MAPS™ LTE S1 Interface and Conformance Emulator

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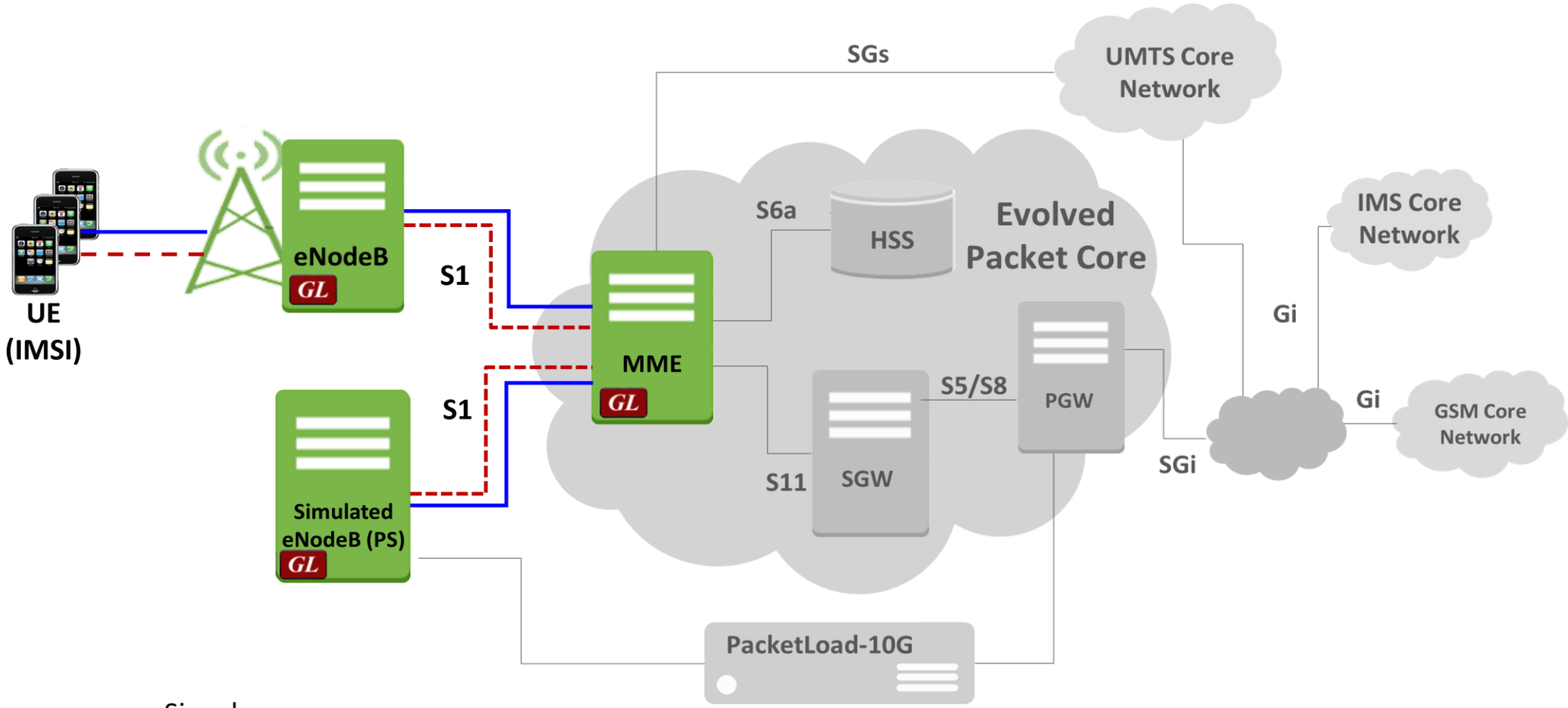
MAPS™ LTE S1 Architecture



MAPS™ LTE S1 Interface and Conformance Emulator

Emulate elements in LTE network

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Main Features

- Setup a virtual real-time network simulating 4G-LTE network elements using ‘MAPS™ 4G Wireless Lab Suite’
- Emulates eNodeB and MME
- Supports LTE Control plane
- Generates hundreds of UE signaling (Load Testing)
- Generates and process S1/NAS (valid and invalid) messages
- Supports GTP Traffic (GTP User Plane Data) which includes: verification like BERT testing, HTTP traffic generation capability, GGSN/PGW can actually be connected to real IP network to simulate Gateway testing
- Supports large number of subscribers with CSV based profiles for bulk call generation
- Handover S1 support including Intra/Inter MME
- UE initiated signaling for CSFB
- Supports LTE S1 interface conformance test suite with 50+ test cases

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Applications

- Provides fault insertion, and erroneous call flows testing capability
- Performance testing, Load testing, Functional testing, Regression testing and Conformance testing of network elements
- Ready scripts makes testing procedure simpler, less time consuming and hence time to market products
- Emulate up to 500 Smartphones (UEs) powering up and down
- Authenticate and confirm security procedures
- QoS requests for greater or lesser bandwidth
- Temporary addressing management for mobility and security

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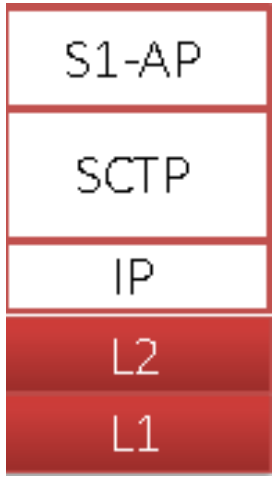
Supported Protocol Stack & Standards



Supported Protocols	Standard / Specification Used
S1 Application Protocol (S1-AP)	3GPP 36.413 9.0.0 (2009-09)
SCTP	RFC 4960
Non-Access-Stratum (NAS)	3GPP TS 24.301 V9.0.0 (2009-09)

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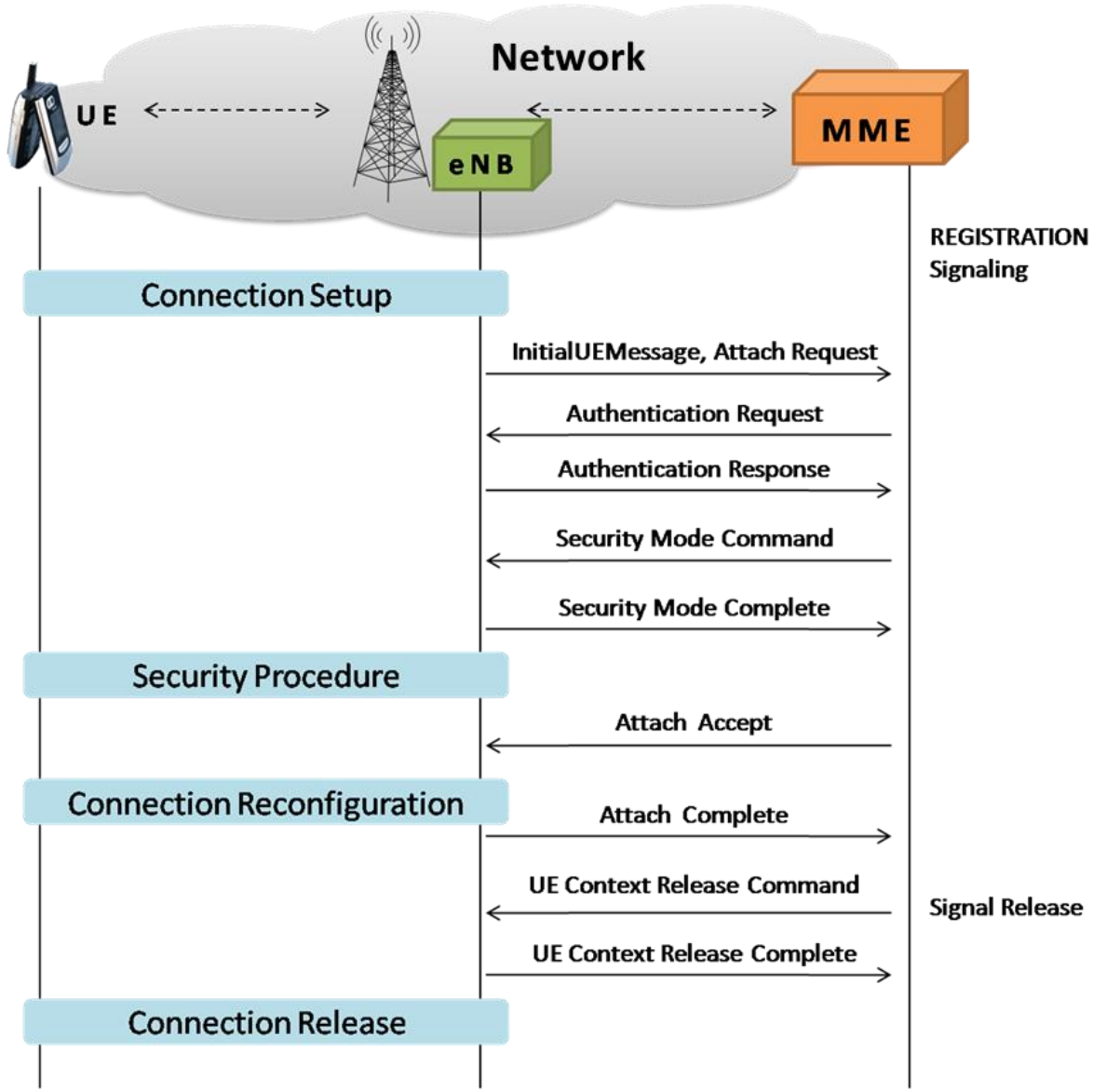
MAPS™ LTE S1 Signaling Scenario



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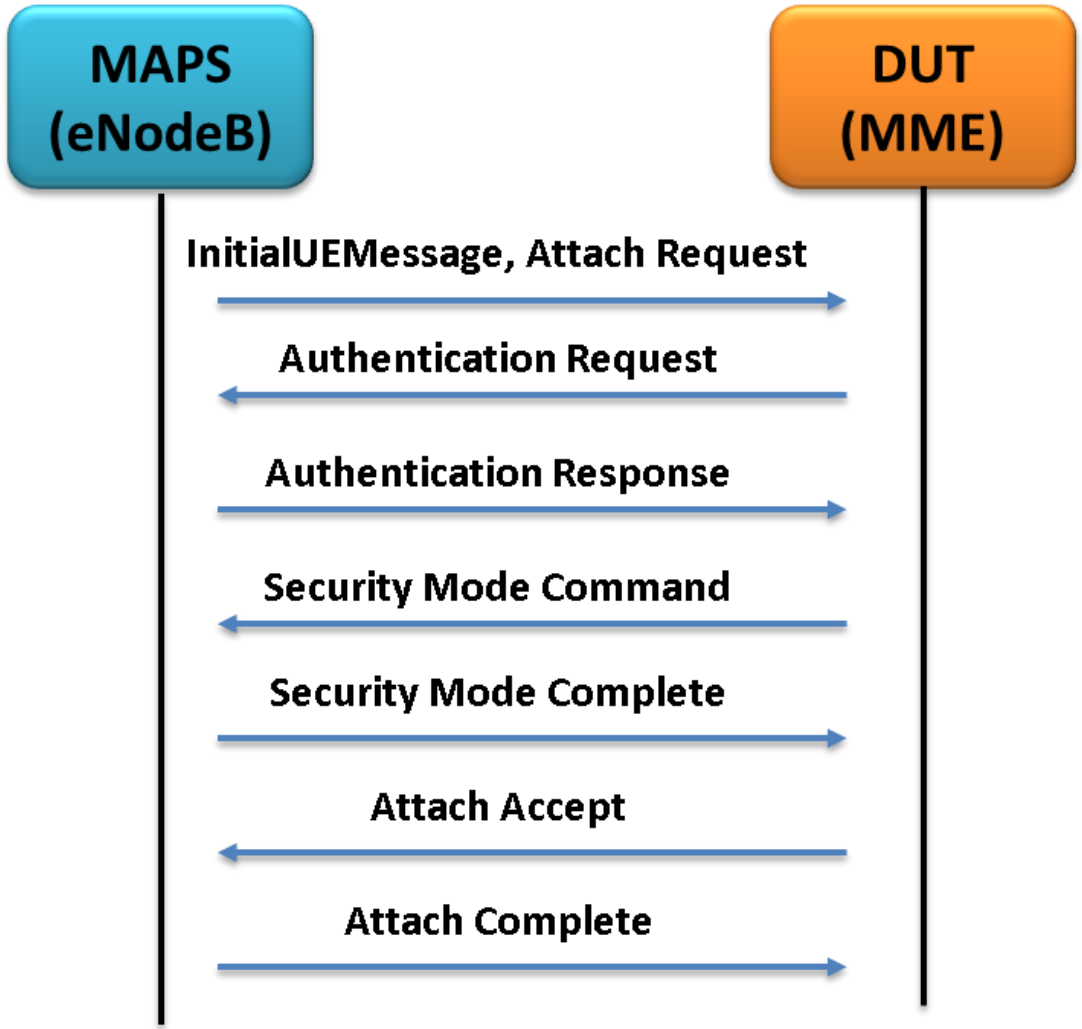
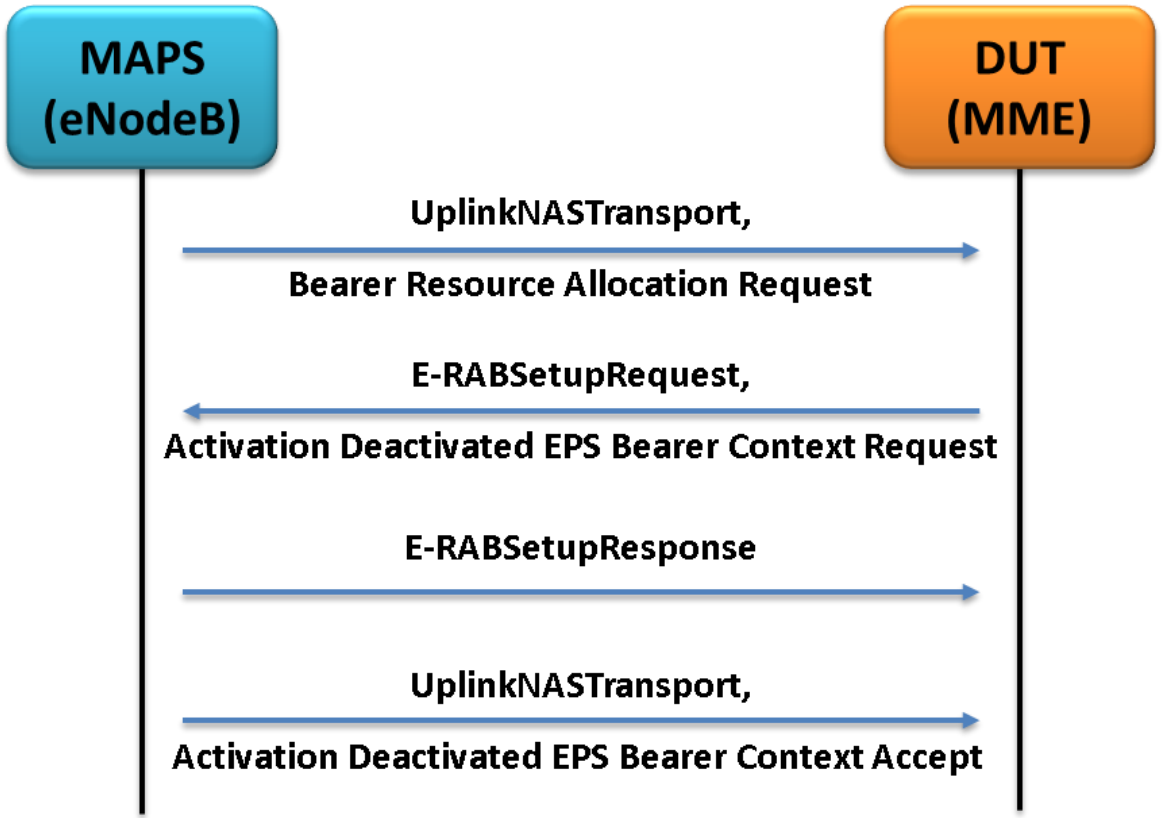
S1AP/NAS Procedures

UE Registration Signaling



Dedicated Bearer Context



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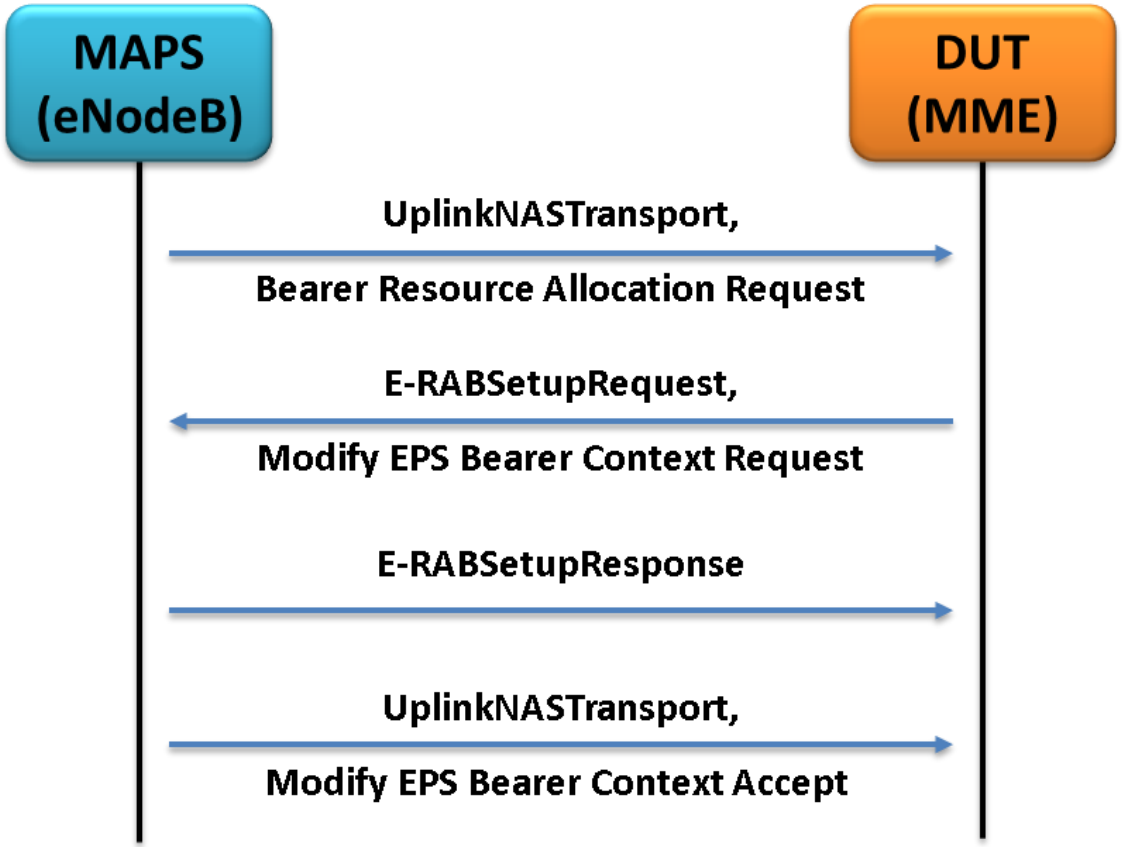
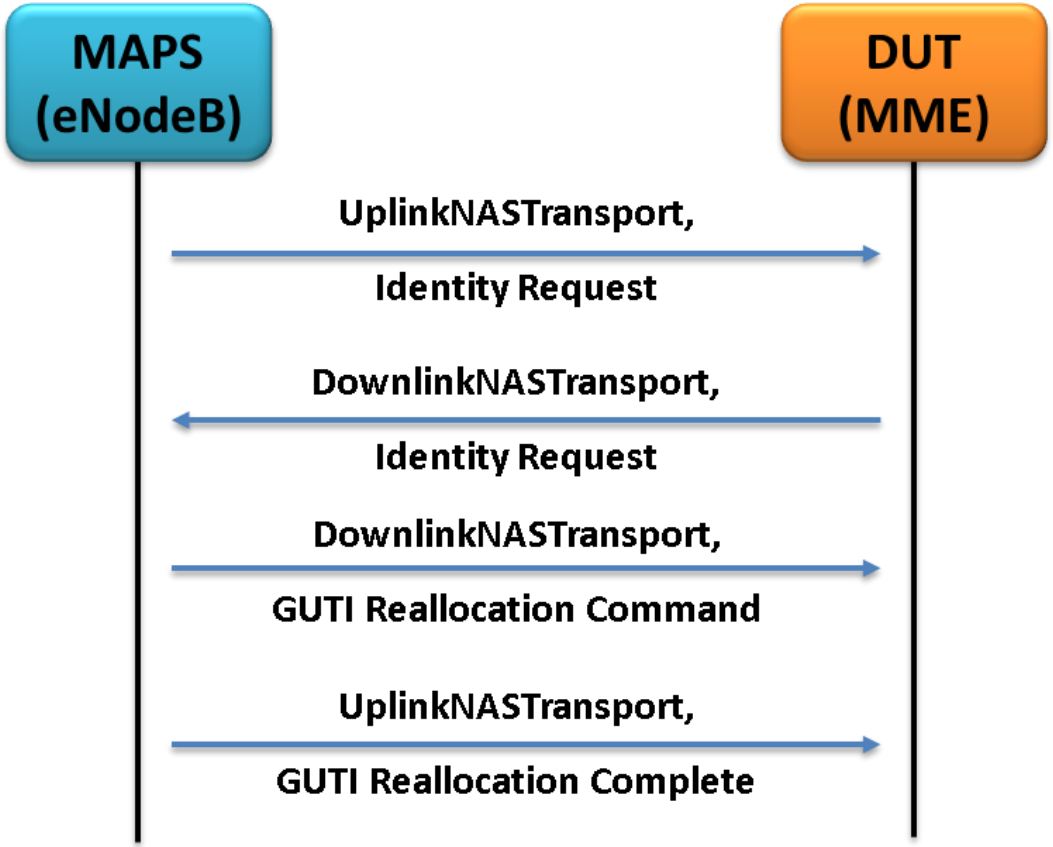
S1AP/NAS Procedures (Contd.)

Modify EP Bearer Context Procedure



Identification & GUTI Reallocation Procedure



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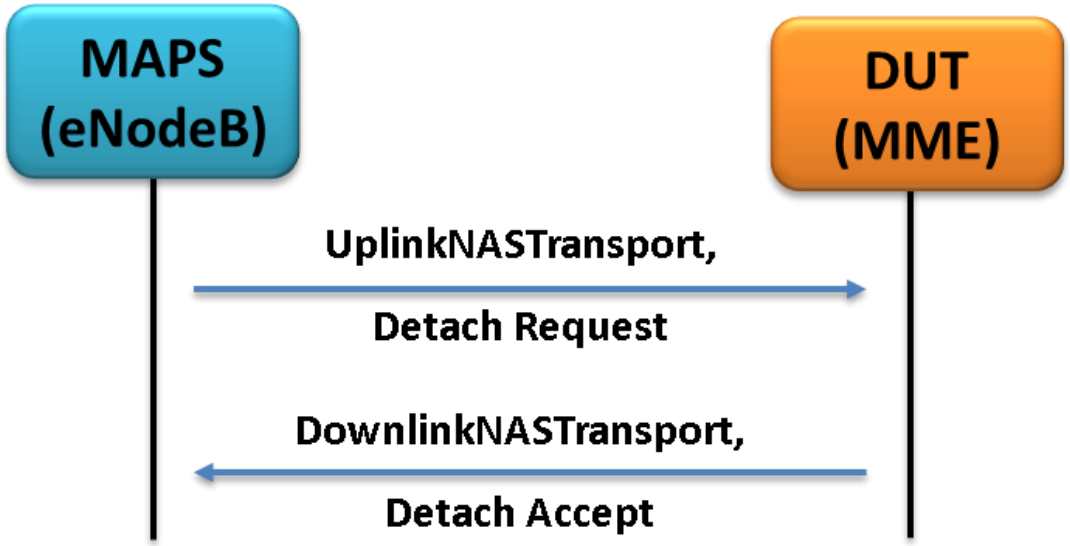
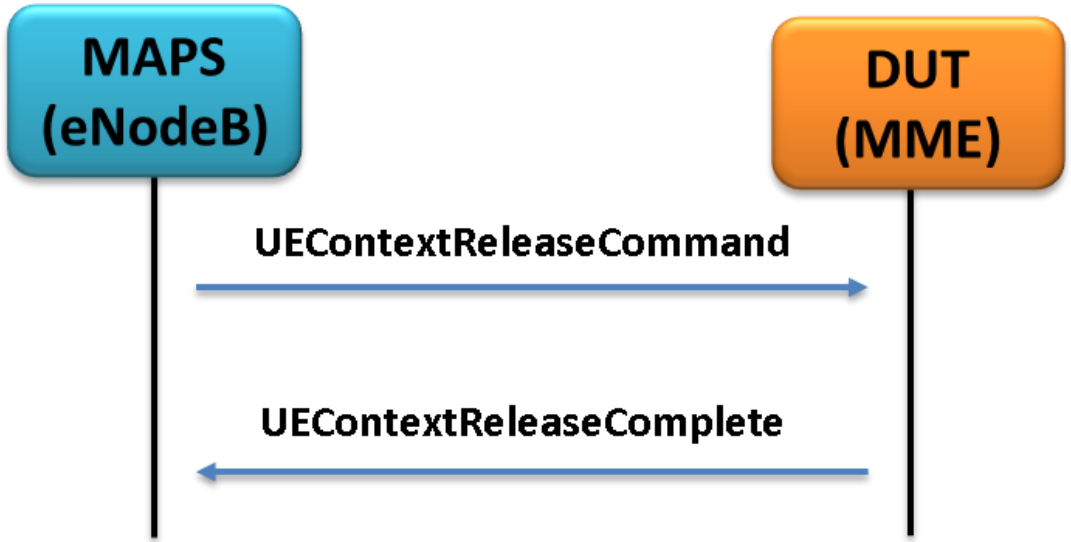
S1AP/NAS Procedures (Contd.)

Detach Procedure



UE Context Release Procedure



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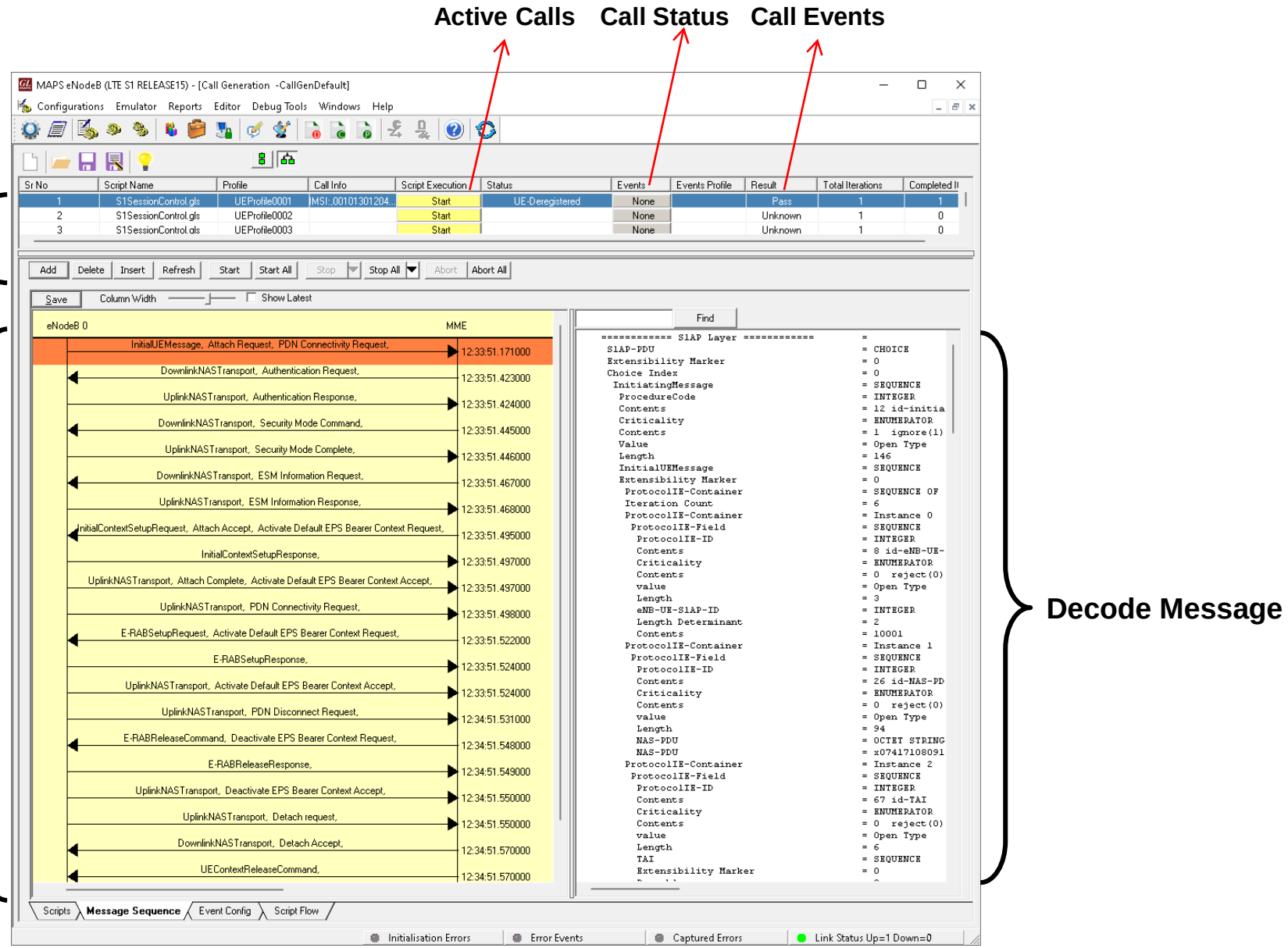
MAPS™ LTE S1 Call Generation



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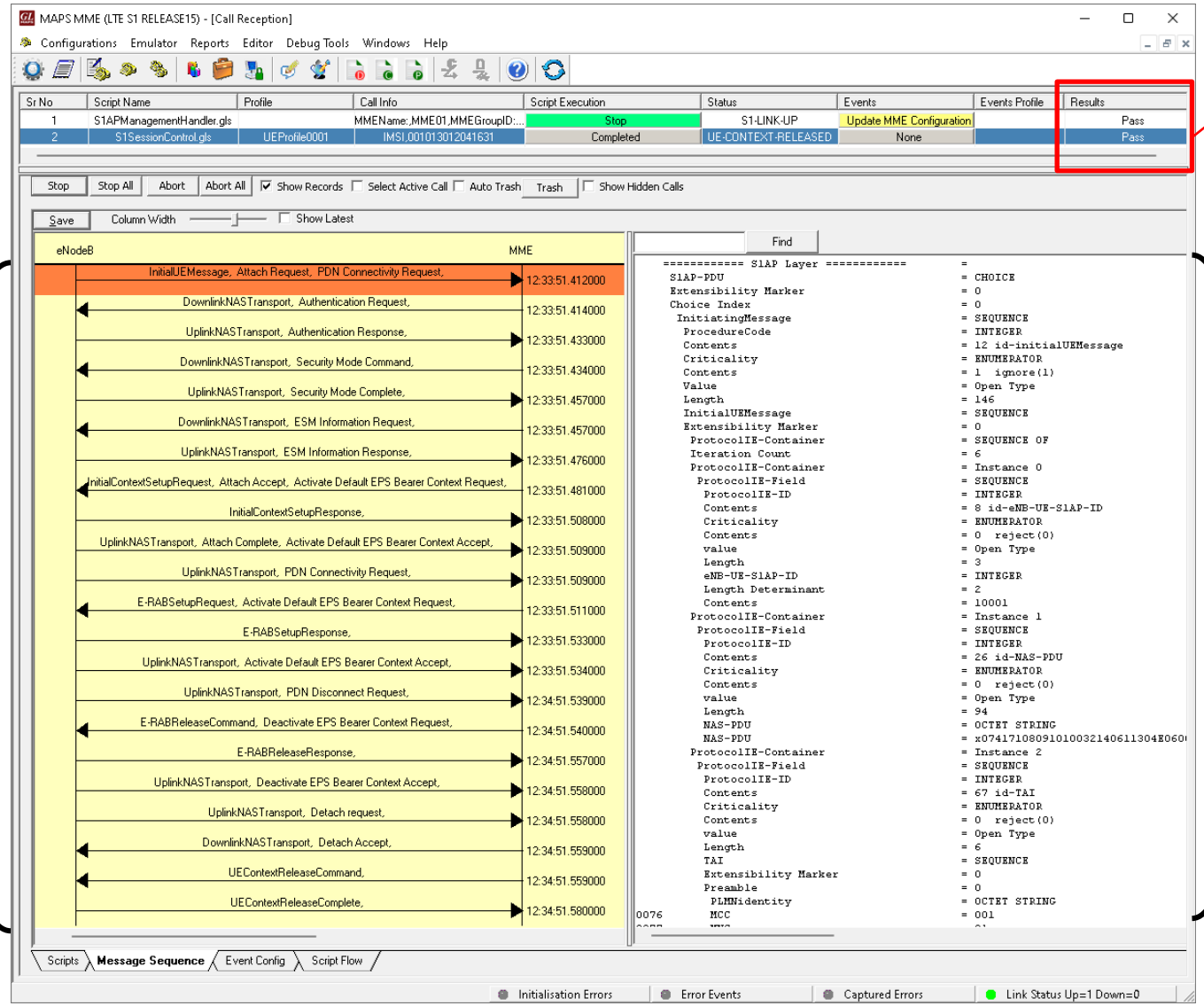
MAPS™ LTE S1 Call Reception

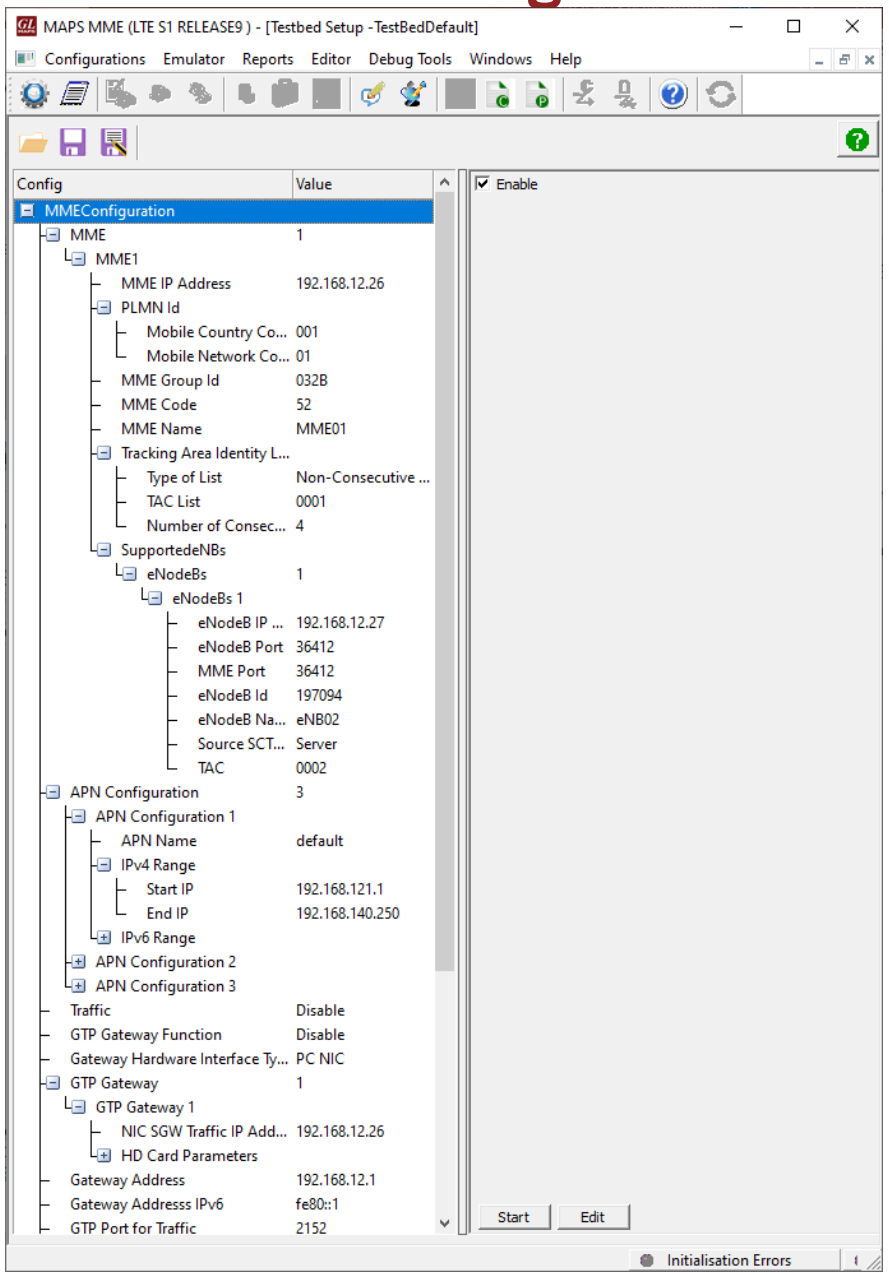


Call Results

Message Sequence

Decode Message

Testbed Configuration



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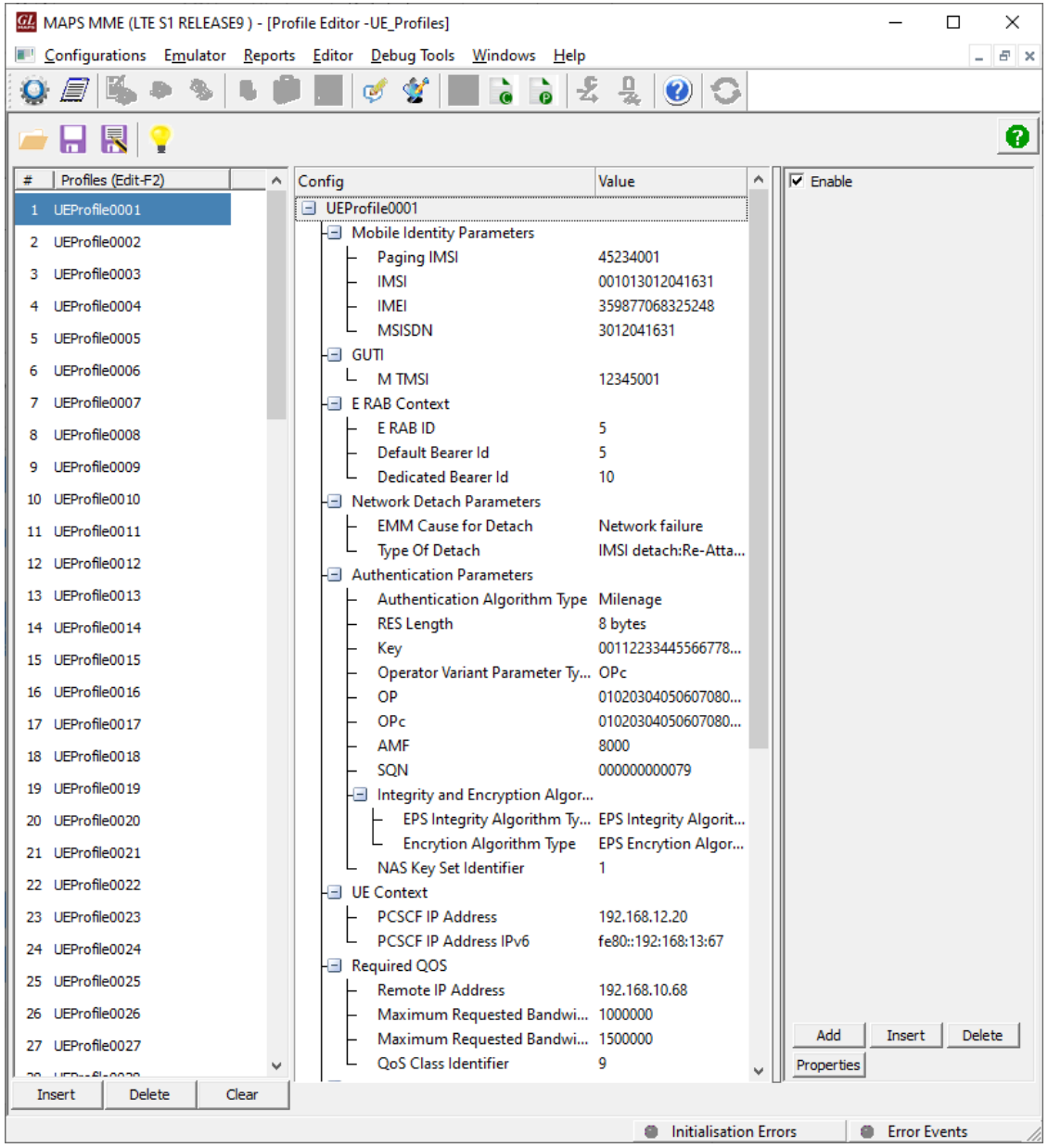
Profile Configuration



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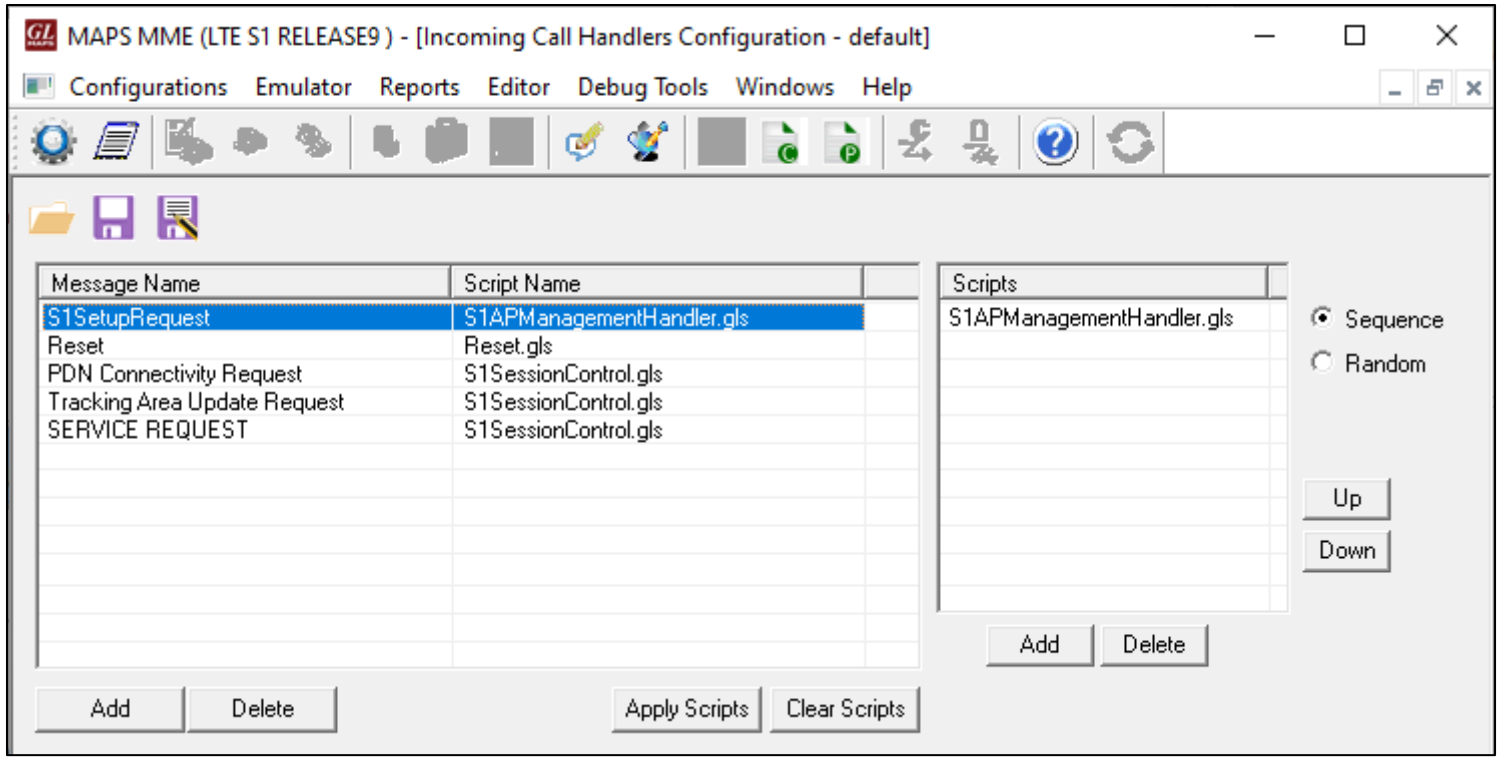
Incoming Call Handler Configuration

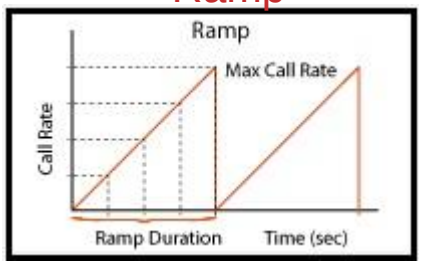


Load Generation

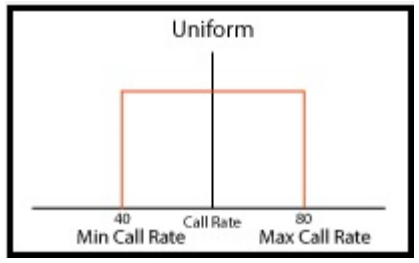
- Stability/Stress and Performance testing using Load Generation
- Different types of Load patterns to distribute load
- User can load multiple patterns for selected script
- User configurable Test Duration, CPS, Maximum and Minimum Call Rate etc.

Fixed

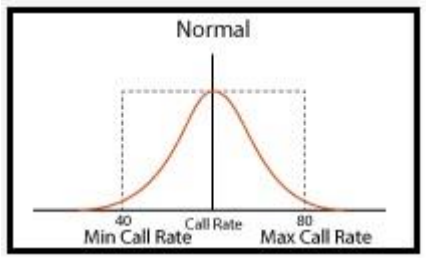
Ramp



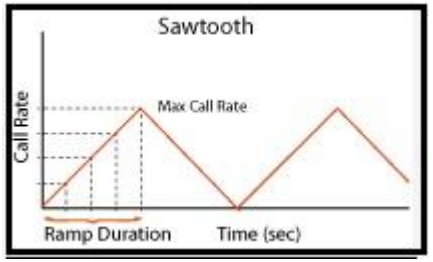
Uniform



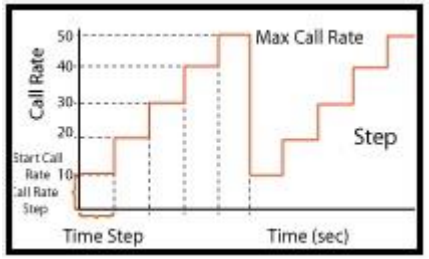
Normal

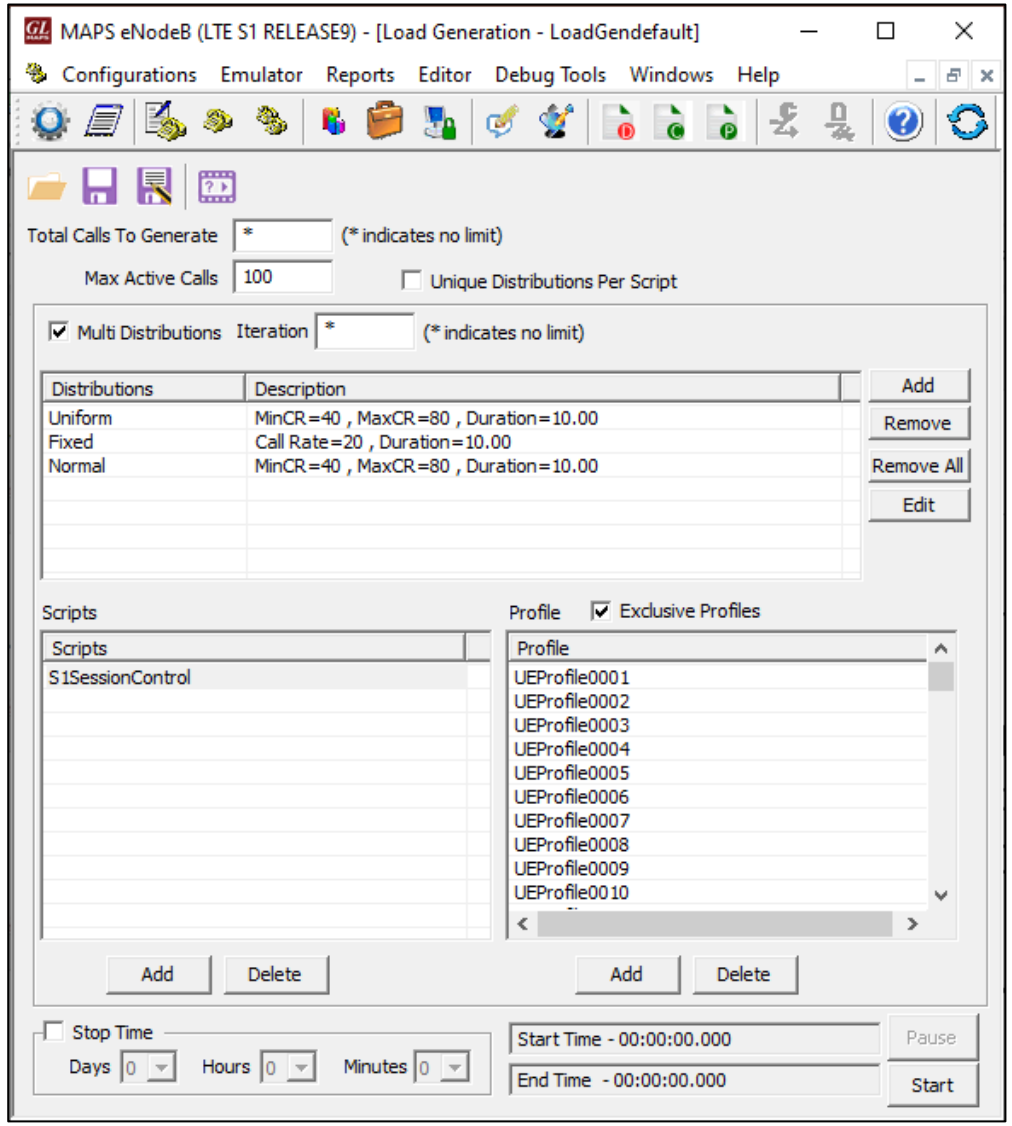


Saw-tooth



Step





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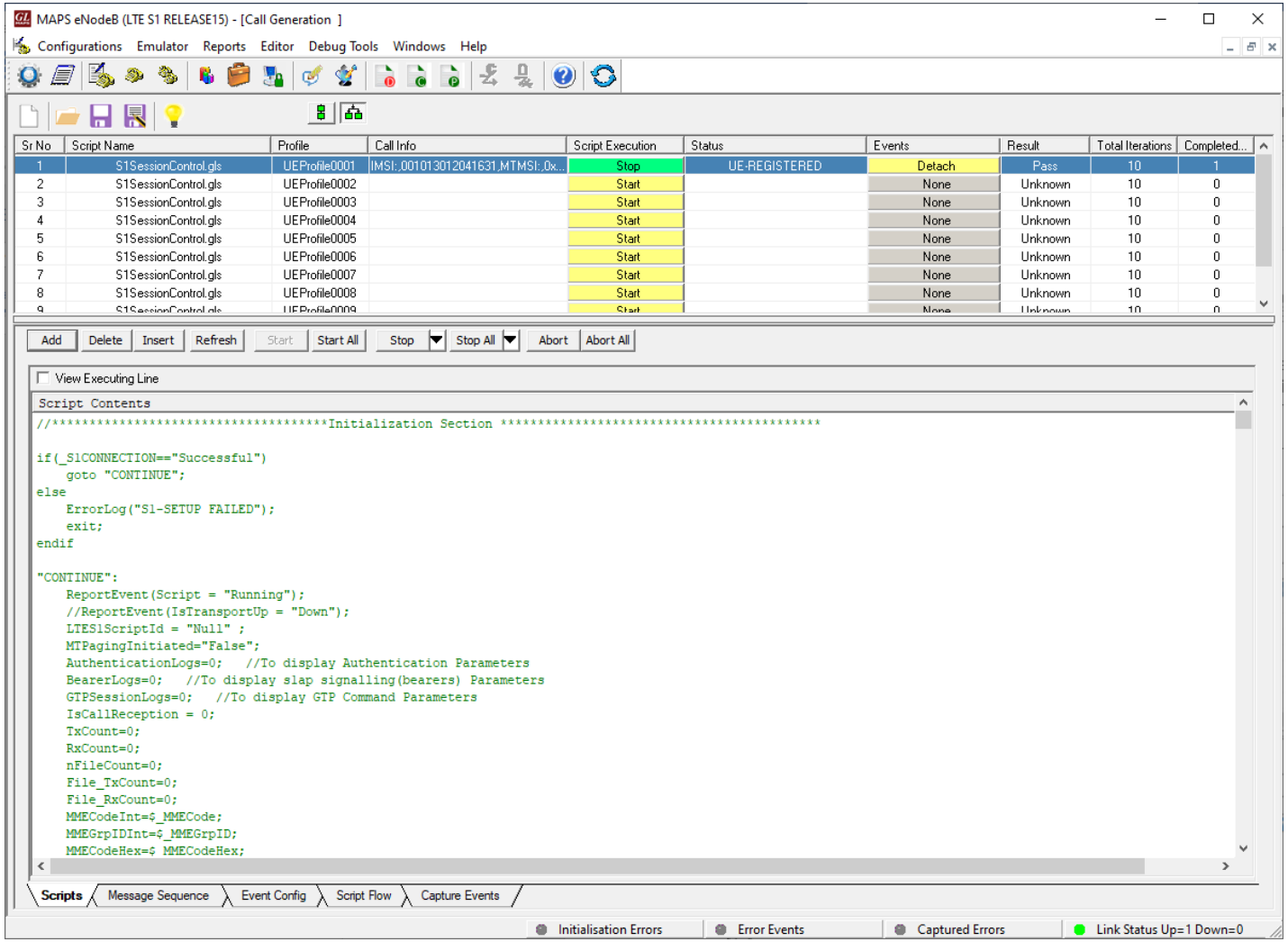
MAPS™ LTE S1 Bulk Call Generation



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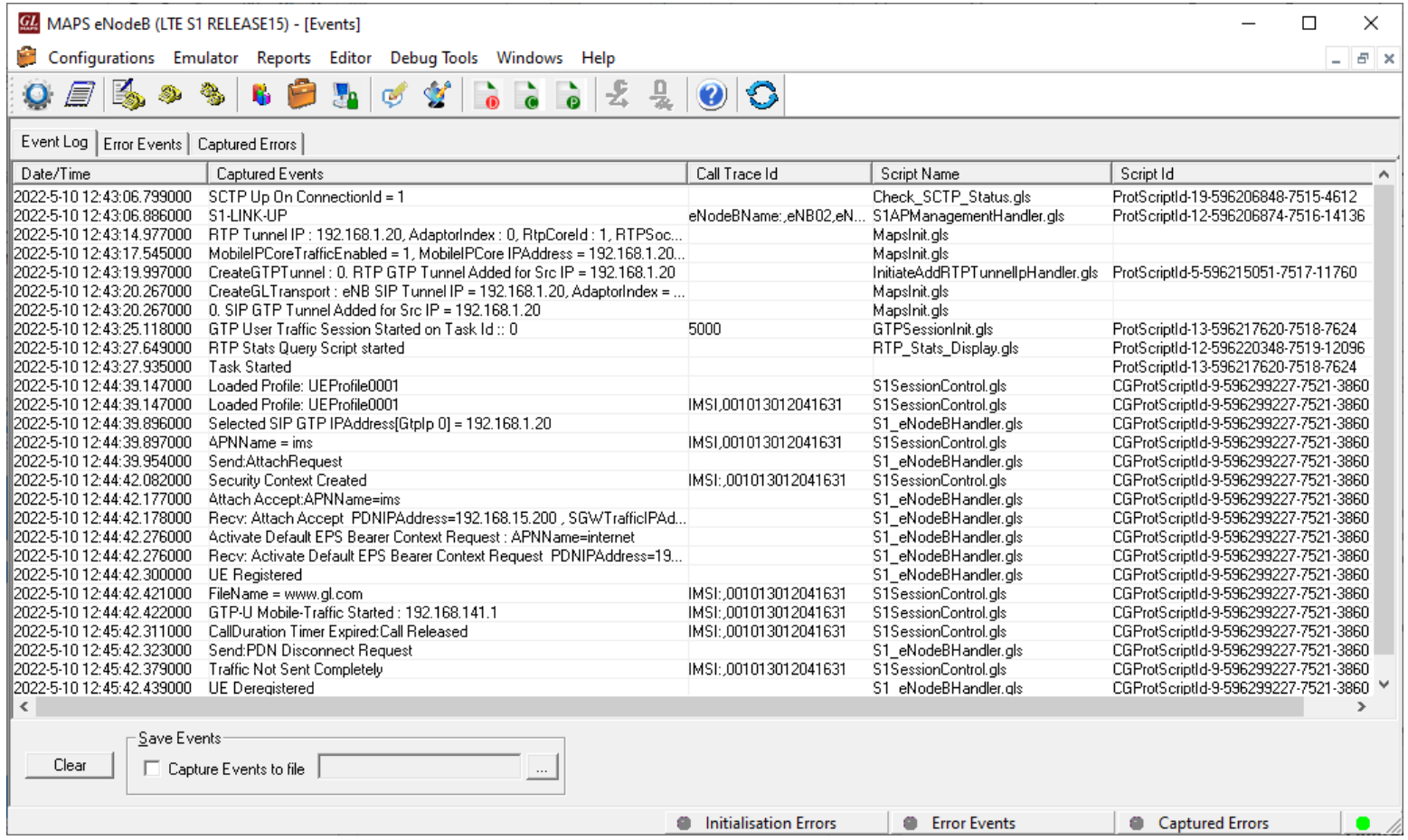
MAPS™ LTE S1 Events Log



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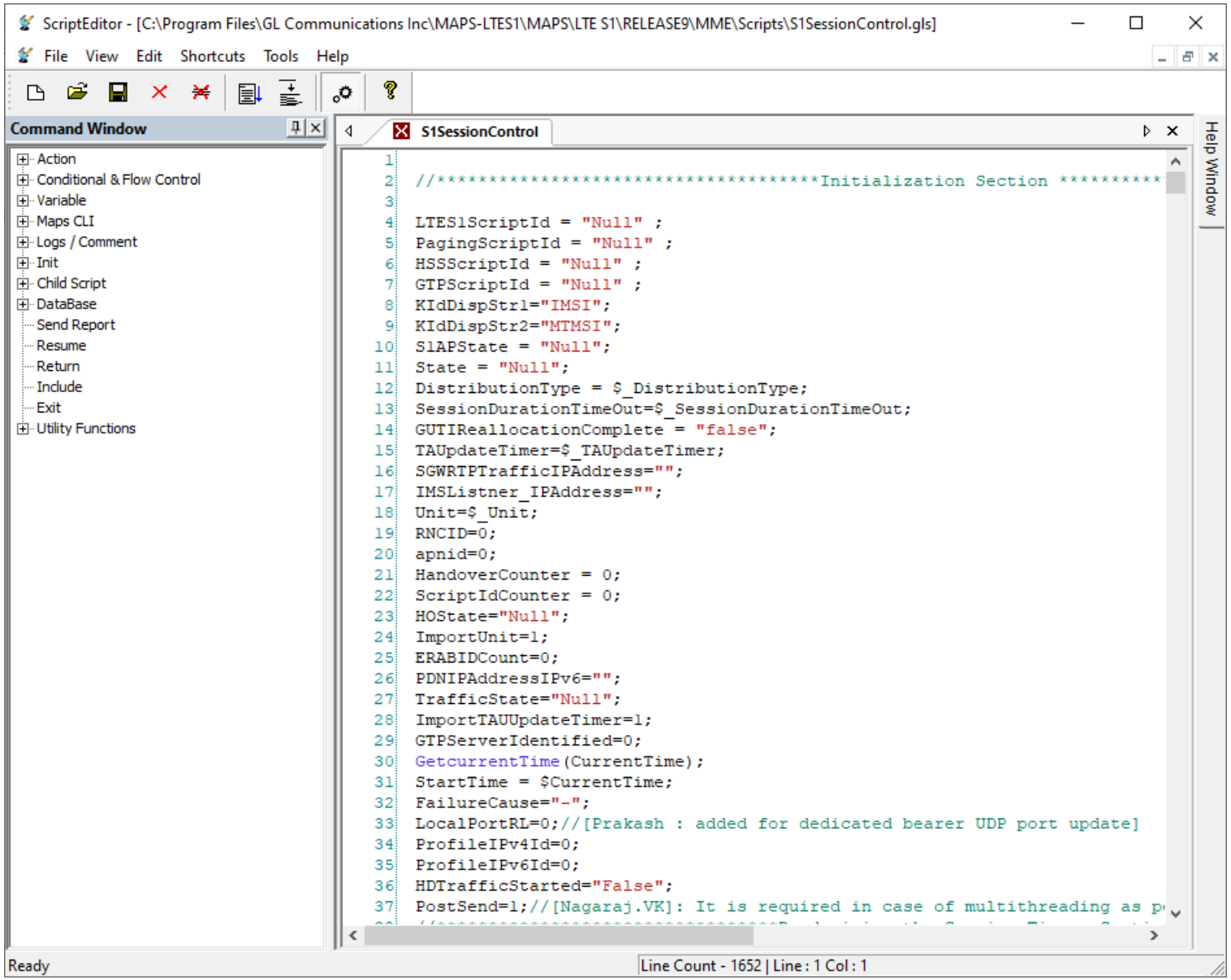
Customizations - Call Flow (Scripts)



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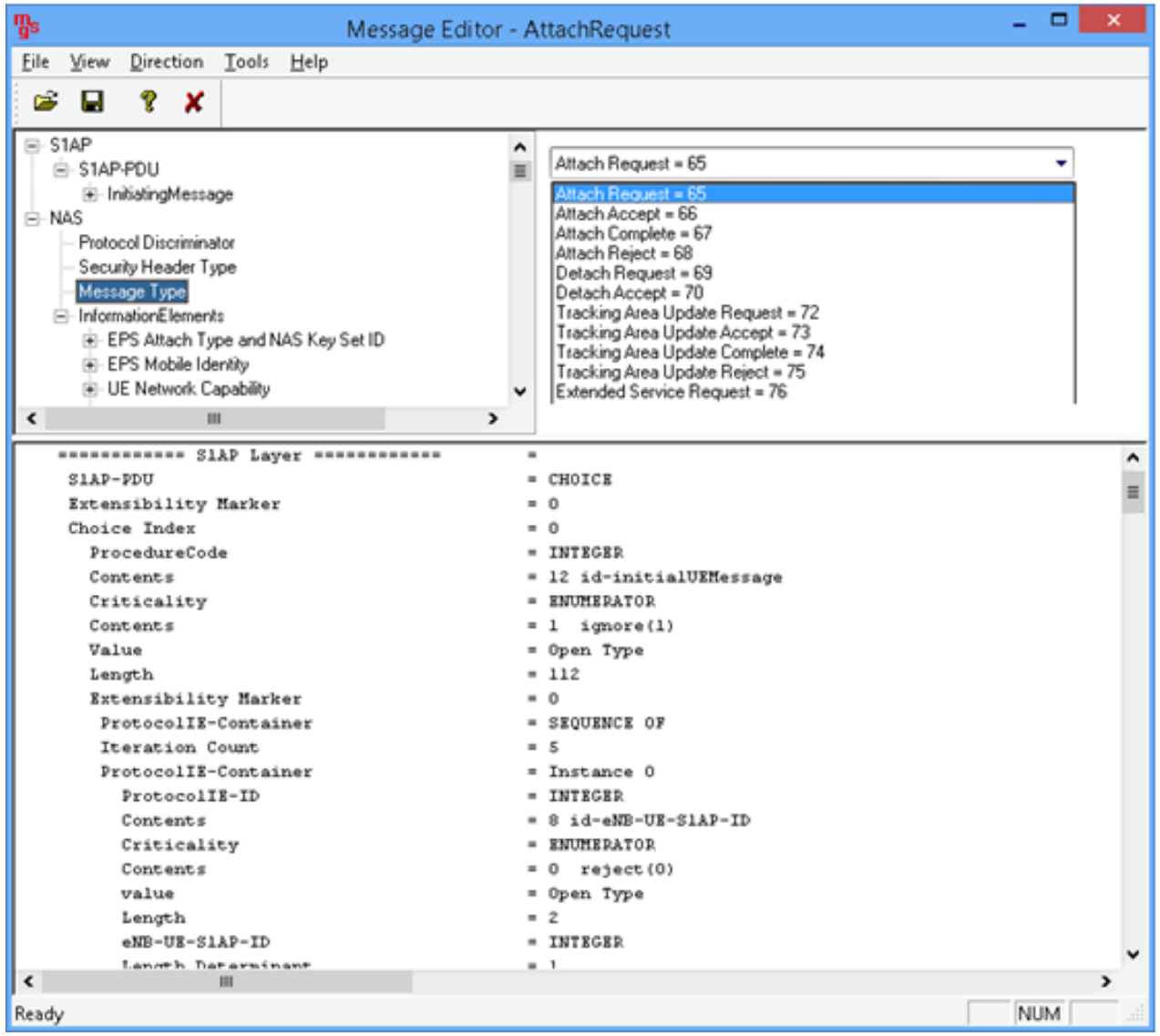
Customizations - Protocol Messages



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Customizations - Statistics and Reports

MOS, R-Factor

Packet Loss

Packets

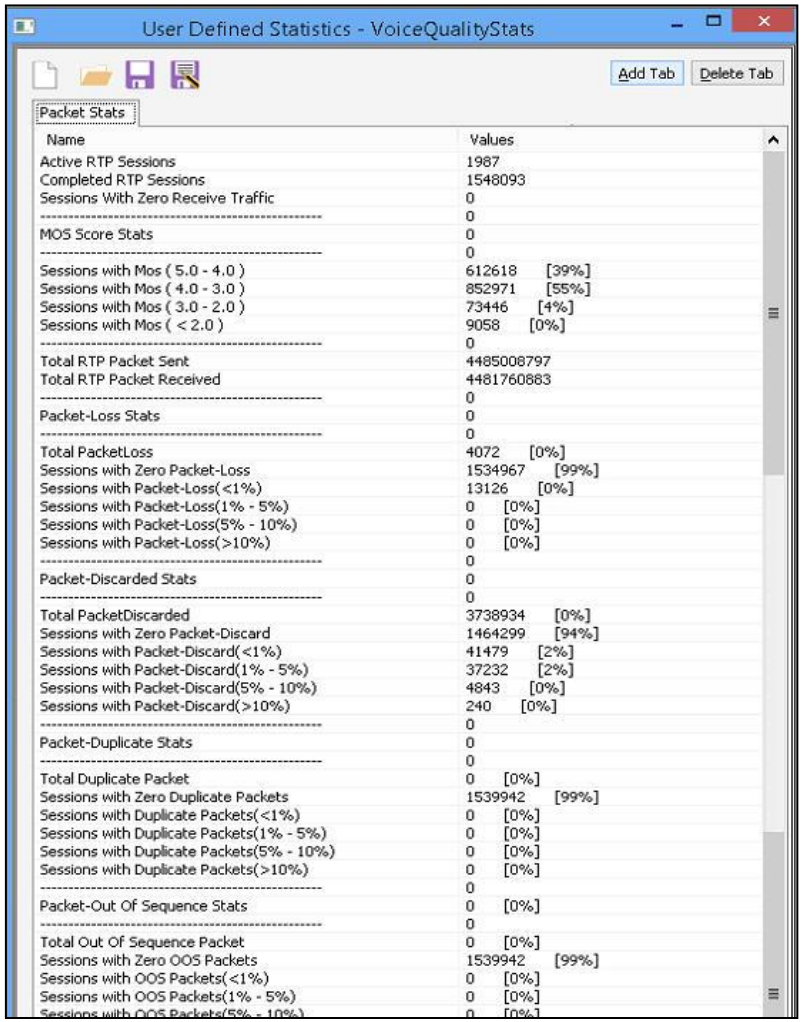
Discarded

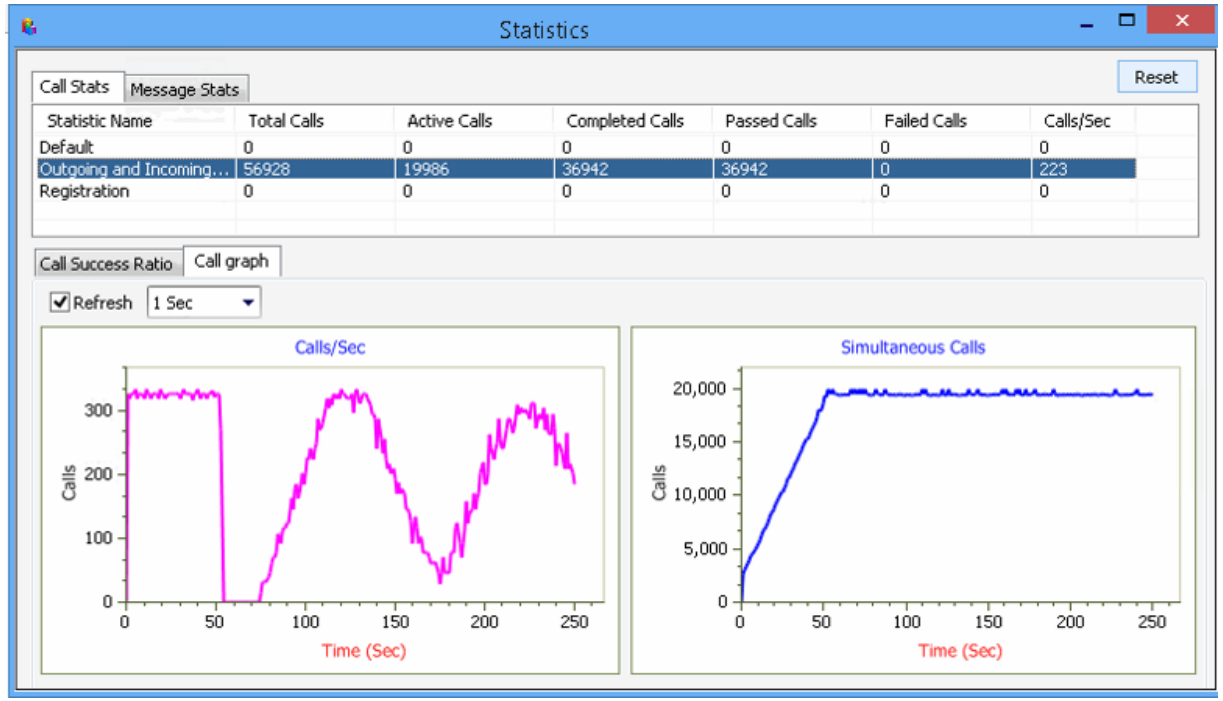
Duplicate Packets

Out-Of-Sequence

Packets

Jitter Statistics





Call Stats provide a running tabular log of system level stats, tracked stats include Total Calls, Active Calls, Completed Calls, Passed Calls, Failed Calls, Instantaneous Calls/Sec

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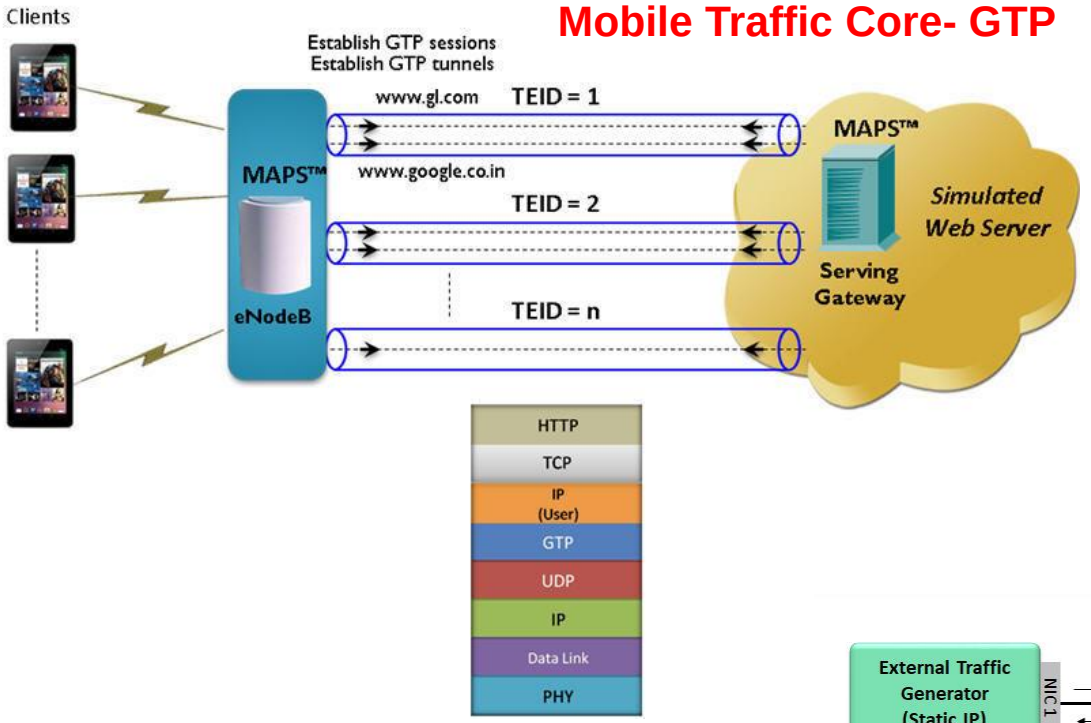
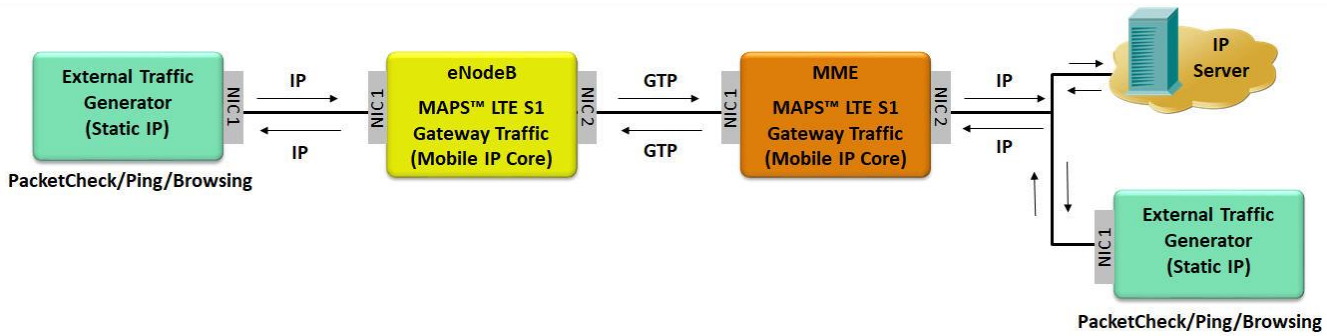
Mobile Traffic Core – GTP and Gateway

Mobile Traffic Core- GTP



- Mobile Traffic Core - GTP (ETH101) – module supports simulation for user-plane packet transmission and reception, generation and verification of data traffic and services between any two nodes in LTE and UMTS networks.

Mobile Traffic Core - Gateway



- Mobile Traffic Core – (ETH102) Gateway module allows simulation of Gateway Traffic to test media gateway telephony interfaces over IP and generate, verify the data traffic like Email, FTP, Web (HTTP), Video, and more.

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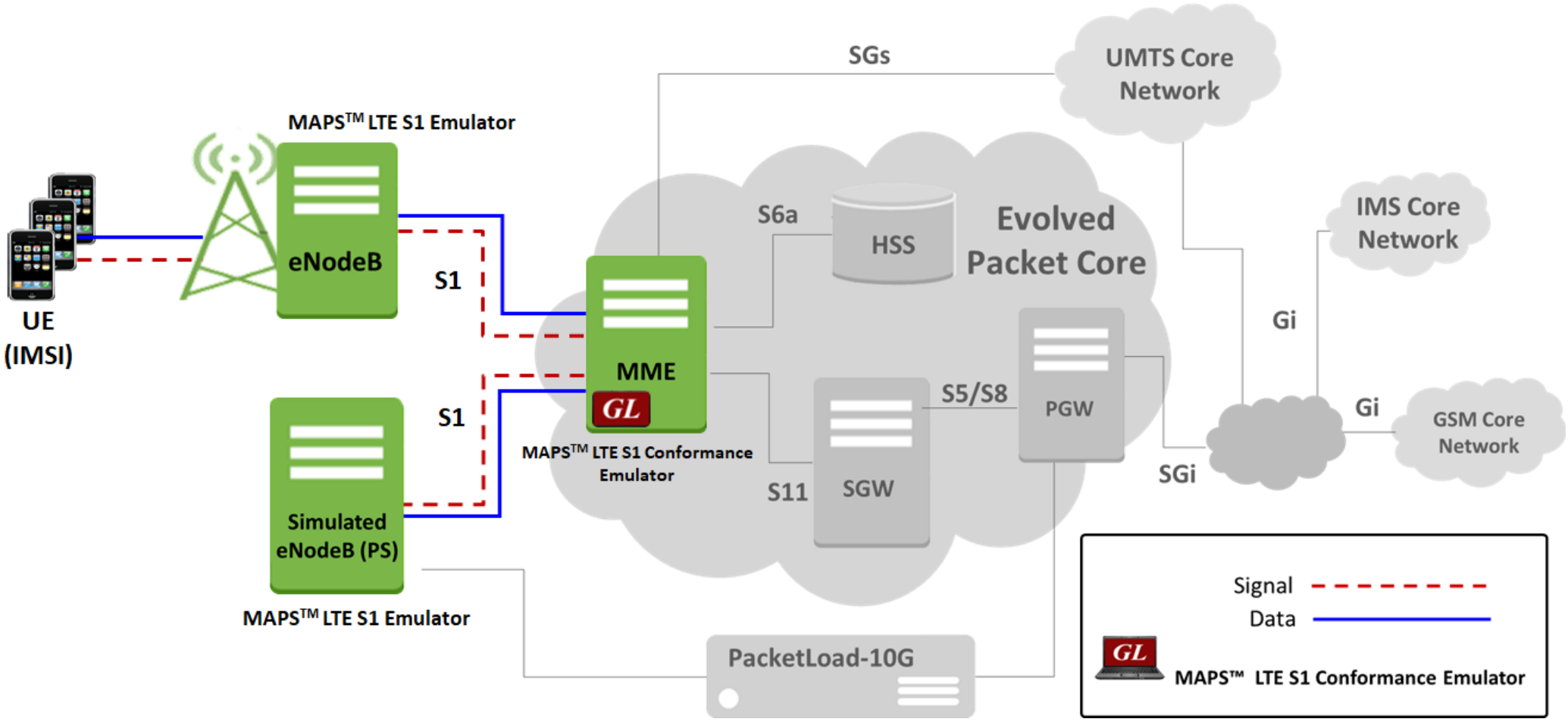

Overview

- GL's MAPS™ LTE Conformance Test Suite is designed with 50+ test cases, as per 3GPP TS 36.413 (LTE S1) specifications
- Includes inbuilt conformance scripts (*.gls) for MME conformance in S1 interface as per 3GPP standards
- Supports LTE Control plane
- Simulates MME Node
- Generates and process S1/NAS (valid and invalid) messages
- Insertion of impairments to create invalid messages
- Supports customization of call flow and message templates using Script and Message Editor
- Ready-to-use scripts for quick testing
- Supports scripted call generation and automated call reception
- Provides Call Statistics and Events Status

Supported Test Cases

Following are the supported test cases -

- Paging success/failure
- Paging via IMSI success/failure
- UE attach success, UE detach, UE tracking area update
- Periodic updating
- Service Request
- E-RAB Setup procedures
- Setup context – Fail, Success
- UE Context Release, Modification
- Handover success, failure S1 interface
- S1 Setup success, failure and resend setup
- Reset all resource, partial resource
- Error Indication
- Location report

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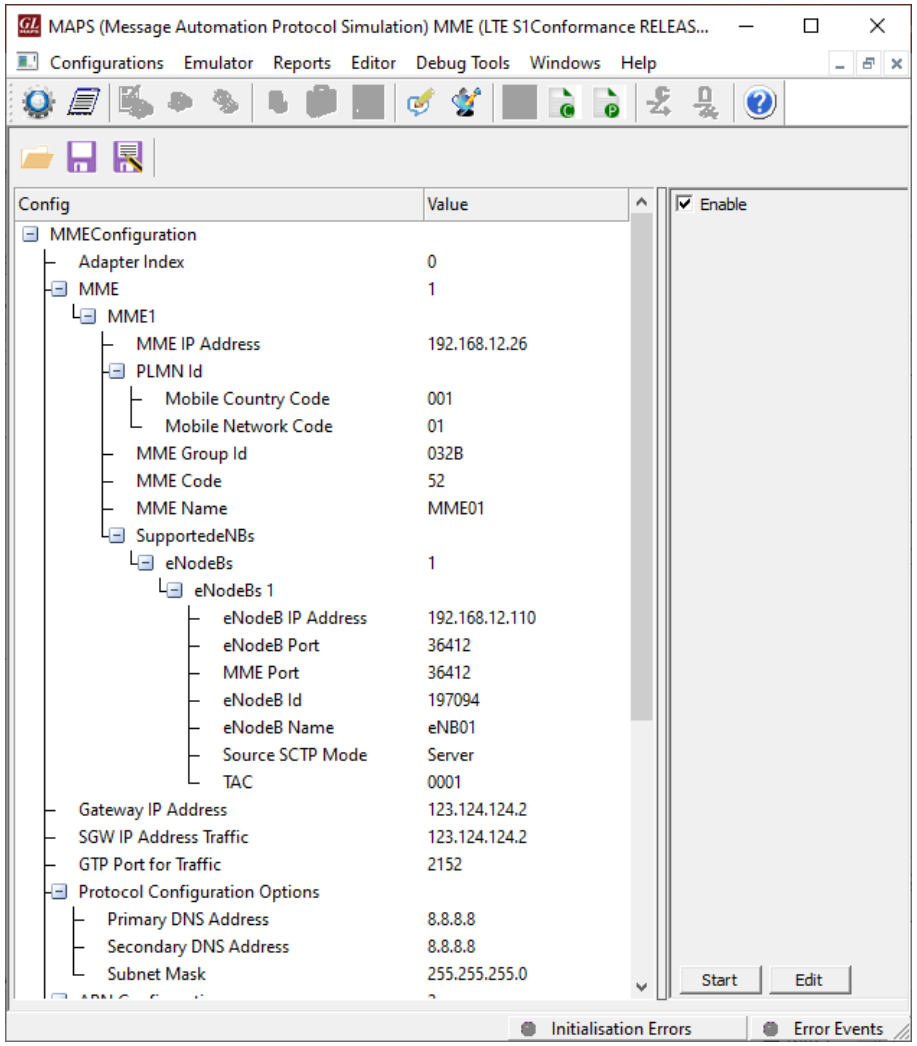
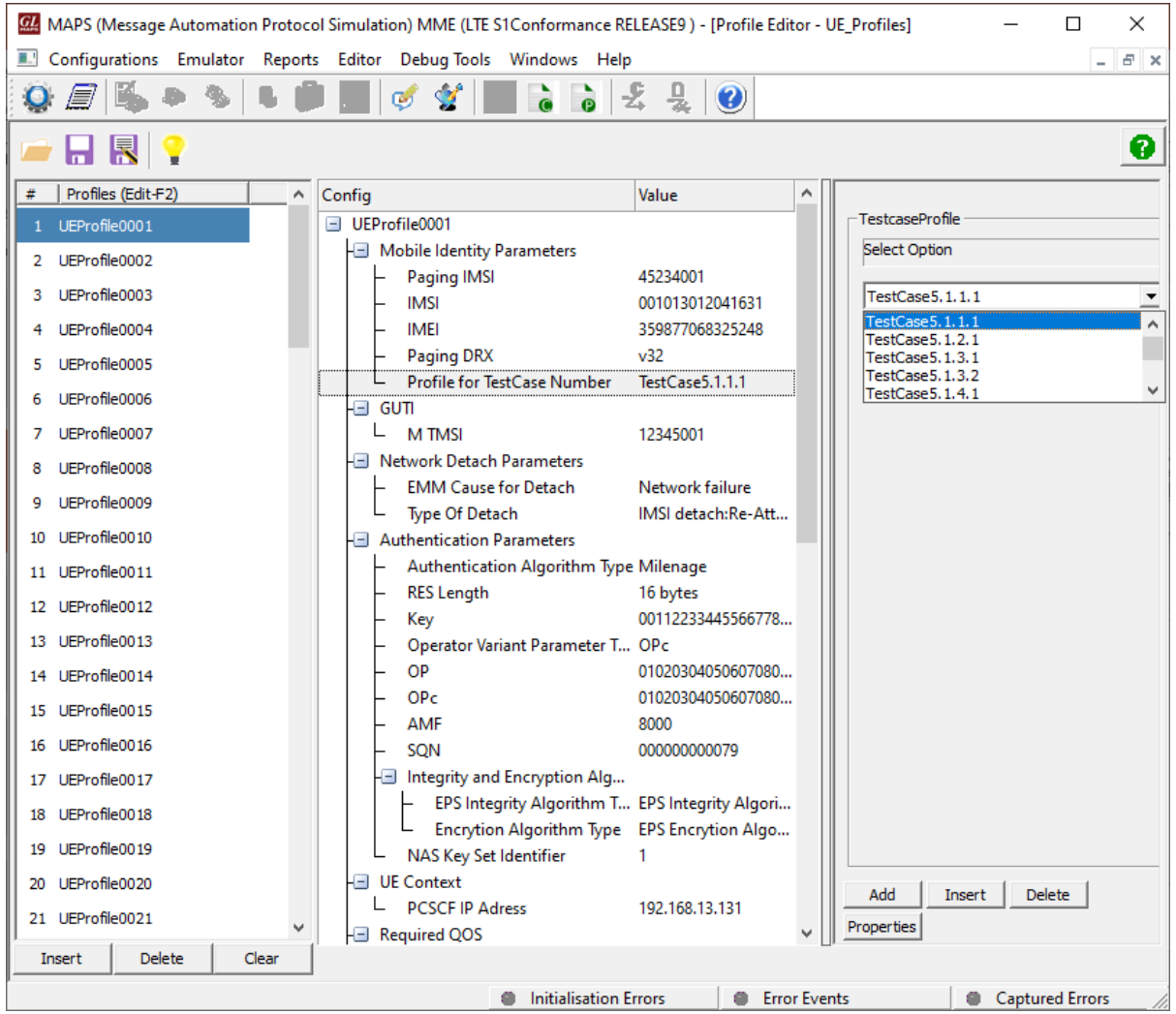
Testbed Setup and Profile Editor

Testbed Setup



UE Profile



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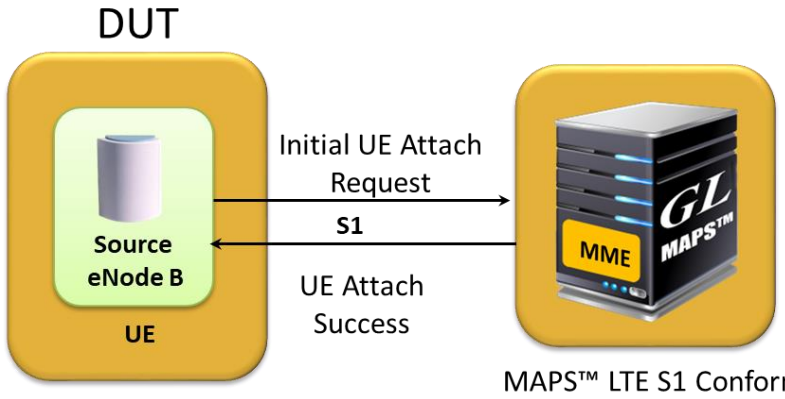
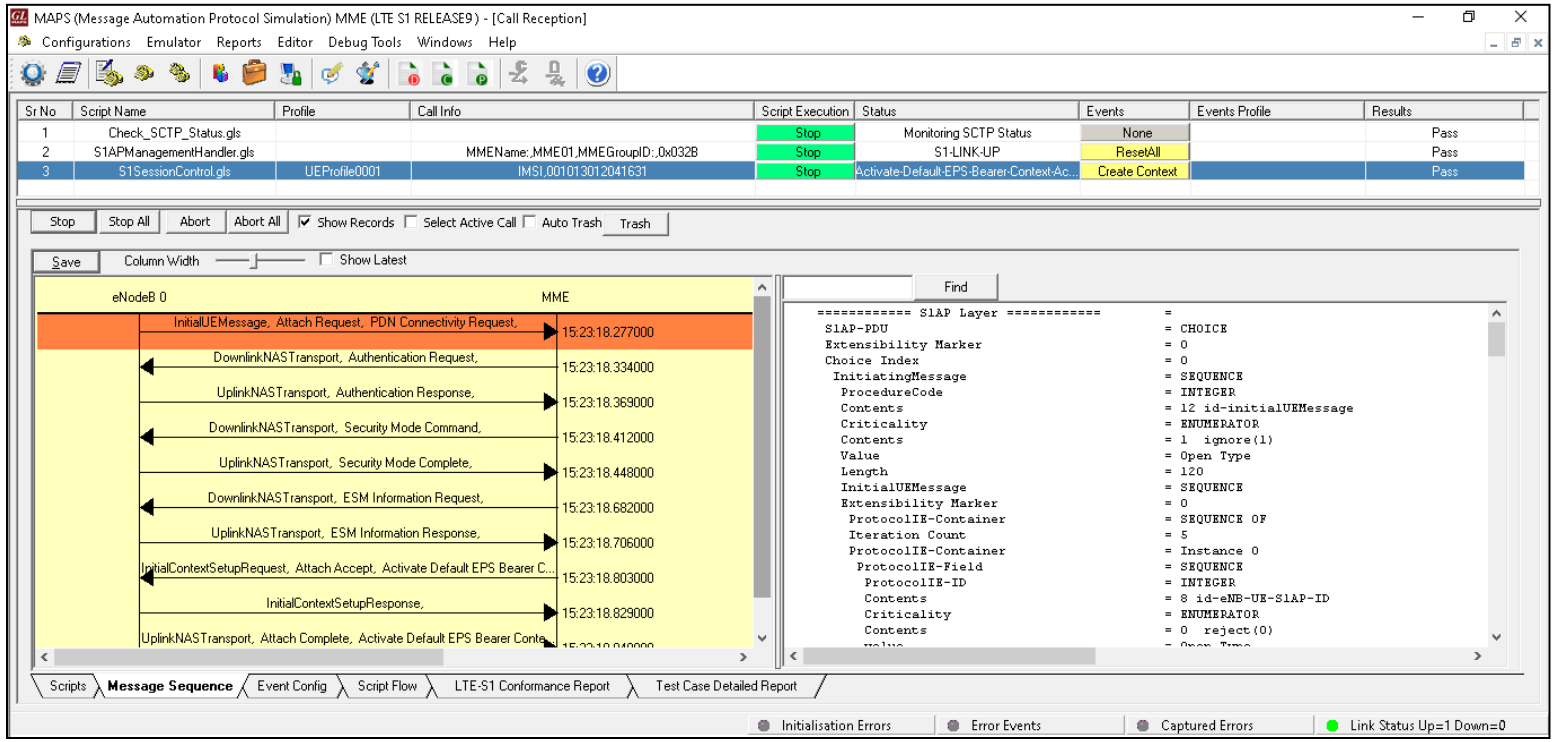
UE Attach Success Conformance Emulation



MAPS™ LTE S1 Conformance



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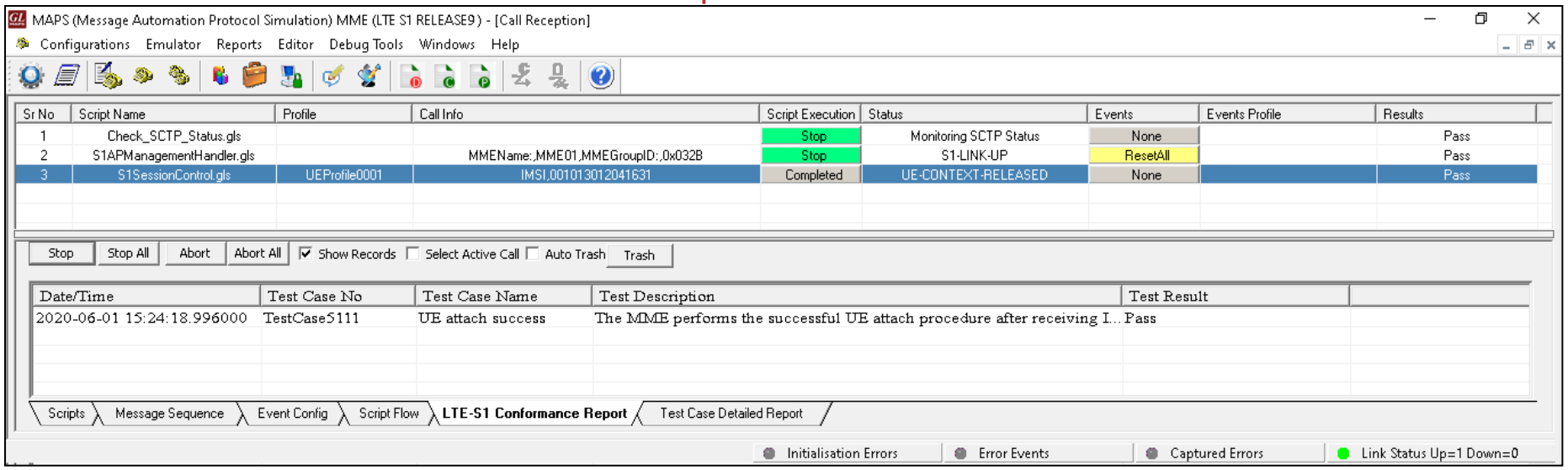
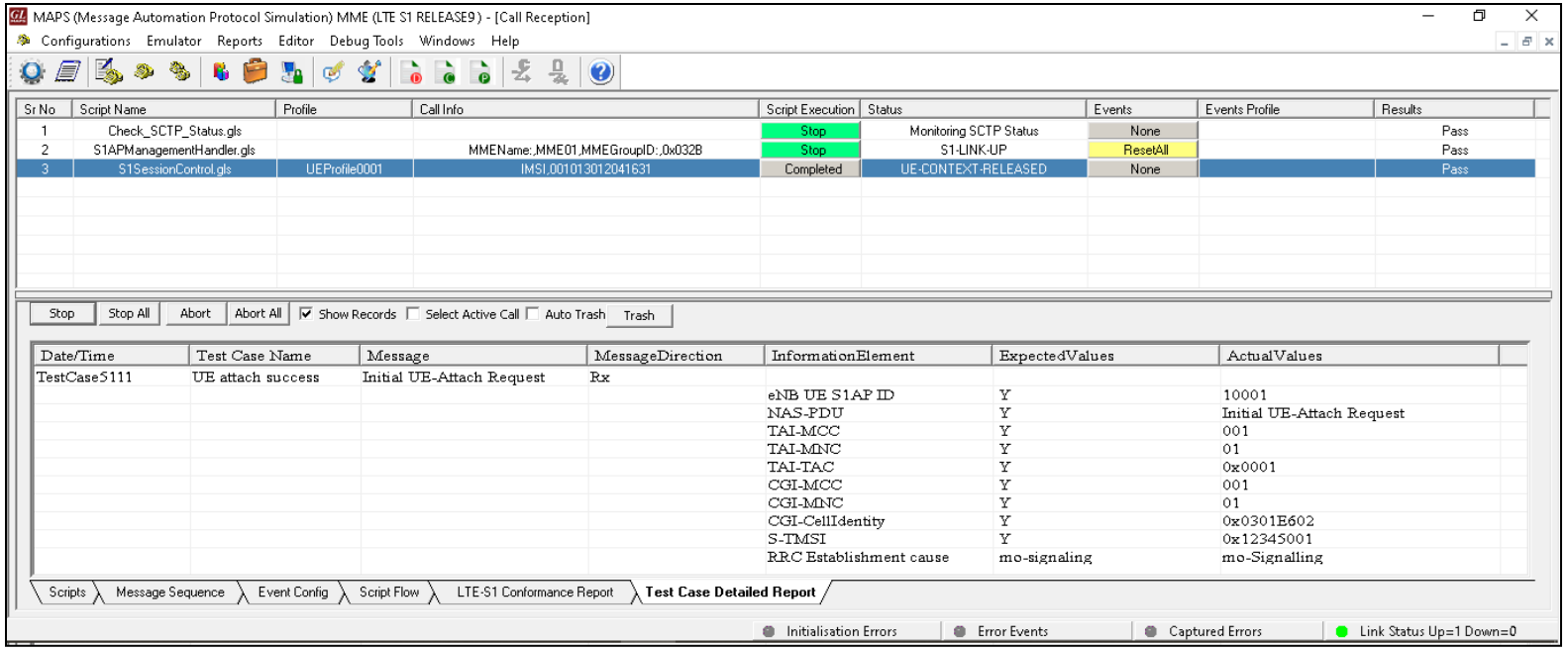
Reports

LTE S1 Conformance Report



Test Case Detailed Report



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Thank you