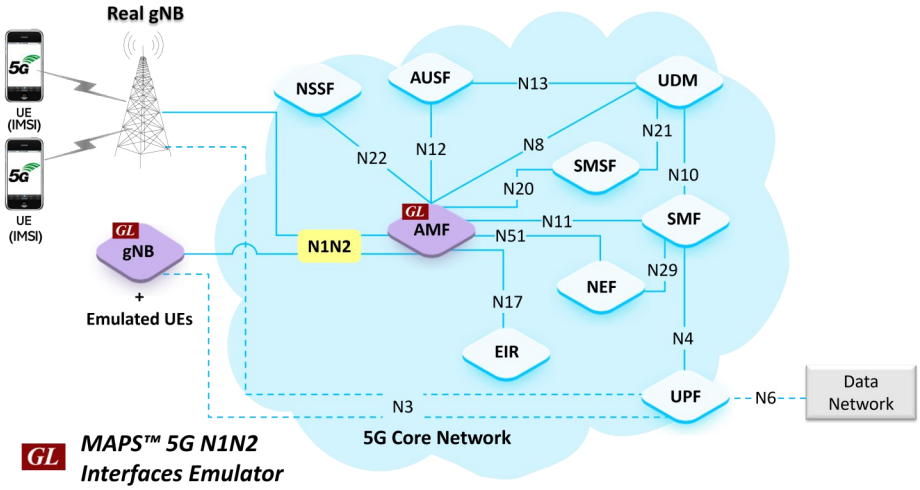
MAPS™ 5G N1N2 (NGAP) Emulator



Overview

GL's **Message Automation & Protocol Simulation (MAPS™)** is enhanced to test 5G N1N2 interface that can emulate gNodeB (gNB), and AMF (Access and Mobility Management Function) according to 3GPP standards (Release 17).

It supports Non-Access-Stratum (NAS) signaling on N1N2 interface between UE and AMF. It also supports NGAP to emulate signaling services between NG-RAN and AMF.

MAPS™ N1N2 Interface emulator supported procedures include - NG Reset, NG Setup, Initial Context Setup, UE Context Release, Registration, De-registration, Primary authentication and key agreement procedure, Security mode control, Identification and PDU session management and SMS over NAS. The application gives the users an unlimited ability to edit NGAP/NAS message and call scenarios (message sequences).

In addition to control plane emulation the application supports generation and verification of traffic, including VoNR (Voice) calls with SIP signaling and RTP Traffic generation. It also emulates mobile traffic such as HTTP, FTP, Video by playing back real capture stateful over established TCP connection with additional licenses - Mobile Traffic Core – GTP (ETH101) and Mobile Traffic Core – Gateway (ETH102).

GL MAPS™ is not only used for protocol validation but also for performance and capacity by emulating tens of thousands of 5G subscribers.

MAPS™ 5G NGAP emulator supports utilities like Message Editor, Script Editor, and Profile Editor which allows new scenarios to be created or modified using 5G NGAP/N1N2 messages and parameters.

For more information, refer to MAPS™ 5G N1N2 Interface Emulator webpage.

Main Features

- MAPS™ 5G N1N2 interface emulates gNodeB and AMF
- Application supports 5G Control Plane and User Plane
- Supported traffic types includes mobile data traffic such as HTTP and VoNR
- Generates and processes NGAP/NAS (valid and invalid) messages
- Includes gateway functionality to forward mobile traffic over GTP to and from external IP network
- 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 detailed Statistics and Events Status
- Emulates tens of thousands of 5G subscribers
- Supports Command Line Interface (CLI) via Python APIs
- Automation, Remote access, and Schedulers to run tests 24/7

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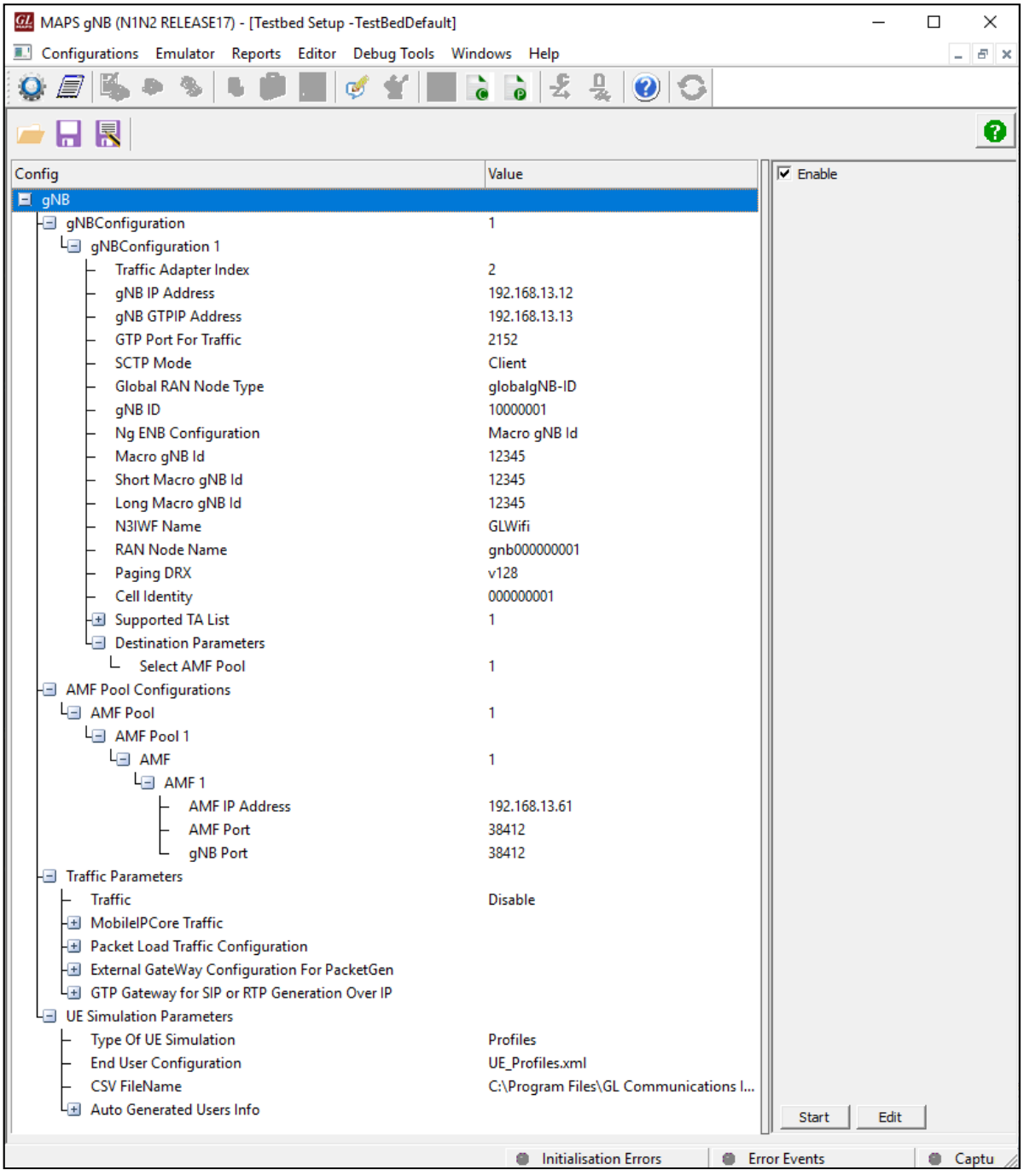
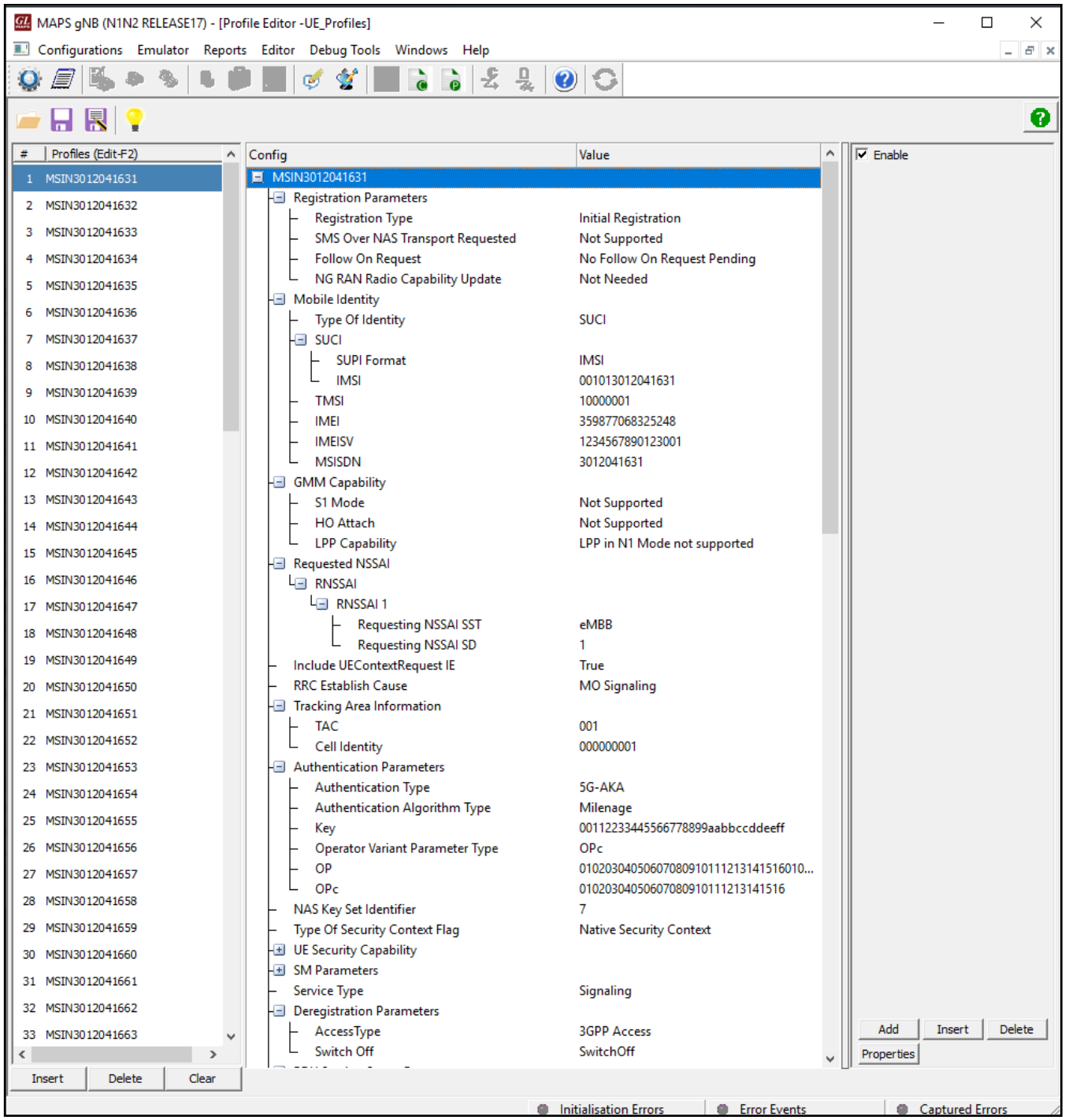
Testbed Configuration

The testbed setup window allows users to setup the required test environment with SCTP configuration in N1N2 interface. SCTP configuration parameters consist of Source/Destination IP addresses, and Port numbers to configure MAPS™ to emulate gNodeB and AMF entities in N1N2 interface. MAPS™ can then generate and receive NGAP/NAS messages to/from valid IP address in the 5G network. End user configuration profile is used to configure MAPS™ 5G N1N2 with supported gNodeB and AMF parameters.



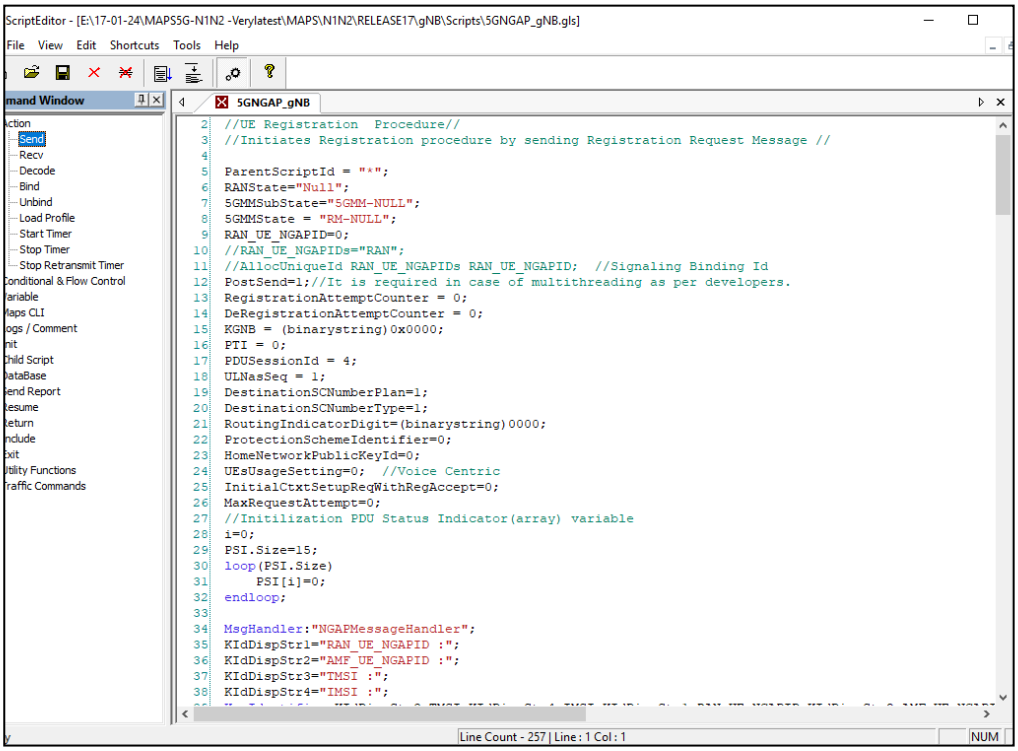
Pre-processing Tools

PROFILE EDITOR - This feature allows loading profile to edit the values of variables using GUI, replacing the original value of variables in the message template. An XML file defines a set of multiple profiles with varying parameter values which allows users to configure call instances in call generation to receive calls. The UE_Profiles includes 5G parameters, that is required to configure multiple UEs to emulate Signaling, Traffic, VoLTE calls. User can configure Mobile Traffic parameters, allowing emulation of offline HTTP Traffic using Mobile IP Core TCP Client Server connections.

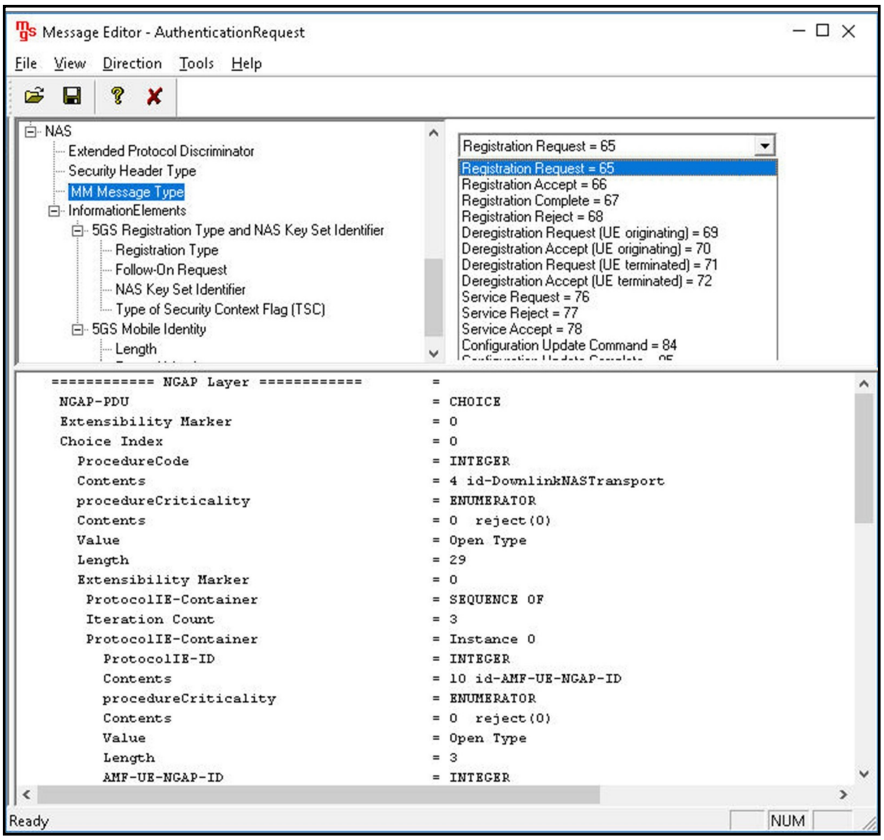


Pre-processing Tools *(Contd.)*

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.



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.



Call Generation and Call Reception

In call generation mode, MAPS™ is configured for the outgoing messages, while in call receive mode, it is configured to respond to the incoming messages. Tests can be configured to run once, multiple iterations and continuously. Also, allows users to create multiple entries using quick configuration feature. The editor allows to run the added scripts sequentially (order in which the scripts are added in the window) or randomly (any script from the list of added script as per the call flow requirements). The test scripts are started manually at call generation, and at the call reception, the script is automatically triggered by incoming messages.

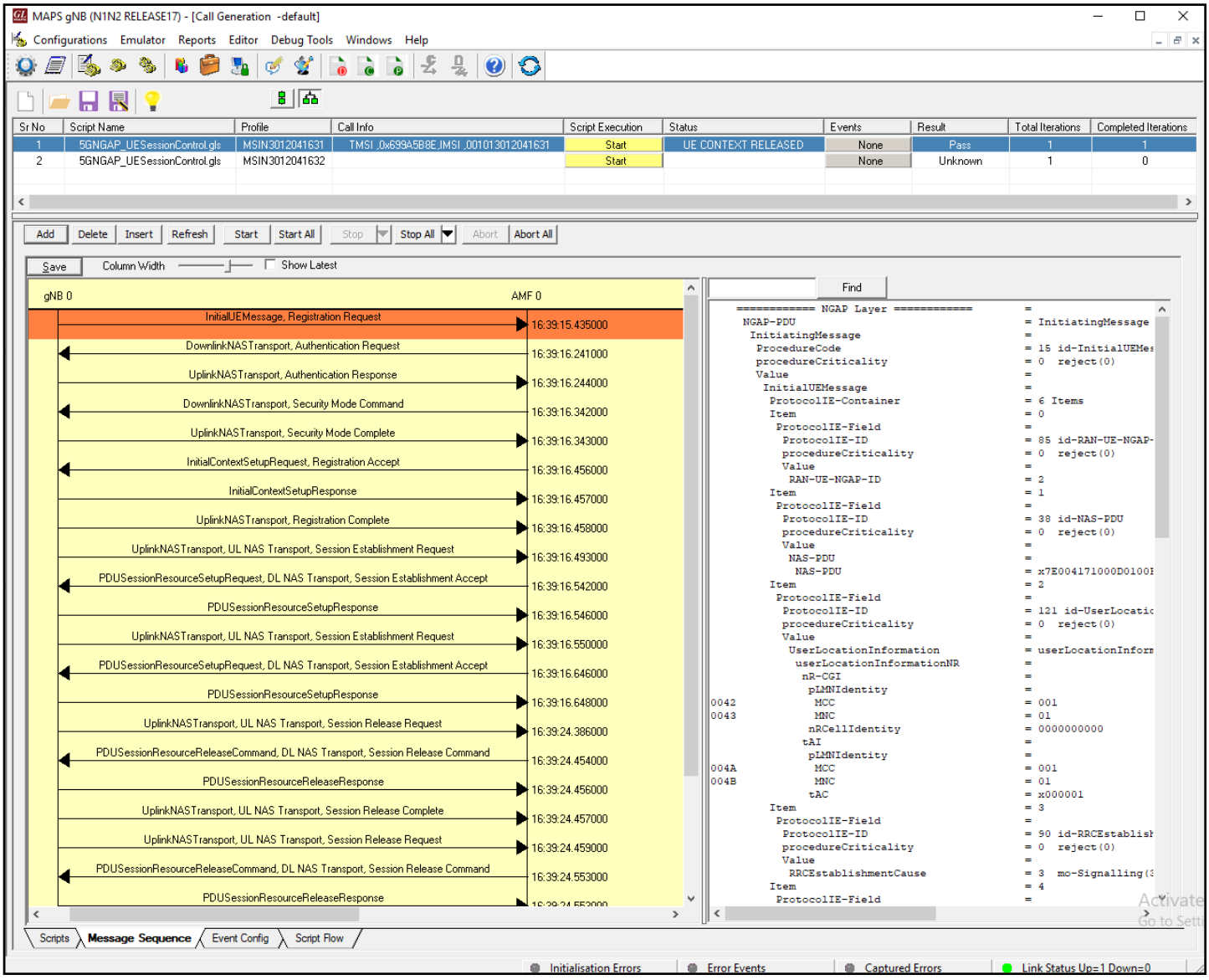


Figure: Call Generation

Call Generation and Call Reception (*Contd.*)

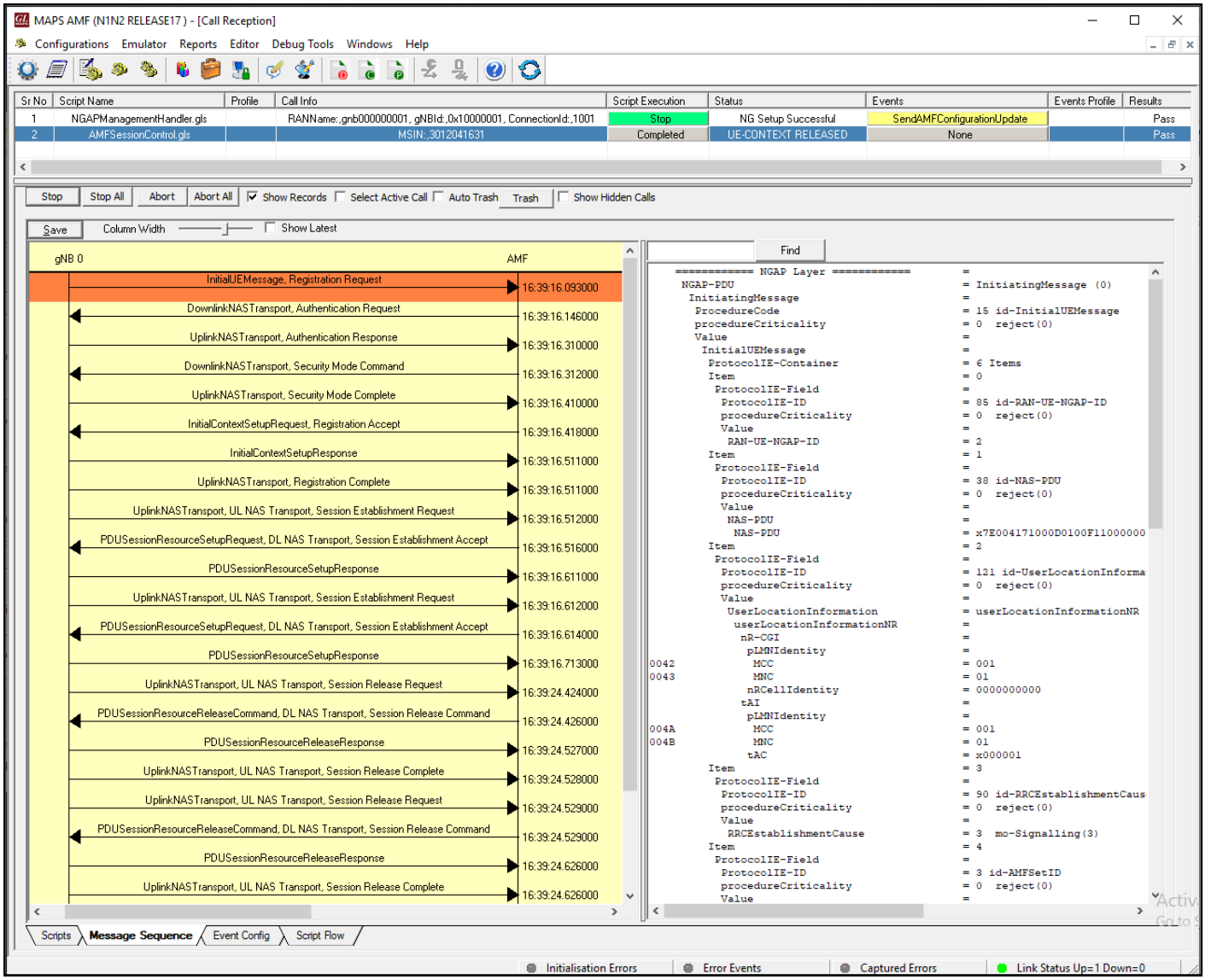


Figure: Call Reception

Emulation of 5G N1N2 Signaling Procedure

The below 5G N1N2 signaling procedure indicates the messages flow between gNodeB (gNB) and AMF, which are emulated using MAPS™ application.

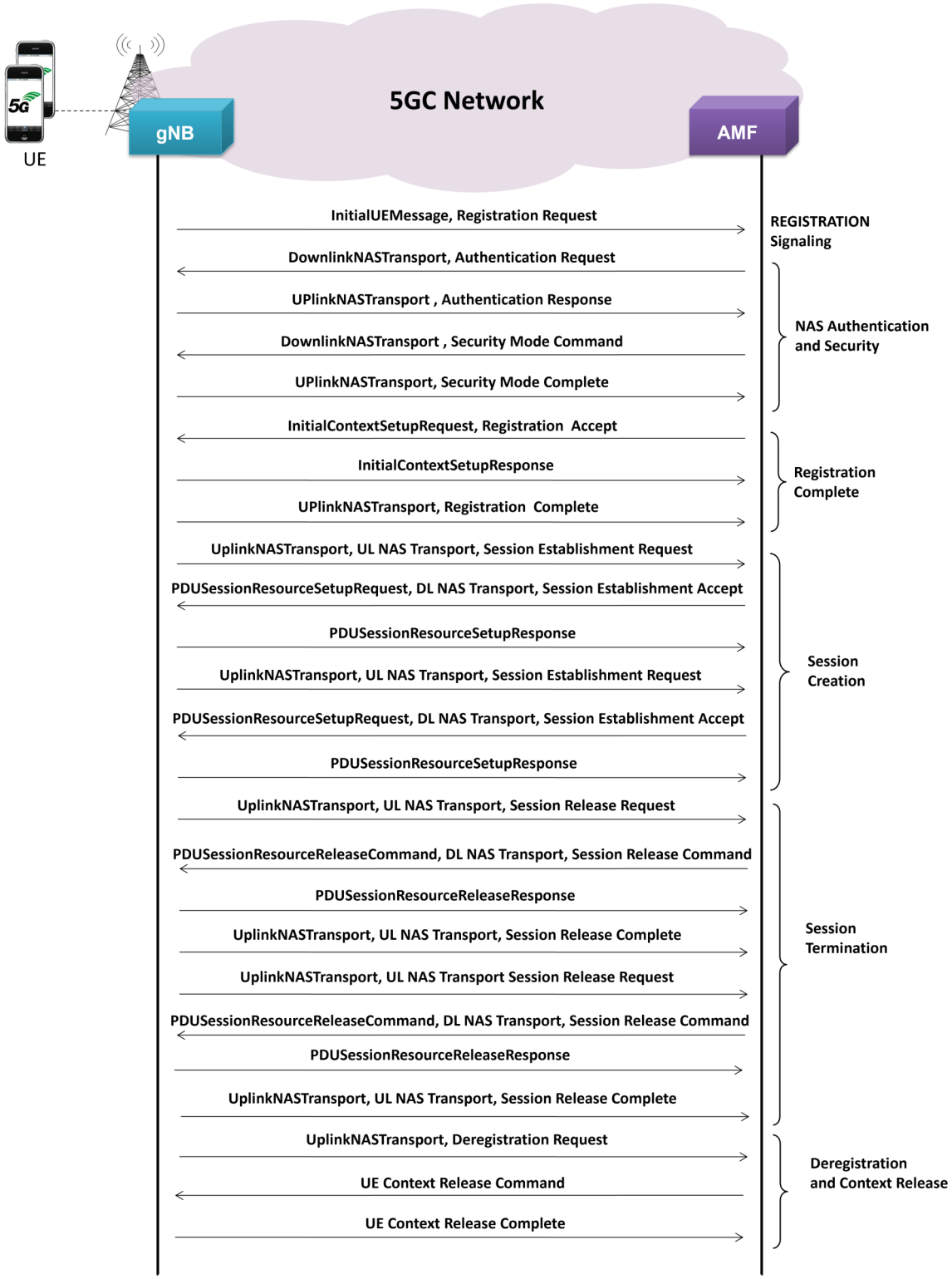
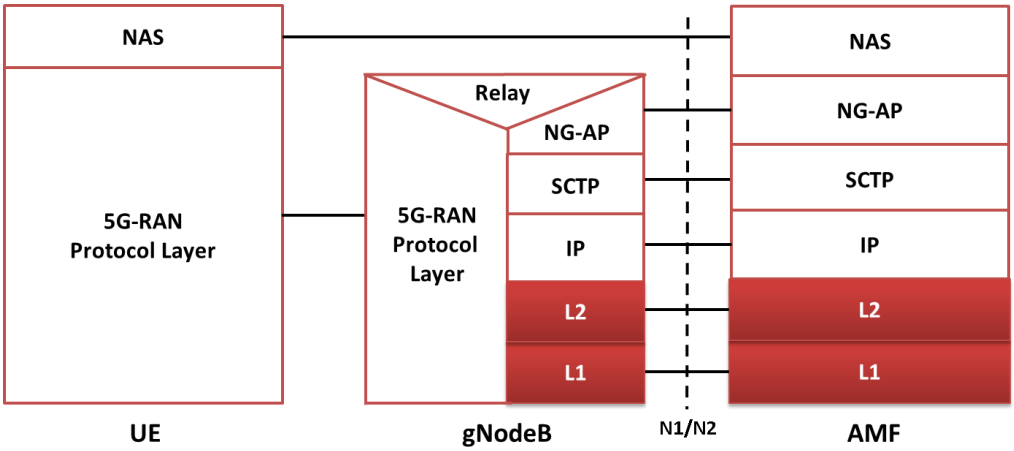


Figure: 5G N1N2 Signaling Procedure

Supported Protocols and Specifications



Supported Protocols	Standard / Specification
N1N2 Interface (gNB - AMF)	TS24.501 (Release 17)
System Architecture for the 5G	3GPP TS 23.501 (Release 17)
Non-Access-Stratum (NAS)	3GPP TS 24.501 (Release 17)
NG Application Protocol (NGAP)	3GPP TS 38.413 (Release 17)
SCTP	RFC 4960
GPRS Tunneling Protocol for User Plane (GTP-U)	3GPP TS 29.281 (Release 17)

Command Line Interface (CLI)

MAPS™ can be configured as server-side application, to enable remote controlling of the application through multiple command-line based clients. Supported clients include Python.

Clients can remotely perform all functions such as start testbed 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. Users can also generate and receive calls through commands. This client application is distributed along with MAPS™ Server application.

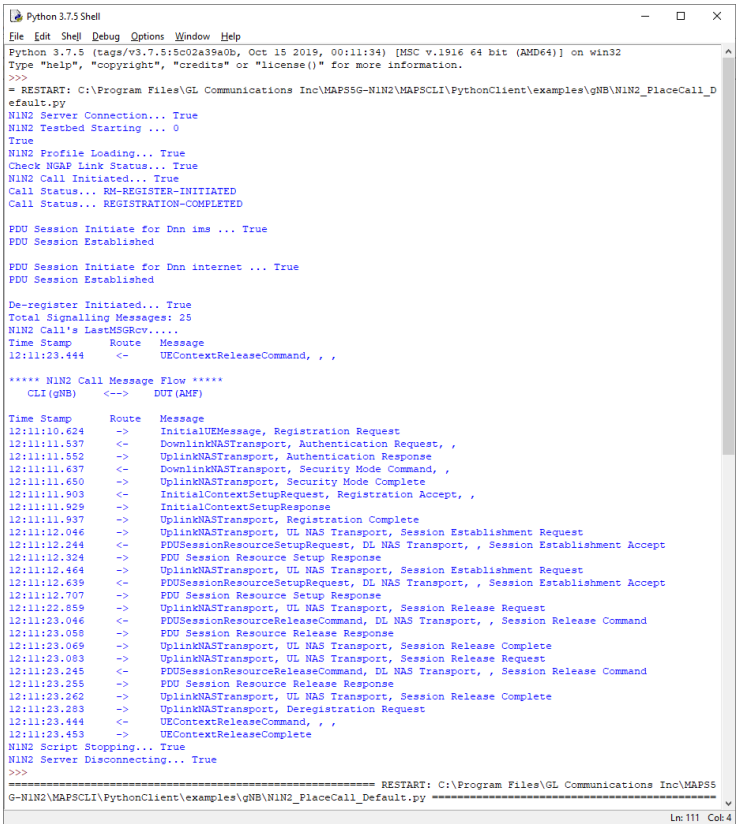


Figure: Sample Python Client

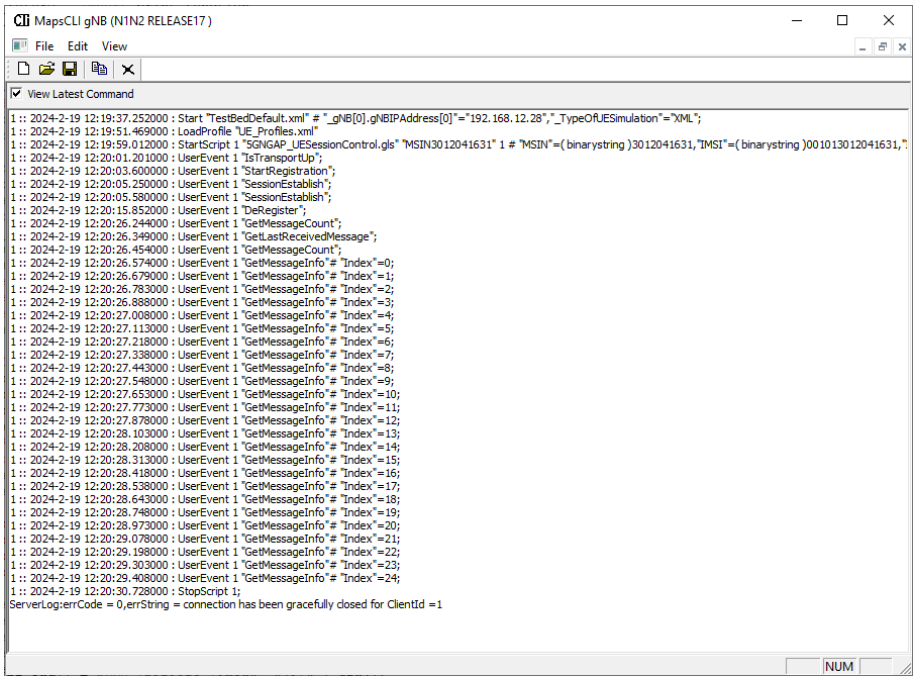


Figure: MAPS™ CLI Server

Buyer's Guide

Item No	Product Description
PKS500	MAPS™ 5G N1N2 Interface Emulator
ETH101	Mobile Traffic Core - GTP
ETH102	Mobile Traffic Core - Gateway

Item No	Related Software
PKS305	MAPS™ 5G Multi-Interface Emulation
PKS501	MAPS™ 5G N4 Interface Emulator
PKS502	MAPS™ 5G N17 Interface Emulator
PKS503	MAPS™ 5G N8 Interface Emulator (Requires PKS502)
PKS504	MAPS™ 5G N10 Interface Emulator (Requires PKS502)
PKS505	MAPS™ 5G N11 Interface Emulator (Requires PKS502)
PKS506	MAPS™ 5G N12 Interface Emulator (Requires PKS502)
PKS507	MAPS™ 5G N13 Interface Emulator (Requires PKS502)
PKS508	MAPS™ 5G N20 Interface Emulator (Requires PKS502)
PKS509	MAPS™ 5G N21 Interface Emulator (Requires PKS502)
PKS510	MAPS™ 5G N22 Interface Emulator (Requires PKS502)
PKS511	MAPS™ 5G N29 and N51 Interface Emulator (Requires PKS502)
PKS170	CLI Support for MAPS™

For complete list of MAPS™ products, refer to Message Automation & Protocol Simulation (MAPS™) webpage.

For more details on supported MAPS™ 5G interfaces, refer to 5G Core (5GC) Network Test Solution webpage.