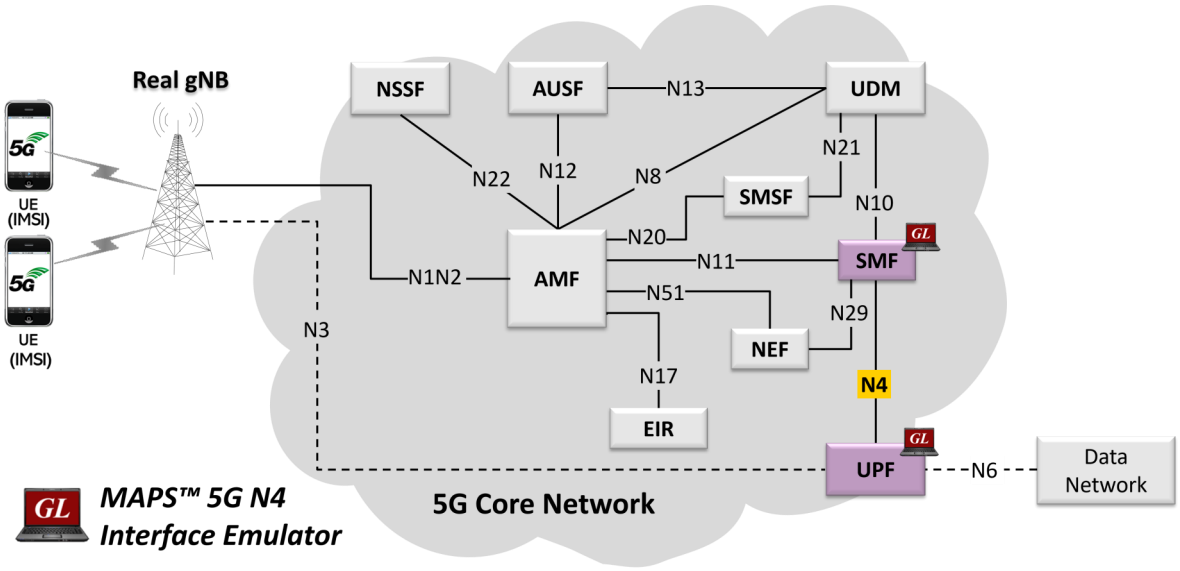
MAPS™ 5G N4 Interface Emulator



Overview

GL's MAPS™ 5G N4 interface can emulate PFCP (Packet Forwarding Control Protocol) signaling messages, as defined by 3GPP standards. PFCP used on the interface between the control plane and the user plane function. In the above network diagram, N4 is the reference point in the Control and User Plane Separation (CUPS) architecture. The PFCP protocol is used on N4 reference point between Session Management Function (SMF) and User Plane Function (UPF) 3GPP mobile core interfaces as specified in 3GPP TS 23.501 and 3GPP TS 23.502.

GL's MAPS™ 5G N4 interface emulator can emulate and test SMF and UPF elements. SMF in the 5G N4 interface is primarily concerned with managing the UEs PDU sessions. Its responsibilities include the establishment, modification, and release of the PDU sessions. UPF in the CUPS architecture is responsible for handling user data packet forwarding and reporting the traffic usage data to the SMF.

Besides emulating network elements SMF and UPF, it also supports error tracking, regression testing, load testing. It can run pre-defined test scenarios against 5G interface test objects in a controlled and deterministic manner. Easy to use script syntax allows user to create conformance test cases based on the test plan.

The application supports utilities such as Message Editor, Script Editor, and Profile Editor that allow new scenarios to be created or modified using messages and parameters.

For more information, visit MAPS™ 5G N4 Interface Emulator webpage.

Main Features

- Emulate SMF and UPF elements
- Supports 5G Control Plane and User Plane
- Generates and process PFCP (valid and invalid) messages
- Supports various PFCP session procedures like Session Establishment, Session Modification, Session Deletion and Reporting Traffic Data Usage
- Supports GTP Traffic (GTP User Plane Data) such as, HTTP/TCP, UDP, PCAP playback scaling up to 40 Gbps per chassis
- Supports scripted call generation and automated call reception
- Supports GTP Traffic (GTP User Plane Data), HTTP traffic generation capability
- Supports customization of call flow and message templates using Script and Message Editor
- Ready-to-use scripts for quick testing
- Provides Call Statistics and Events Status
- Automation, Remote access, and Schedulers to run tests 24/7

GL Communications Inc.

818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A

(Web) www.gl.com - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) info@gl.com

Testbed Configuration

The testbed setup window allows user to setup the required test environment in N4 interface. The SCTP Configuration parameters consists of Source / Destination IP address, and Port numbers to be configured in MAPS™ to emulate SMF and UPF entities in N4 interface. MAPS™ can then generate and receive messages to / from valid IP Address in the 5G network. End user configuration profile used to configure MAPS™ 5G N4 with supported SMF and UPF parameters.

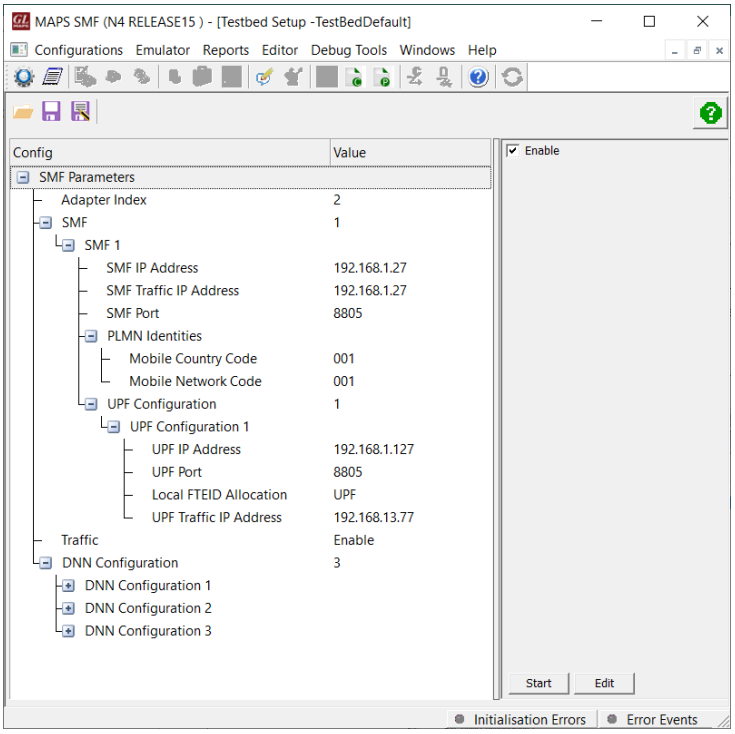


Figure: Testbed Setup

Pre-processing Tools

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 comprises of mandatory fixed parameters, mandatory variable parameters, and optional variable parameters.

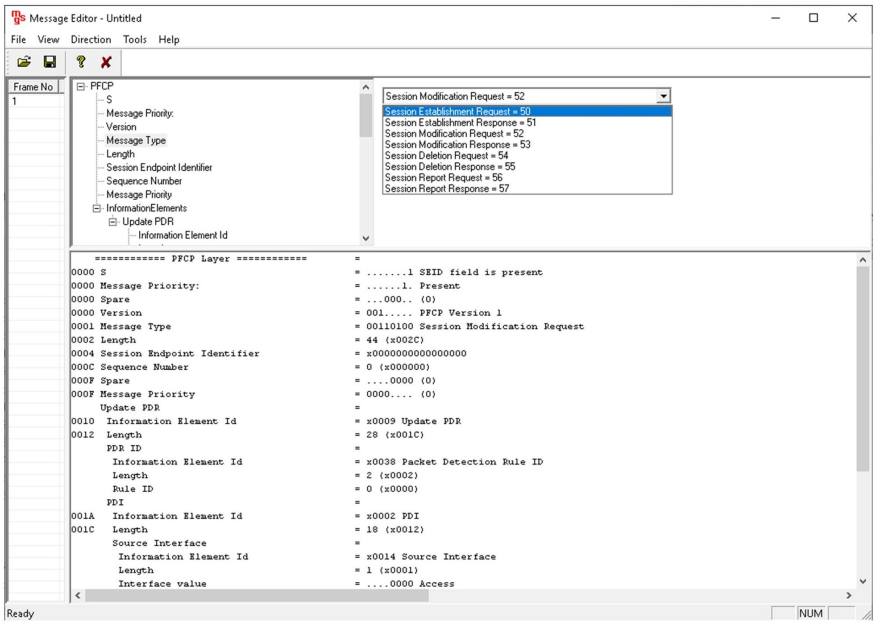


Figure: Message Editor

Pre-processing Tools (*Contd.*)

SCRIPT EDITOR - The script editor allows the 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.

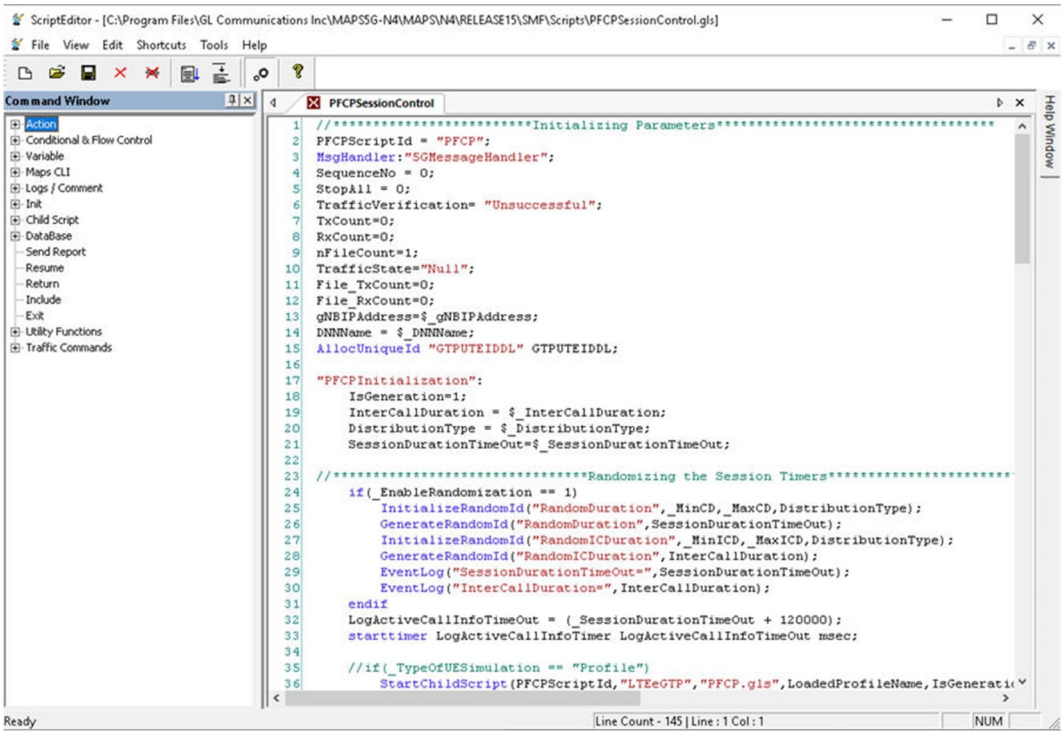


Figure: Script Editor

PROFILE EDITOR - The profile editor 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 user to configure call instances in call generation and to receive calls. The MobileIPCore.xml profile used during script execution includes traffic parameter settings - HTTP Server IP address, TCP port, UDP Source and Destination ports and other traffic related parameters.

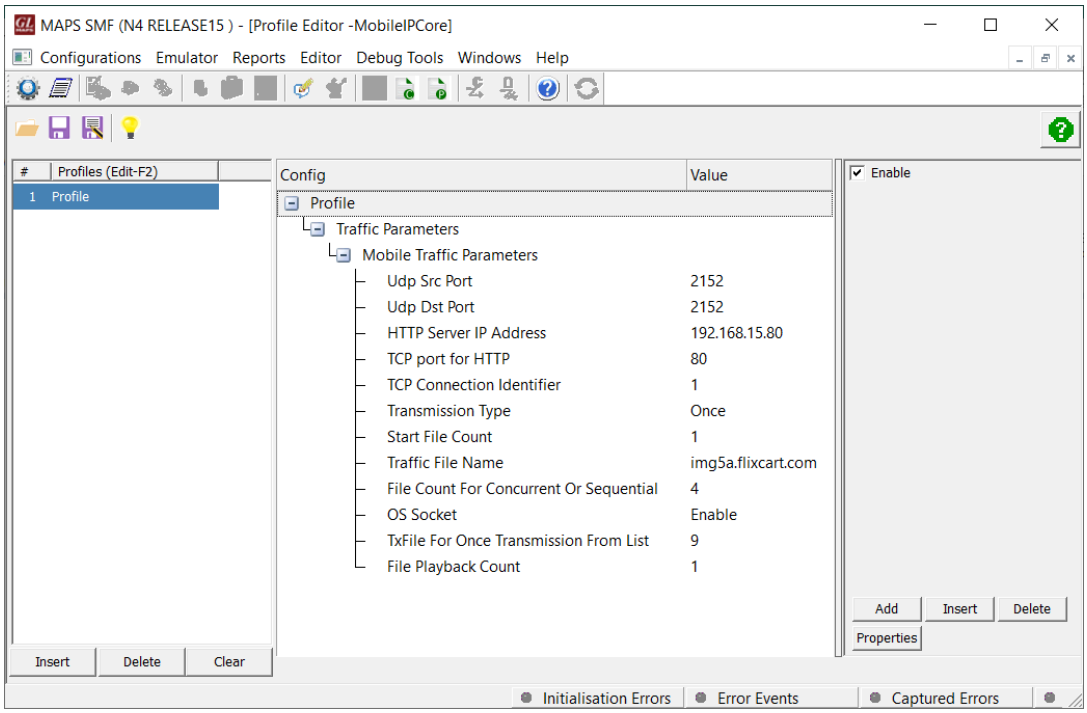


Figure: Profile Editor

Call Generation and Call Reception

In call generation, 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 user 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.

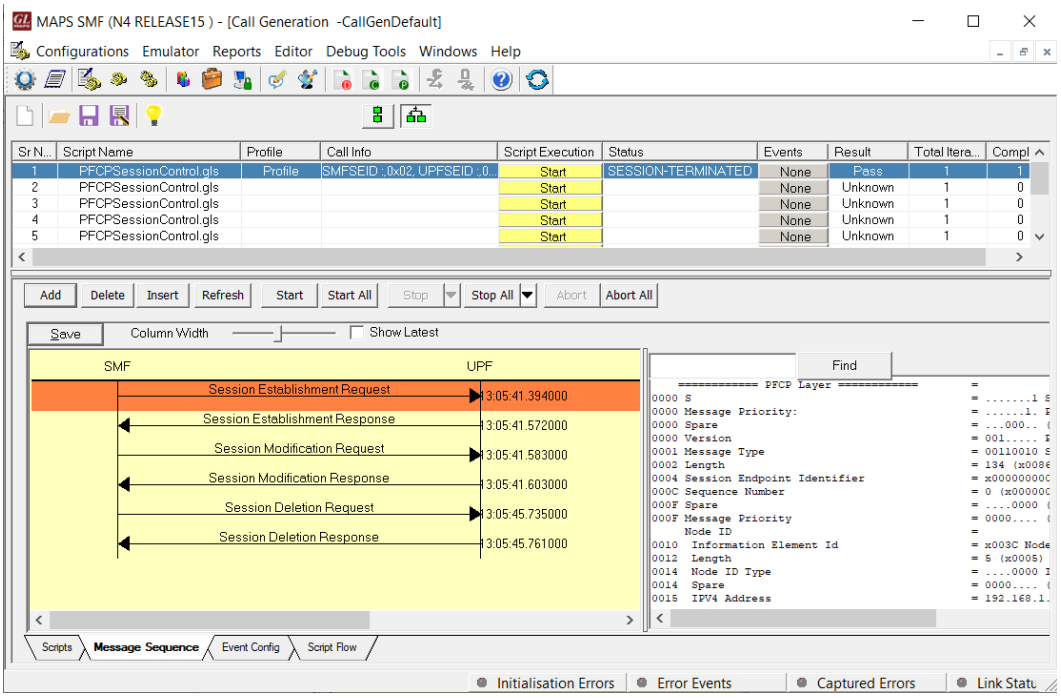


Figure: Call Generation

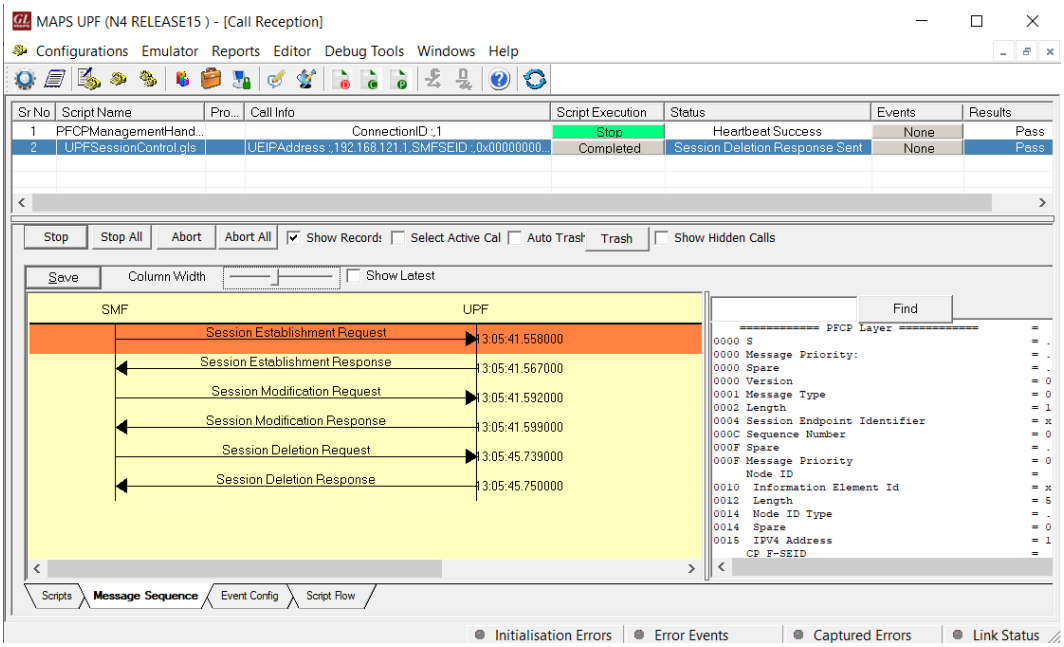


Figure: Call Reception

Emulation of 5G N4 Signaling Procedure

The below figure shows the messages flow between SMF (Session Management Function) and UPF (User Plane Function) that are emulated using MAPS™ application.

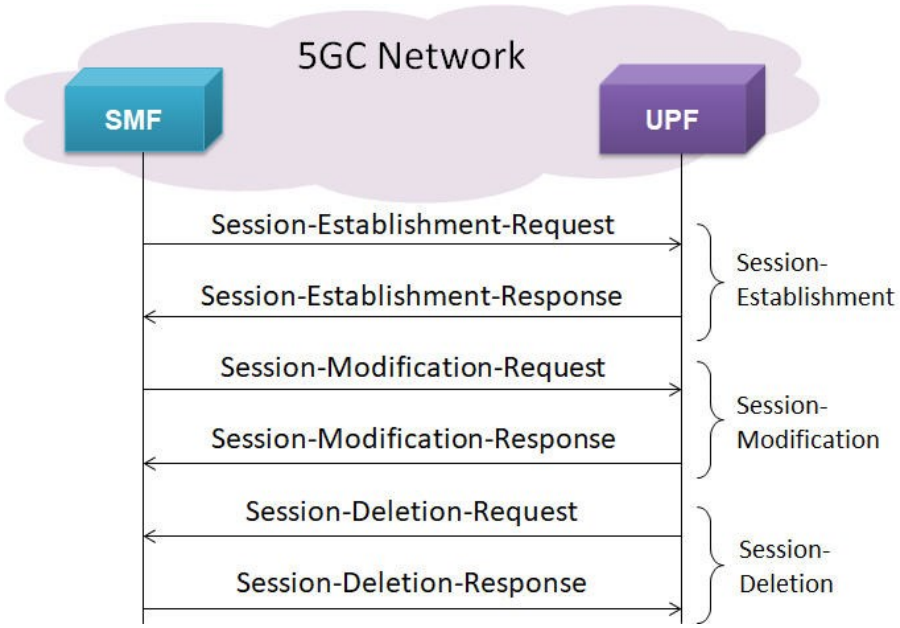
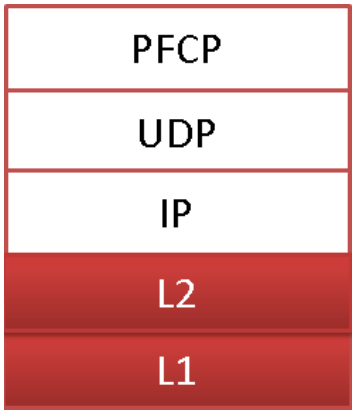


Figure: 5G N4 Signaling Call Flow

Supported Protocols and Specifications



Supported Protocols	Standard / Specification
N4 Interface (SMF - UPF)	TS29.244 Release 15
PFCP	3GPP TS 29.244
UDP	IETF RFC 768
IPv4	IETF RFC 791 IETF RFC 2460

Buyer's Guide

Item No	Product Description
PKS501	MAPS™ 5G N4 Interface Emulator
ETH101	Mobile Traffic Core - GTP
ETH102	Mobile Traffic Core - Gateway

Item No	Related Software
PKS305	MAPS™ 5G Multi-Interface Emulation
PKS500	MAPS™ 5G N1N2 Interface Emulator
PKS502	MAPS™ 5G Service based Emulator (Pre-requisite base license for all service based (Open API) interface emulations)
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)
PKS502	MAPS™ 5G N17 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 Interface Emulator (Requires PKS502)
PKS511	MAPS™ 5G N51 Interface Emulator (Requires PKS502)

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

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

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818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A
(Web) www.gl.com - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) info@gl.com