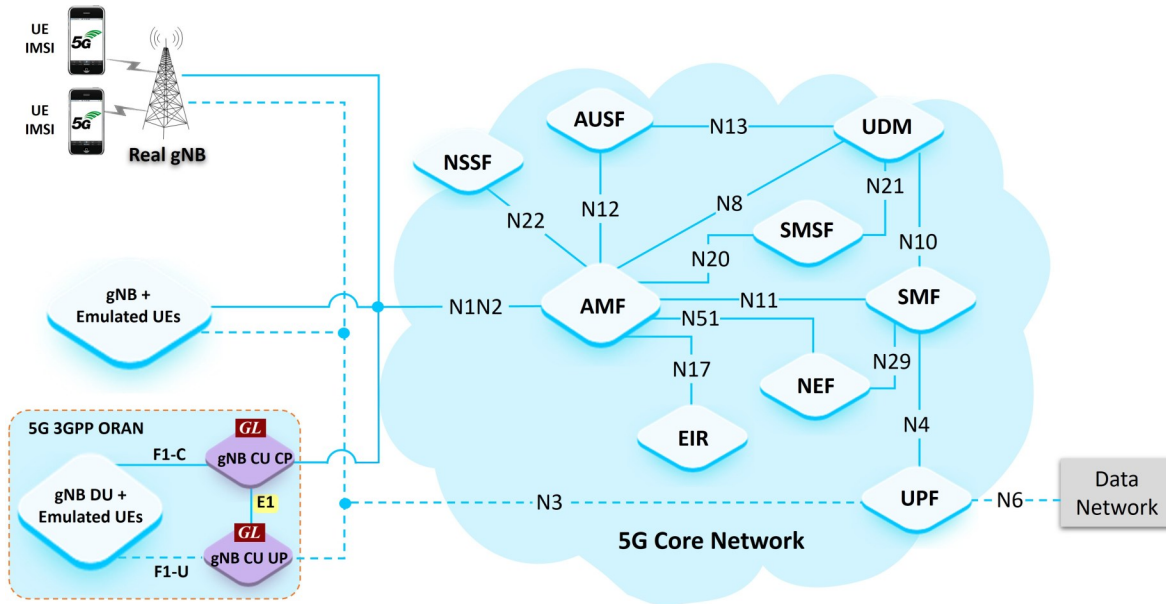


MAPS™ 5G ORAN E1 Interface Emulator



GL MAPS™ 5G E1AP Interface Emulator

Overview

GL's Message Automation & Protocol Simulation (MAPS™) tests the 5G ORAN **E1AP interface**, emulating both **gNB-CU-CP (Central Unit - Control Plane)** and **gNB-CU-UP (Central Unit - User Plane)** in compliance with **3GPP TS 38.463** specification. The **E1 interface** defines control-plane communication between CU-CP and CU-UP, enabling efficient coordination, session management, and resource handling within the gNB-CU architecture.

The **MAPS™ E1AP Interface Emulator** supports key 5G control-plane procedures such as **Bearer Context Setup, Modification, Release, E1 Setup, and Error Indication**, ensuring standards-compliant signaling between CU-CP and CU-UP nodes. Users can emulate either network element to validate interoperability and control signaling functionality.

MAPS™ 5G ORAN E1AP provides a powerful test environment for **functional testing, conformance testing, load testing, and negative testing**, allowing engineers to verify **stability, scalability, and protocol behavior** without requiring live RAN equipment.

The platform includes robust utilities such as **Message Editor, Script Editor, and Profile Editor**, enabling users to easily customize signaling scenarios, automate test cases, and analyze message exchanges in real time.

For more information, visit [MAPS™ 5G ORAN E1 Interface Emulator](#) webpage.

Main Features

- MAPS™ 5G ORAN E1AP interface emulates gNB Central Unit – Control Plane (CU-CP) and User Plane (CU-UP)
- Supports E1AP procedures for control and user plane separation in 5G CU-split architecture
- Provides fault insertion and negative testing to verify robustness under failure conditions
- Enables dynamic creation and modification of call flows using built-in Script and Message Editors
- Performs load and stress testing by emulating multiple CUs and large bearer contexts
- Supports automated and unattended test execution with remote access and scheduling
- Includes ready-to-use test scripts for quick setup and validation of E1AP procedures
- Ensures interoperability validation for multi-vendor CU deployments in controlled lab environments



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Testbed Configuration

The testbed setup window allow users to setup the required test configurations in E1 interface. It includes a list of variables that are declared and assigned before starting the script. Testbed Setup defines the MAPS™ parameters which communicates with the rest of the test network. End user configuration profile is used to configure MAPS™ 5G E1AP interface with the supported gNB CU CP and gNB CU UP parameters.

Config	Value	Enable
gNB CU CP		<input checked="" type="checkbox"/>
gNB CU CP Configurations	1	
gNB CU CP Configurations 1		
gNB CU CP IP Address	192.168.13.131	
gNB CU CP Port	38462	
nG UL UP TNL Information	192.168.13.132	
uP TNL Information	192.168.13.133	
SCTP Mode	Client	
gNB CU CP Name	GL-gNB-CU-CP-01	
gNB CU UP Parameters		
gNB CU UP IP Address	192.168.13.135	
gNB CU UP Port	38462	
UE Simulation Parameters		
Type Of UE Simulation	Profiles	
End User Configuration	gNB-CU-CP_Profiles.xml	
CSV FileName	UE_Profiles.csv	
Auto Generated Users Info		
No Of Users To Be Simulated	100000	
Starting IMSI	001013012061631	
Starting MSIN	3012061631	
Starting IMEI	359877068345248	
Starting IMEISV	1234567890143001	
Auto Generated End User Profile	AutoGenerated_UE_Profiles_N1N2gNB.xml	

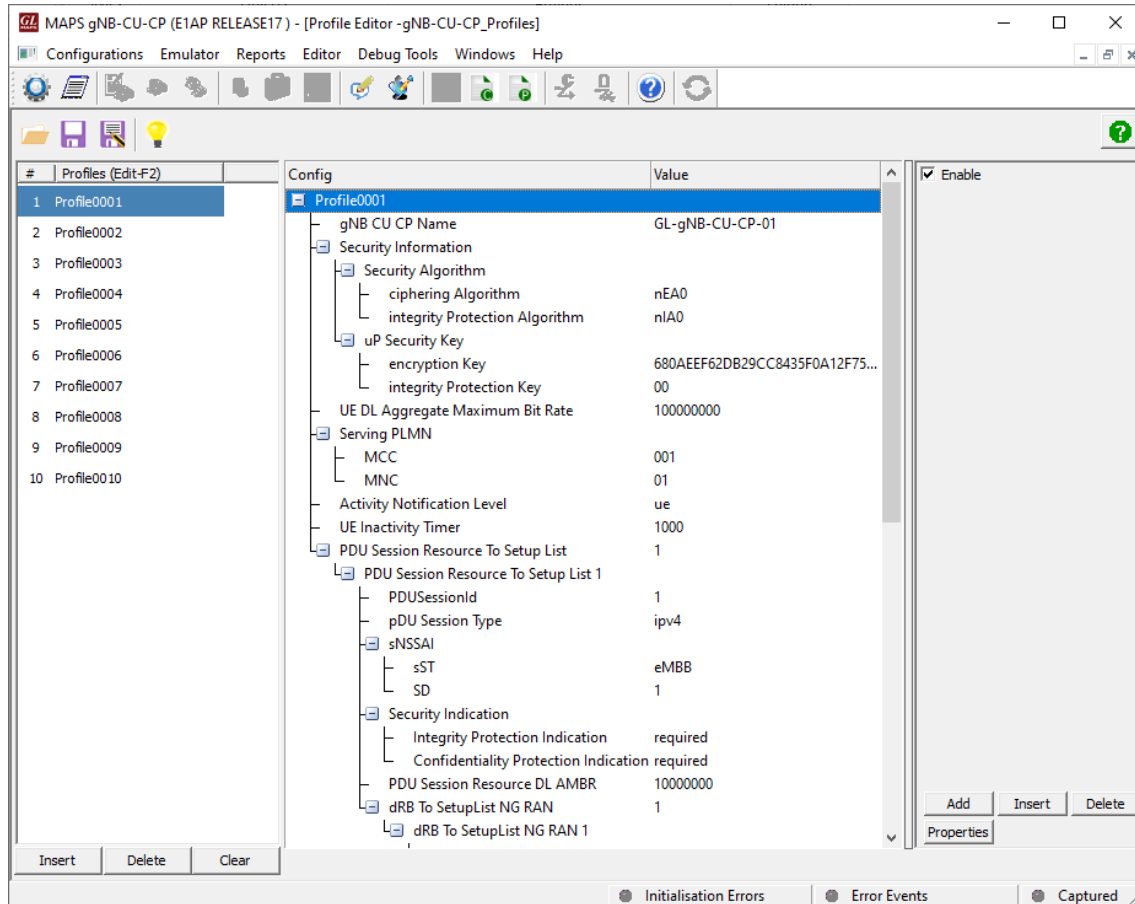
Start Edit

Initialisation Errors

Testbed Setup

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 allow user to configure call instances in call generation to receive calls. The **gNB-CU-CP_Profiles** include 5G parameters, that is required to configure multiple UEs to emulate Signaling and Traffic.



Profile Editor

Pre-processing Tools (Contd.)

SCRIPT EDITOR - The script editor allow 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:\Users\Sneha\Desktop\MAPS5G-E1AP\MAPS\E1AP\RELEASE17\gNB-CU-CP\Scripts\5GE1AP_UESessionControl.gls]
File View Edit Shortcuts Tools Help
Command Window
5GE1AP_UESessionControl
1 //Debug Log options
2 //CallFlowDebug=1; //To log MessageSequence, message contentes
3
4 if(CallFlowDebug==1)
5     ToggleScriptFlow(1); // Utility to enable scriptFlow
6 endif
7
8 //*****Initialization Section *****
9 "Initialization":
10     InterSessionDurationTimeOut = _InterSessionDuration;
11     SessionDurationTimeOut = _SessionDurationTimeOut;
12
13 "SimulatedUserInfo":
14
15
16
17 "E1APInitialization":
18 "E1AP Procedures":
19     ELAPScriptId = "E1AP";
20     StartChildScript (ELAPScriptId, "E1AP", "5GE1AP_gNBCUCP.gls", LoadedProfileName, EnableCLI=En
21     if(InterSessionDurationTimeOut!=0)
22         starttimer InterSessionDurationTimer InterSessionDurationTimeOut msec;
23     else
24         starttimer InterSessionDurationTimer 1 msec;
25     endif
26     wait;
27
28 "InterSessionDurationTimerExpiry":
29     (ELAPScriptId) goto "InitiateBearerContext";
30     resume;
31
32 "OnBearerContextSetupResponse":
33     (ELAPScriptId) goto "SendModifyBearerContext";
34     resume;
35
36 "OnBearerContextModificationResponse":
37     starttimer SessionDurationTimer SessionDurationTimeOut;
38     ActiveUserEvent: "ReleaseBearerContext";

```

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Script Editor

Call Generation and 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, allow 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.

The screenshot shows the 'Call Generation' interface. At the top, a table lists script executions:

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Pr...	Result	Total Iteratio...	Completed Iteratio...
1	5GE1AP_UESessionControl.gls	Profile0001	GNB-CU-CP-0	Start	Bearer context Release complete Received	None		Pass	1	1
2	5GE1AP_UESessionControl.gls	Profile0002		Start		None		Unknown	1	0
3	5GE1AP_UESessionControl.gls	Profile0003		Start		None		Unknown	1	0
4	5GE1AP_UESessionControl.gls	Profile0004		Start		None		Unknown	1	0
5	5GE1AP_UESessionControl.gls	Profile0005		Start		None		Unknown	1	0

Below the table is a 'Message Sequence' diagram showing interactions between gNB-CU-CP-0 and gNB-CU-UP. The sequence includes: BearerContextSetupRequest (12:27:50.440000), BearerContextSetupResponse (12:27:50.725000), BearerContextModificationRequest (12:27:50.752000), BearerContextModificationResponse (12:27:50.949000), BearerContextReleaseCommand (12:27:55.060000), and BearerContextReleaseComplete (12:27:55.190000). To the right, a 'Find' window displays a detailed log of the E1AP Layer messages, including fields like E1AP-PDU, Extensibility Marker, Choice Index, InitiatingMessage, ProcedureCode, Contents, Criticality, Length, Value, BearerContextSetupRequestIEs, Extensibility Marker, ProtocolIE-Container, Iteration Count, and ProtocolIE-Container.

Call Generation

The screenshot shows the 'Call Reception' interface. At the top, a table lists script executions:

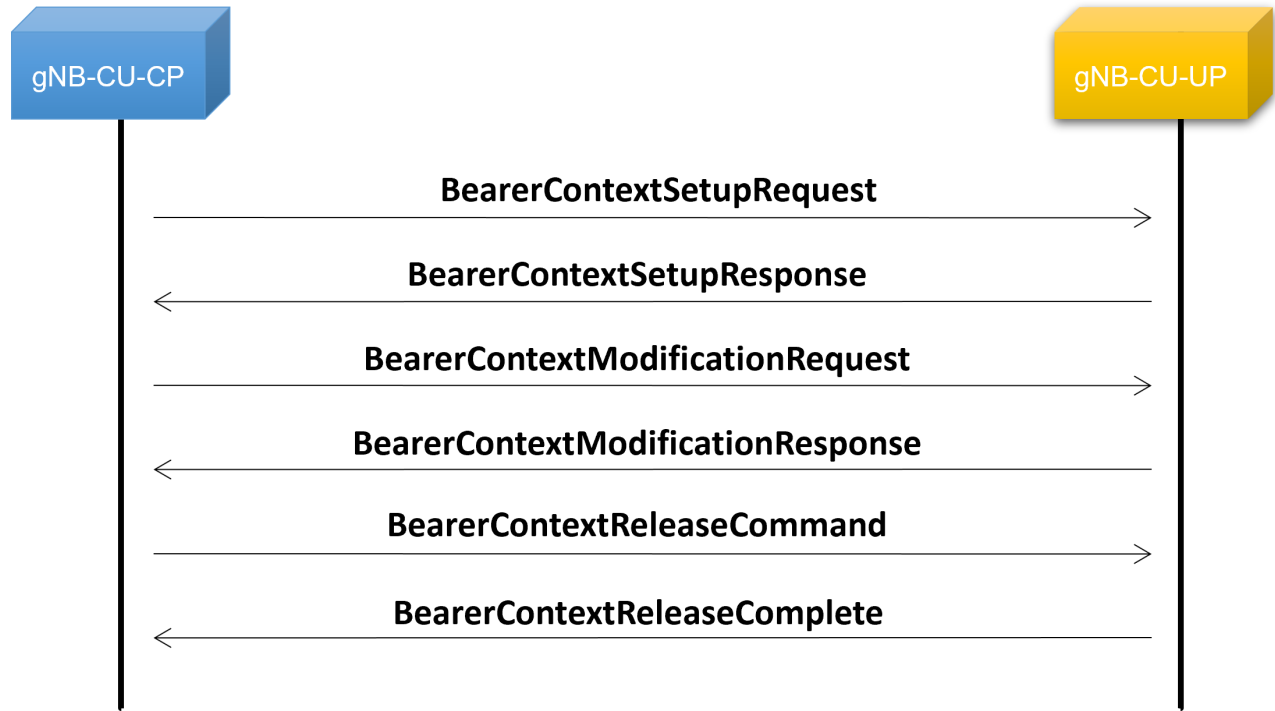
Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Results
1	E1APManagementHandler.gls		GNB-CU-UP-id:55555, GNB-CU-UP-name:GL-gNB-CU-UP-01, GNB...	Stop	E1AP-LINK-UP	SendGNBCUUPConfiguration...	Pass
2	5GE1AP_UESessionControl.gls		GNB-CU-CP-0	Completed	Bearer Context Release Complete Sent	None	Pass

Below the table is a 'Message Sequence' diagram showing interactions between gNB-CU-CP and gNB-CU-UP-0. The sequence includes: BearerContextSetupRequest (12:27:50.621000), BearerContextSetupResponse (12:27:50.640000), BearerContextModificationRequest (12:27:50.810000), BearerContextModificationResponse (12:27:50.833000), BearerContextReleaseCommand (12:27:55.124000), and BearerContextReleaseComplete (12:27:55.147000). To the right, a 'Find' window displays a detailed log of the E1AP Layer messages, including fields like E1AP-PDU, Extensibility Marker, Choice Index, InitiatingMessage, ProcedureCode, Contents, Criticality, Length, Value, BearerContextSetupRequestIEs, Extensibility Marker, ProtocolIE-Container, Iteration Count, and ProtocolIE-Container.

Call Reception

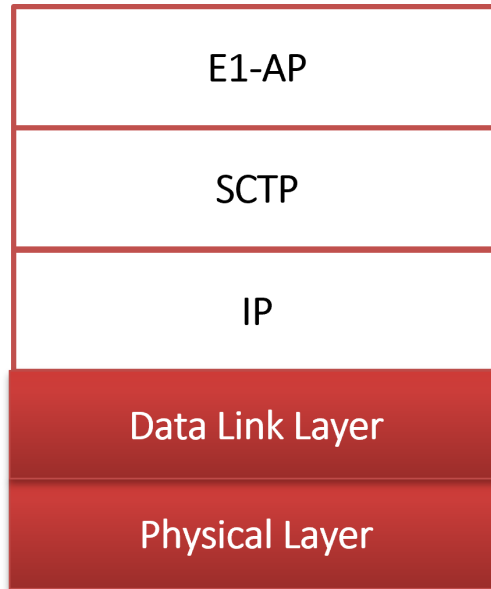
Emulation of 5G E1AP Signaling Procedure

The below 5G E1AP signaling procedure indicates the messages flow between gNB CU CP and gNB CU UP, which are emulated using MAPS™ application.



Bearer Context Procedure

Supported Protocols and Specifications



Supported Protocols	Standard / Specifications
E1AP Interface	TS38.463
SCTP	RFC 4960

Buyer's Guide

Item No	Product Description
PKS513	MAPS™ 5G-E1AP Interface Emulator
PKS512	MAPS™ 5G-F1AP Interface Emulator

Item No	Related Software
PKS500	MAPS™ 5G N1/N2 Interface Emulator
PKS501	MAPS™ 5G N4 Interface Emulator
PKS502	5G service-based Emulation (Prerequisite 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 Emulation (Requires PKS502)
PKS502	MAPS™ 5G N17 Interface Emulator
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)
PKS305	MAPS™ 5G Multi-Interface Emulation
PKS170	CLI Support for MAPS™

Note: PCs which include GL hardware/software require Intel or AMD processors for compliance.

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.