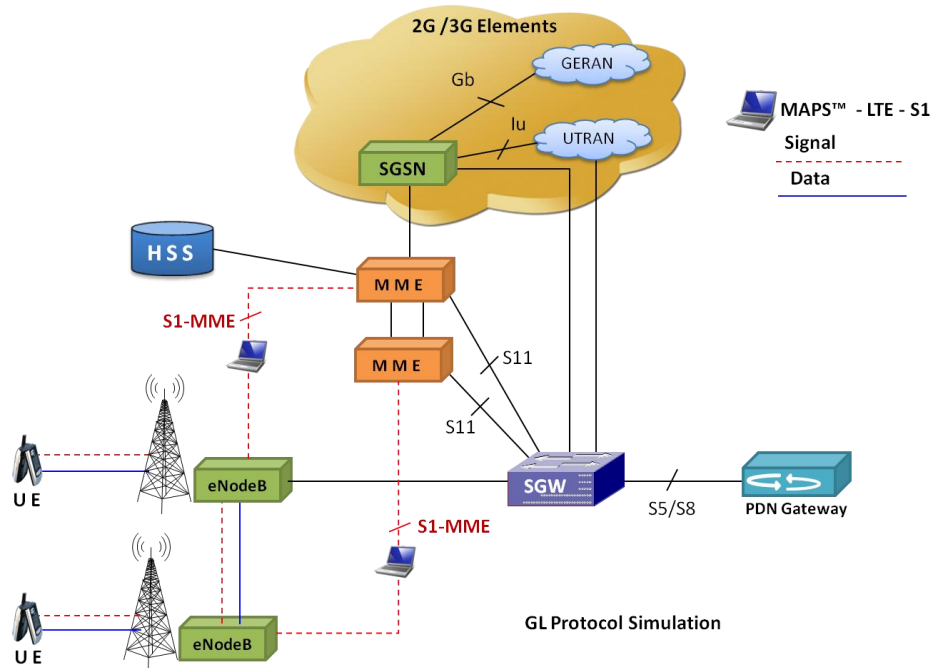


Message Automation & Protocol Simulation (MAPS™)

Long Term Evolution (LTE) S1 Interface



Overview

GL's **Message Automation & Protocol Simulation™ (MAPS™)** designed for **LTE S1** network can simulate and test eNodeB (Evolved Node B), and MME (Mobility Management Entity). eNodeB is the base station in the LTE/SAE S1 interface and also includes MME (to handle signaling of control plane) as shown in the network diagram above.

The **MAPS™ - LTE** test tool is designed with specific test cases, as per LTE 3GPP mobile standards. Test cases include general messaging and call flow scenarios for enhanced mobile radio and internet access. Logging and pass/fail results are also reported. Test cases verify actions such as signaling registration, and other related call procedures.

The application gives the users the unlimited ability to edit S1-AP/NAS messages and call control scenarios (message sequences). "Message sequences" are generated through scripts. "Messages" are created using message templates.

For more information on MAPS™ - LTE S1, refer to <http://www.gl.com/maps-lte-s1.html>.

Main Features

- Simulates eNodeB, and MME entities in S1 interface.
- Supports LTE Control plane.
- Generates hundreds of UE Signaling (Load testing).
- Generates and process S1/NAS valid and invalid messages.
- Handles Retransmissions.
- Impairments can be applied to messages to simulate error conditions.
- Script based & protocol independent software architecture.
- Supports customization of call flow and messages.
- Supports scripted call generation and automated call reception.
- Allows defining variables for various fields of the selected message type.
- Provides call statistics and associated events status.
- Supported on Windows® XP or higher version operating systems.

LTE S1 Interface Simulation

Test Cases as per LTE 3GPP Mobile Standards

Simulates eNodeB and MME

Generate / Respond to S1-AP/NAS Signaling Messages

Authenticate and Confirm Security Procedures

Scripted Call Generation and Automated Call Reception

Simulate up to 500 Smartphones (UEs) Powering Up & Down

Provides Fault Insertion, & Erroneous Call Flow Testing

Powerful Message, and Script Editors for Call Flow Customization

QoS Requests for Greater or Lesser Bandwidth

Temporary Addressing Management for Mobility and Security



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Call Generation and Call Reception

In call generation, MAPS™ is configured for the outgoing 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.

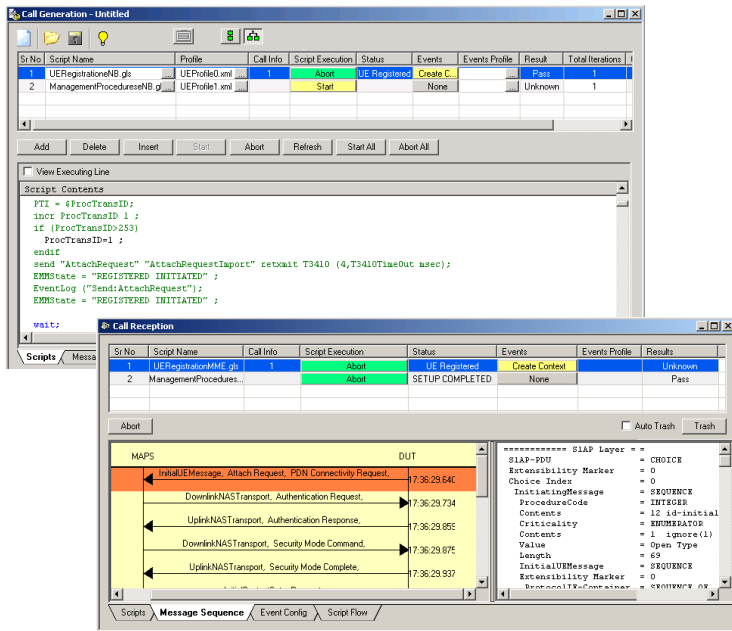


Figure: Call Generation & Reception

Incoming Call Handler Configuration

Incoming Call Handlers configuration option is used to preset the script required to handle all possible signaling and call processing messages for responding to the call requests during call reception.

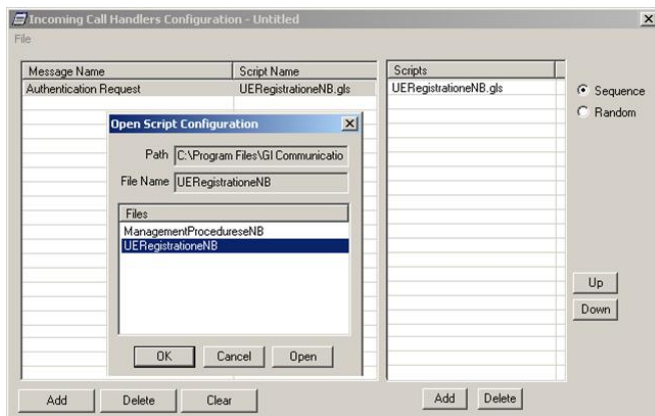
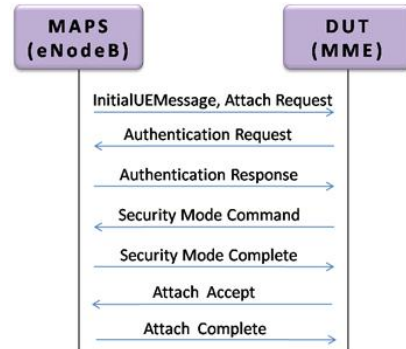


Figure: Incoming Call Handler

MAPS™ - LTE S1 Signaling Flow

Scenario 1: MAPS™-LTE S1 acting as eNodeB and testing DUT (MME)

MAPS™-LTE S1 is considered as Caller (User End) and initiates the call flow by sending AttachRequest to the DUT (Network).

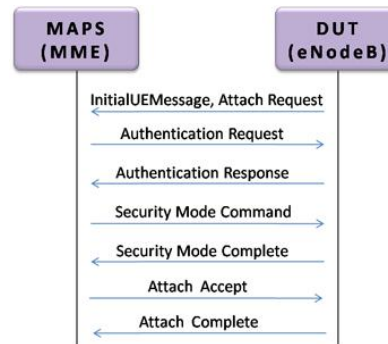


Sample Place Call Script

```
send "AttachRequest" "AttachRequestImport";
decode "AuthenticationRequestExport";
send "AuthenticationResponse" AuthenticationResponseImport";
decode "SecurityModeCommandExport";
send "SecurityModeComplete" "SecurityModeCompleteImport";
decode "AttachAcceptExport";
send "AttachComplete" "AttachCompleteImport";
```

Scenario 2: MAPS™-LTE S1 resides at the network (MME) testing DUT (eNodeB)

MAPS™ -LTE S1 is considered as the DUT (MME) processing the call flow by receiving the AttachRequest from the caller (eNodeB).



Sample Answer Call Script

```
decode "AttachRequestExport" ;
send "AuthenticationRequest" "AuthenticationRequestImport";
decode "AuthenticationResponseExport" ;
send "SecurityModeCommand" SecurityModeCommandImport";
decode "SecurityModeCompleteExport" ;
send "AttachAccept" "AttachAcceptImport";
decode "AttachCompleteExport";
```



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Supported Protocols and Specifications

Supported Protocols	Standard / Specification Used
S1 Application Protocol (S1-AP)	3GPP 36.413 9.0.0 (2009-09)
Non-Access-Stratum (NAS)	3GPP TS 24.301 V9.0.0 (2009-09)

Buyer's Guide

[PKS140](#) - MAPS™ - LTE S1 Interface

Related Software

[PKS142](#) - MAPS™ - LTE eGTP (S3, S4, S5, S8, S10, S11 and S16) Interfaces

[PKS164](#) - MAPS™ - UMTS – Iu-PS Interface Emulation

[PKS160](#) - MAPS™ - UMTS – Iu-CS and Iuh Interface Emulation

[XX165](#) - T1 or E1 UMTS Protocol Analyzer

[OLV165](#) - Offline UMTS Protocol Analyzer

[LTS206](#) - OC-3 / STM-1 UMTS Protocol Analysis

[LTS306](#) - OC-12 / STM-4 UMTS Protocol Analysis

[PKS130](#) - MAPS™ - SIGTRAN (SS7 over IP)

[XX120](#) - SS7 Analysis Software

[PKS135](#) - MAPS™ - ISDN SIGTRAN (ISDN over IP)

[XX100](#) - ISDN Analyzer Software

[PKV107](#) - LTE Protocol Analyzer

[PKS120](#) - MAPS™ - SIP

[PKS121](#) - MAPS™ - SIP Conformance Test Suite (Test Scripts)

[PKS122](#) – MAPS™ - MEGACO

[PKS123](#) – MAPS™ - MEGACO Conformance Test Suite (Test Scripts)

[PKS124](#) - MAPS™ - MGCP

[PKS125](#) - MAPS™ - MGCP Conformance Test Suite (Test Scripts)

[PKB100](#) - RTP Toolbox™

[PKS100](#) - PacketGen™

[PKV100](#) - PacketScan™ (Online and Offline)

For complete list of MAPS™ products, refer to <http://www.gl.com/maps.html> webpage.



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