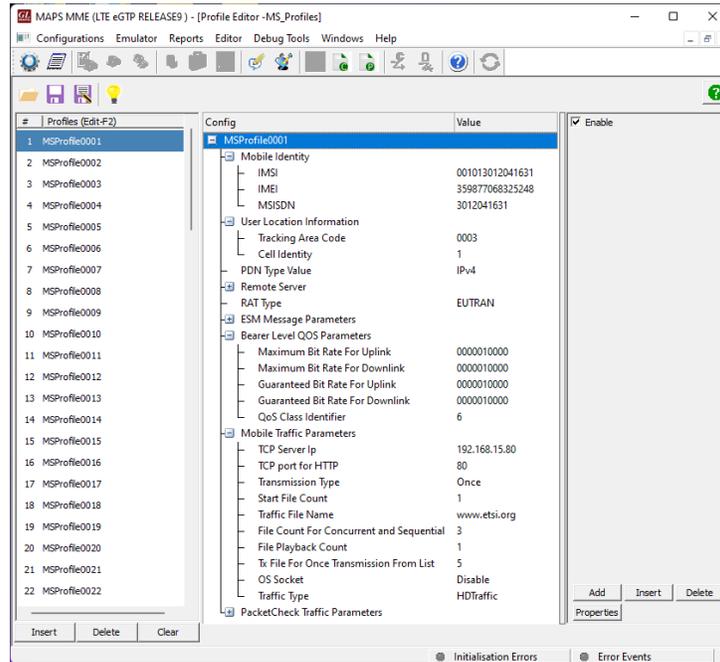


Figure: Profile Editor

Message Editor

The message editor allows user to build a template for each protocol message type. The value for each field may be changed in the message template prior to testing. The protocol fields comprise of mandatory and optional parameters.

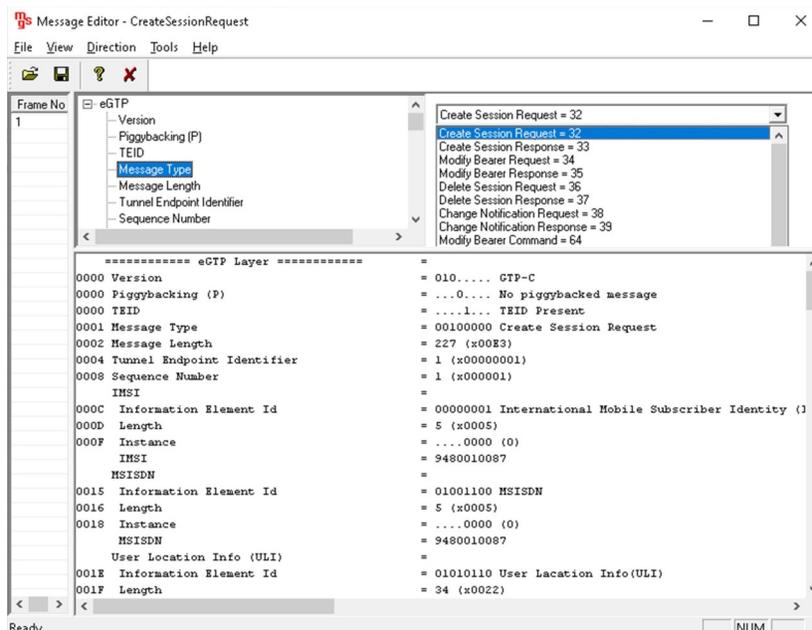
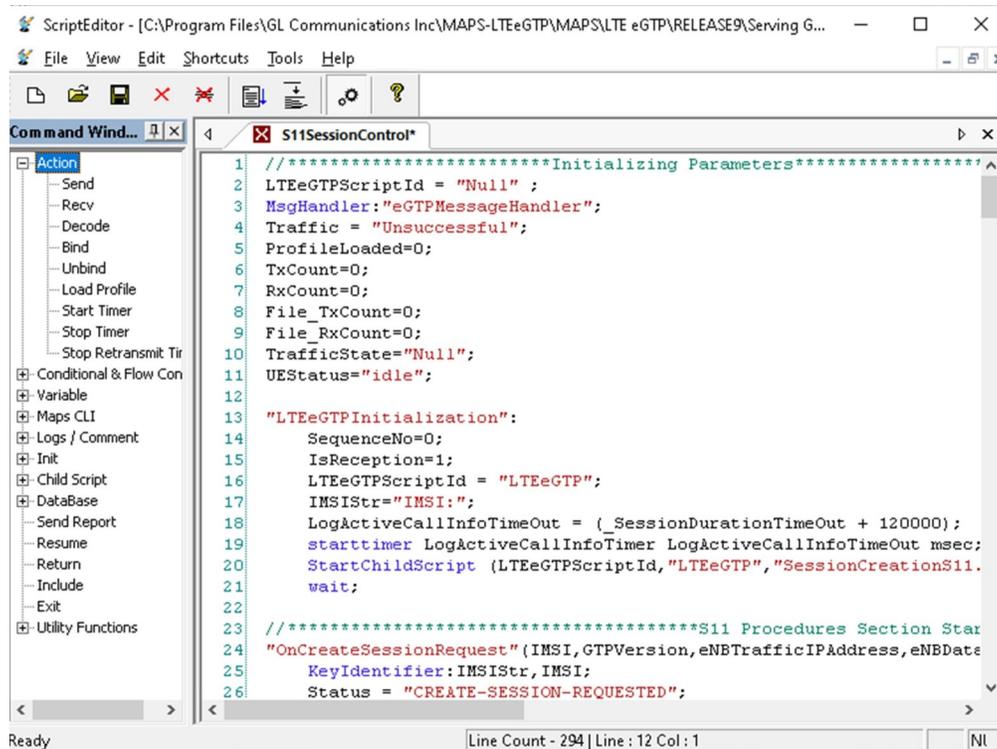


Figure: Message Editor

Pre-processing Tools (Contd.)

Script Editor

The script editor allows user to create/edit scripts and access protocol fields as variables for the message template parameters. The script uses pre-defined message templates, to perform send and receive actions.



```

ScriptEditor - [C:\Program Files\GL Communications Inc\MAPS-LTEeGTP\MAPS\LTE eGTP\RELEASE9\Serving G...
File View Edit Shortcuts Tools Help
Command Wind...
Action
  Send
  Recv
  Decode
  Bind
  Unbind
  Load Profile
  Start Timer
  Stop Timer
  Stop Retransmit Tir
  Conditional & Flow Con
  Variable
  Maps CLI
  Logs / Comment
  Init
  Child Script
  DataBase
  Send Report
  Resume
  Return
  Include
  Exit
  Utility Functions
S11SessionControl*
1 //*****Initializing Parameters*****
2 LTEeGTPScriptId = "Null" ;
3 MsgHandler:"eGTPMessageHandler";
4 Traffic = "Unsuccessful";
5 ProfileLoaded=0;
6 TxCount=0;
7 RxCount=0;
8 File_TxCount=0;
9 File_RxCount=0;
10 TrafficState="Null";
11 UEStatus="idle";
12
13 "LTEeGTPInitialization":
14   SequenceNo=0;
15   IsReception=1;
16   LTEeGTPScriptId = "LTEeGTP";
17   IMSIstr="IMSI:";
18   LogActiveCallInfoTimeOut = (_SessionDurationTimeOut + 120000);
19   starttimer LogActiveCallInfoTimer LogActiveCallInfoTimeOut msec;
20   StartChildScript (LTEeGTPScriptId,"LTEeGTP","SessionCreationS11.
21   wait;
22
23 //*****S11 Procedures Section Star
24 "OnCreateSessionRequest" (IMSI, GTPVersion, eNBTrafficIPAddress, eNBDate
25   KeyIdentifier: IMSIstr, IMSI;
26   Status = "CREATE-SESSION-REQUESTED";
Line Count - 294 | Line : 12 Col : 1
  
```

Figure: Script Editor

Supported LTE eGTP-c Procedures

Given below is a general LTE S3, S4, S5, S8, S10, S11 and S16 interfaces signaling scenario, the messages between MME (Mobility Management Entity), SGW (Serving Gateway), and PGW (PDN Gateway) are simulated using MAPS™ application. MAPS™ LTE eGTP supports Path Management and Tunnel Management procedures over eGTP interfaces as indicated in the call flow below:

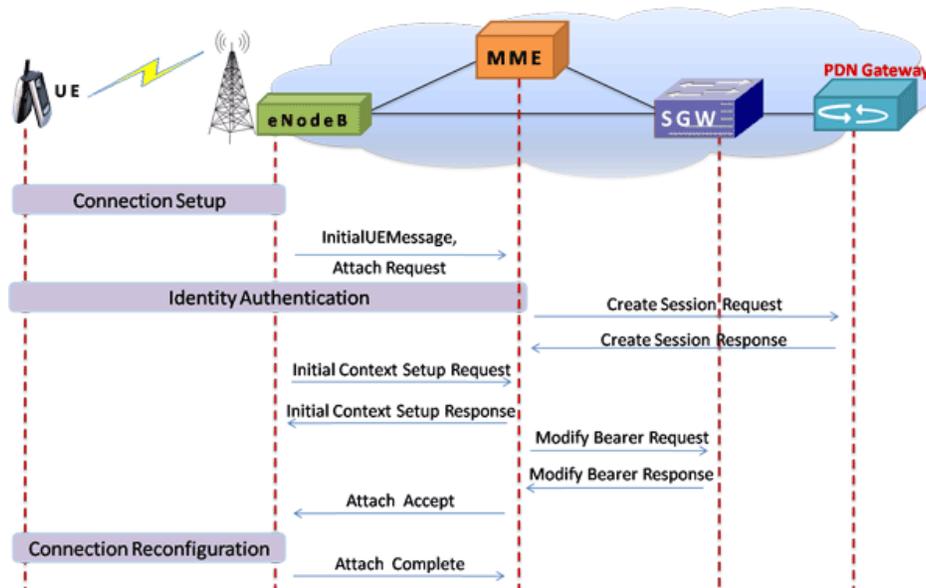


Figure: LTE eGTP (S11, S5/S8) Interfaces Procedure

Call Generation and Call Reception

In call generation, MAPS™ is configured for the out going calls, and in call receive mode, it is configured to respond to incoming calls. Tests can be configured to run once, multiple iterations or continuously. Scripts can be set to run sequentially according to a call scenario or randomly.

The test scripts may be started manually or they can be automatically triggered by incoming messages. In receive mode, MAPS™ can be automated to respond to messages using script configuration dialog, where a receive script is preset against particular message expected to arrive.

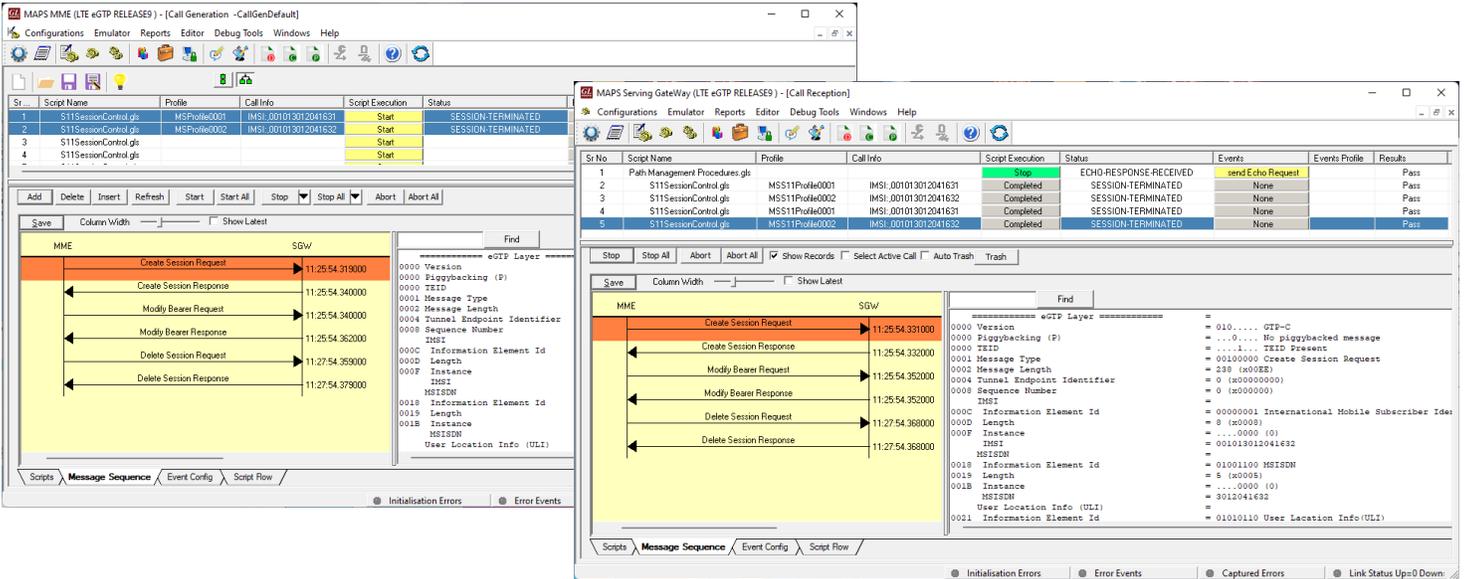


Figure: Call Generation & Reception

Load Testing (eGTP-c, eGTP-u)

MAPS™ includes Auto UE Generation feature with which each UE is automatically generated with unique IMSI, TMSI, MSISDN and other key parameters in sequential order. While other common parameters such as Bearer Identifier, Bearer QoS, Access Point Name, underlying physical connection method, and mobile traffic parameters required during simulation are accessed from a XML based user profile (AutoGeneratedUser_Profile.xml). This ability to auto generate number of subscribers allow MAPS™ LTE eGTP to simulate high intensity eGTP-u signaling.

In order to achieve much higher density GTP user traffic simulation, GL recommends MAPS™ LTE eGTP with [Packet Load](#) appliance. MAPS™ LTE eGTP with PacketLoad generates high density (4 Gbps or 40 Gbps options available) stateful HTTP/TCP, UDP Ethernet traffic.

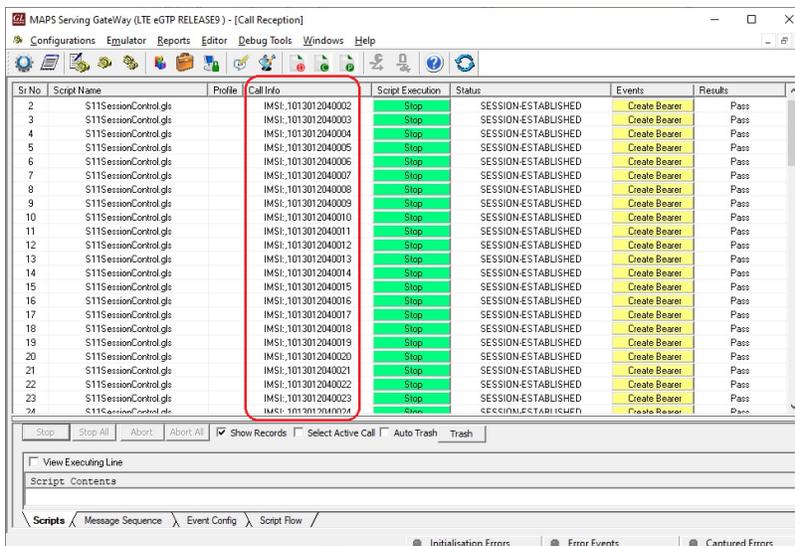


Figure: Auto Generating Users Info

Capture Event Log

MAPS™ provides Events, Error Events, and Captured Errors log encountered during the progress of the call. The events are saved in the database which can be accessed via web interface.

Protocol specific signaling events and the traffic events are logged along with the Call Trace ID, Script Name, Script ID, and the Timestamp of the occurred event.

Date/Time	Captured Events	Call Trace Id	Script Name	Script Id
2022-5-5 03:32:51.871000	SESSION-ESTABLISHED	IMSI;.001013012041631	S11SessionControl.gls	CGProtScriptId-3-1590549423-6790-2568
2022-5-5 03:32:51.891000	BEARER-MODIFIED	IMSI;.001013012041631	S11SessionControl.gls	CGProtScriptId-3-1590549423-6790-2568
2022-5-5 03:32:55.581000	DEDICATED-BEARER-CREATED	IMSI;.001013012041631	S11SessionControl.gls	CGProtScriptId-3-1590549423-6790-2568
2022-5-5 03:32:57.890000	SESSION-TERMINATED	IMSI;.001013012041631	S11SessionControl.gls	CGProtScriptId-3-1590549423-6790-2568
2022-5-5 03:33:07.852000	SESSION-ESTABLISHED	IMSI;.001013012041631	S11SessionControl.gls	CGProtScriptId-4-1590565414-6792-2568
2022-5-5 03:33:07.874000	BEARER-MODIFIED	IMSI;.001013012041631	S11SessionControl.gls	CGProtScriptId-4-1590565414-6792-2568
2022-5-5 03:33:10.630000	DEDICATED-BEARER-CREATED	IMSI;.001013012041631	S11SessionControl.gls	CGProtScriptId-4-1590565414-6792-2568
2022-5-5 03:33:12.694000	SESSION-TERMINATED	IMSI;.001013012041631	S11SessionControl.gls	CGProtScriptId-4-1590565414-6792-2568

Figure: Events Log

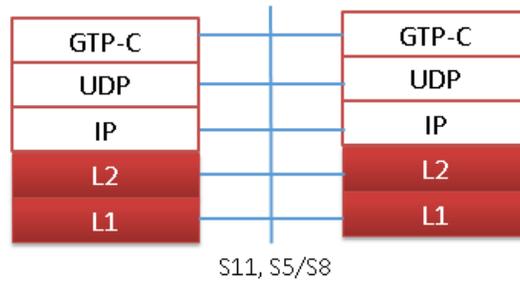
Call Statistics and Graph

Statistics provides the number of calls passed/failed, which are also plotted as pie-graph, to view the statistics of the messages sent/received; Calls per sec graph, and Simultaneous calls per sec graph, which are displayed as per the pattern type and the parameters set in **Load Generation** window.



Figure: Call Statistics

Supported Protocols and Specifications



Supported Protocols	Standard / Specification Used
Evolved GTP (eGTP) for EPS	3GPP TS 29.274 V8.0.0 (2008-12)
Evolved GTP (eGTP) for EPS	3GPP TS 29.274 V9.2.0 (2010-03)

Buyer's Guide

Item No	Product Description
PKS142	MAPS™ LTE eGTP (S3, S4, S5, S8, S10, S11 and S16) Interfaces
ETH100	Mobile Traffic - PacketCheck™
ETH101	MobileTrafficCore - GTP
ETH102	MobileTrafficCore - Gateway

Item No	Related Software
PKV107	LTE Protocol Analyzer
PKS140	MAPS™ - LTE S1 Interface
PKS164	MAPS™ - UMTS – IuPS Interface Emulation
PKS160	MAPS™ - UMTS – IuCS and Iuh Interface Emulation
PKS130	MAPS™ - SIGTRAN (SS7 over IP)
PKS135	MAPS™ - ISDN SIGTRAN (ISDN over IP)
PKS120	MAPS™ - SIP
PKS121	MAPS™ - SIP Conformance Test Suite (Test Scripts)
PKS122	MAPS™ - MEGACO
PKS123	MAPS™ - MEGACO Conformance Test Suite (Test Scripts)

For more information, please visit [Signaling and Traffic Simulator](#) webpage.



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