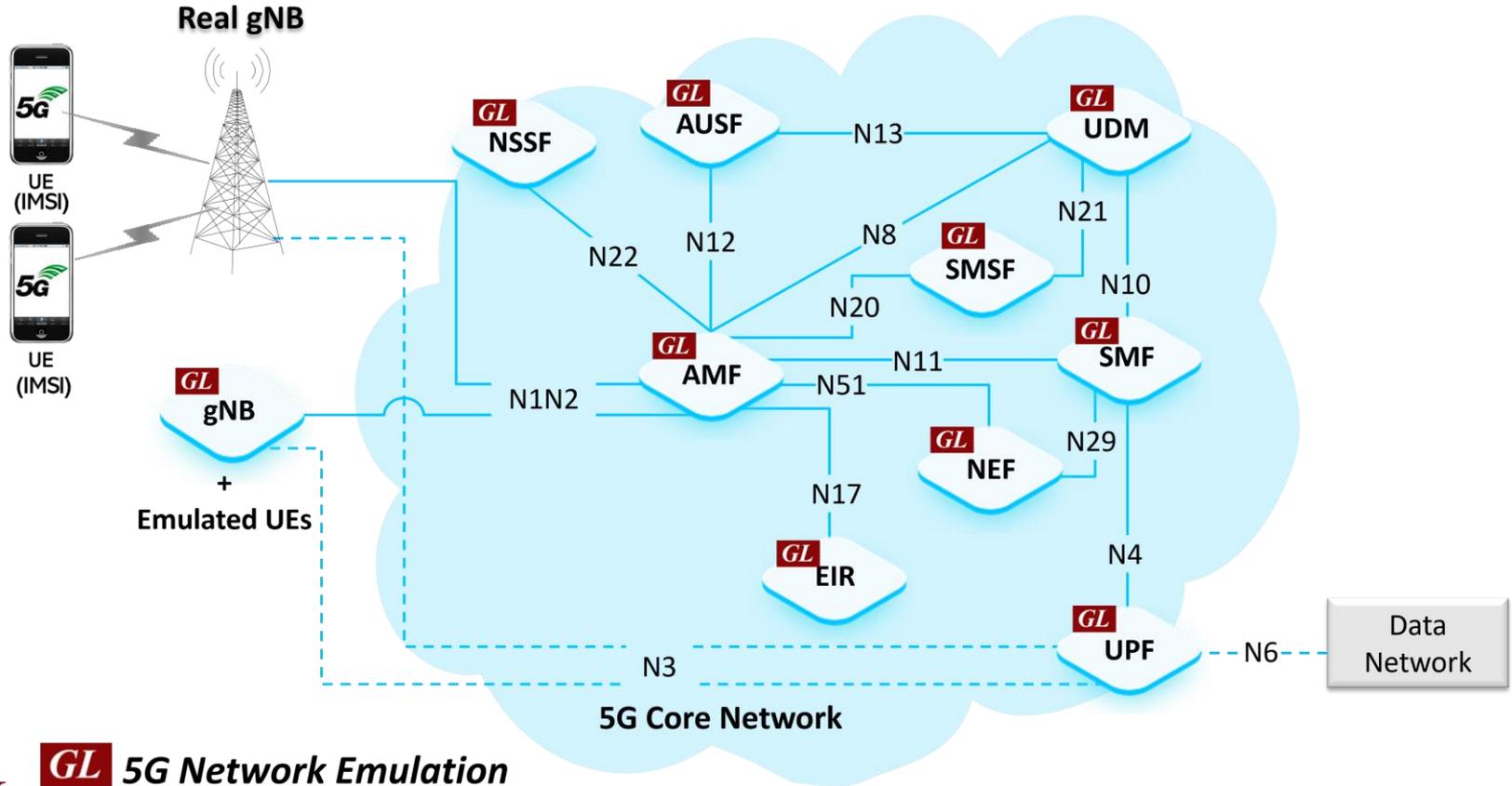

MAPS™ 5G N1N2 Interface Emulator

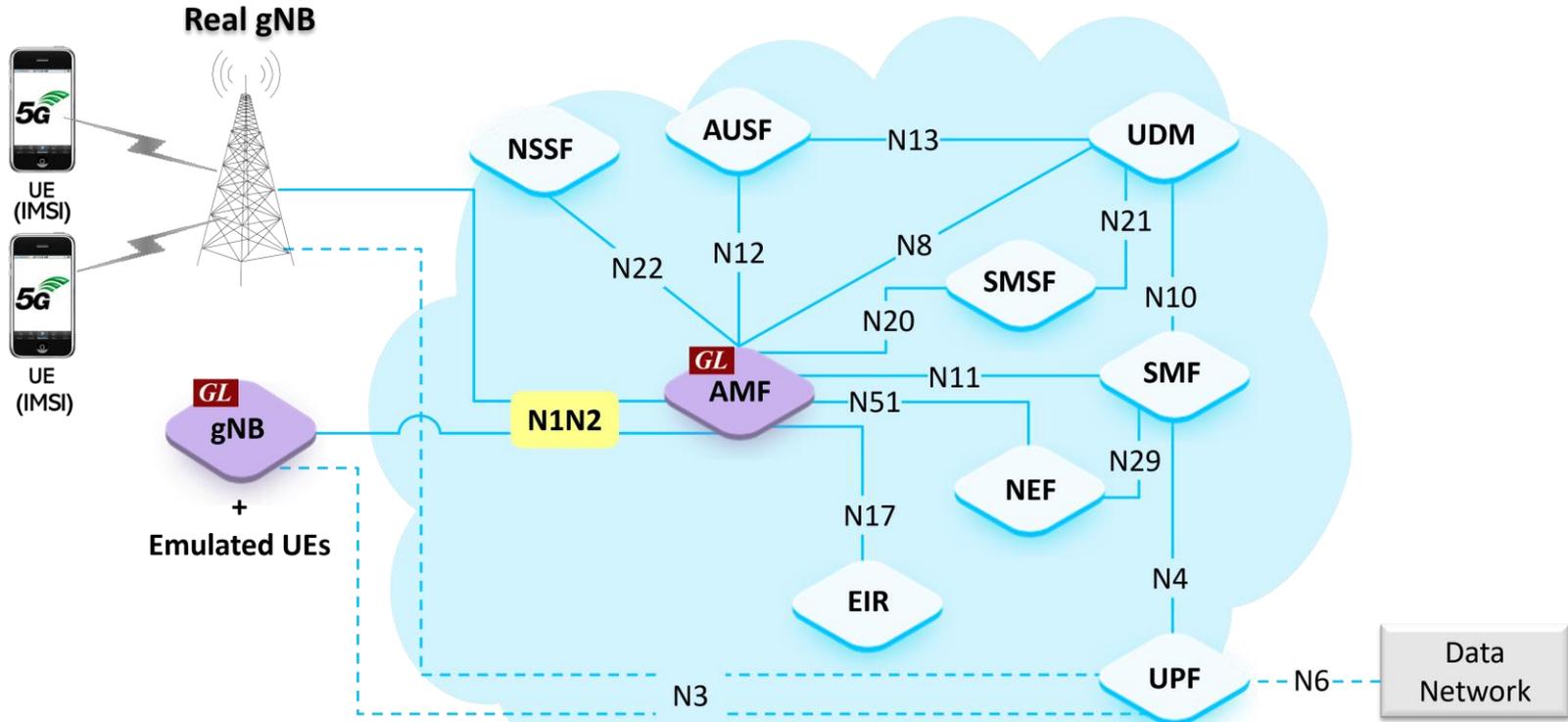


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Website: <https://www.gl.com>

5G Network Diagram



MAPS™ 5G N1N2 Interface Network Architecture

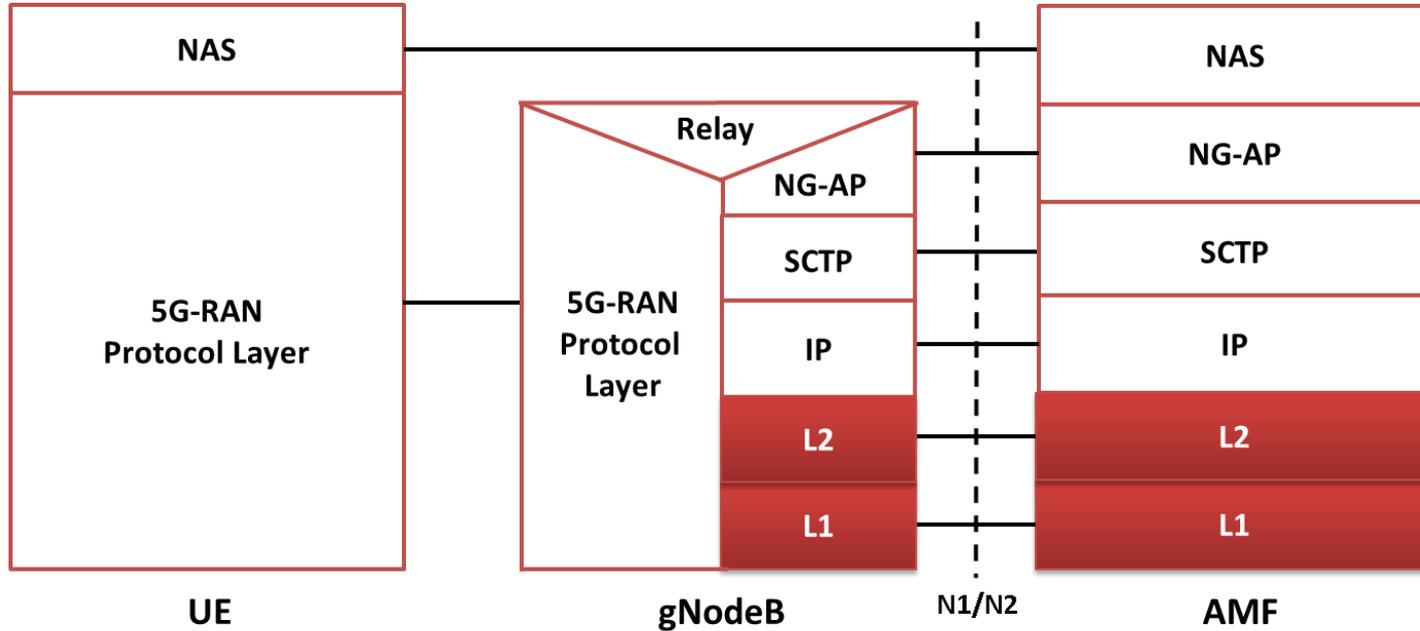


MAPS™ 5G N1N2
Interfaces Emulator

Features

- End-to-End 5G Network Emulation
- Emulate UE+gNodeB and AMF nodes
- Supports Control plane signaling and User plane traffic
- Generate and process NGAP/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
- Emulate Massive UEs (up to 64,000) with Voice Traffic
- Emulate User-plane GTP traffic at high line rates (up to 40 Gbps)
- Provides Call Statistics and Events Status
- Supports Command Line Interface (CLI) using Python API Client

Protocol Stack Specification



Protocol Stack Specification (Contd.)

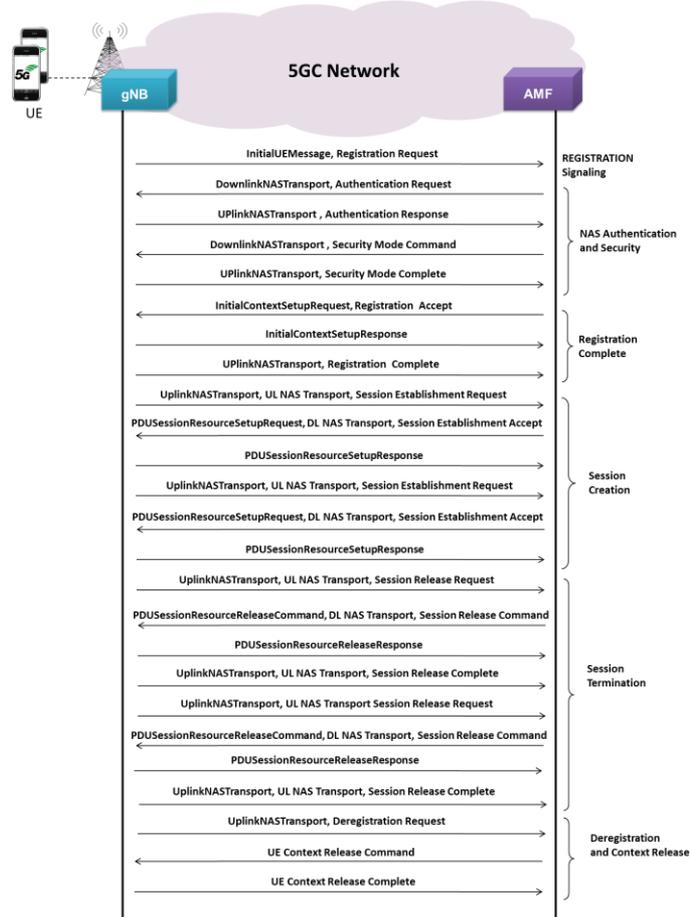
Supported Protocols	Standard / Specification Used
N1N2 Interface (gNB - AMF)	TS24.501 (Release 17)
NG-AP	3GPP TS 38.413 (Release 17)
SCTP	RFC 4960
Non-Access-Stratum (NAS)	3GPP TS 24.501 (Release 17)
NR and NG-RAN	3GPP TS 28.300 (Release 17)

- NG Application Protocol (NGAP): Application Layer Protocol between the gNodeB and the AMF
- SCTP for the control plane (SCTP): This protocol guarantees delivery of signaling messages between AMF and gNodeB (N1N2). SCTP is defined in RFC 2960

MAPS™ 5G Call Scenarios

- UE Registration Signaling
 - Initial UE Message
 - Downlink NAS Transport
 - Uplink NAS Transport
 - Registration Procedure
 - Authentication Procedure
 - Security Mode Procedure
 - PDN Connectivity Request
 - Initial Context Setup Procedure
- Session Establishment Procedure
 - Session Establishment Request
 - Session Establishment Accept
- Session Release Procedure
 - Session Release Request
 - Session Release Command
 - Session Release Complete
- Deregistration procedures
 - Deregistration Request
 - Deregistration Accept
- UE Context Release Procedure
 - UE Context Release Command
 - UE Context Release Complete

MAPS™ 5G N1N2 Call Scenario



Testbed Configuration (AMF)

The screenshot displays the MAPS AMF configuration interface for a testbed. The window title is "MAPS AMF (N1N2 RELEASE17) - [Testbed Setup - TestBedDefault]". The main area is a tree view under "AMFConfiguration" with a table of values and an "Enable" checkbox on the right.

Config	Value	Enable
AMFConfiguration		<input checked="" type="checkbox"/>
AMF	1	
AMF 1		
Traffic Adapter Index	1	
AMF IP Address	192.168.13.61	
AMF Port	38412	
AMF GTP IP Address	192.168.13.61	
PLMN Identity		
MCC	001	
MNC	01	
Network Slicing NSSAI	1	
Network Slicing NSSAI 1		
AMF Name	glamf	
AMF Region ID	2	
AMF Set ID	1	
AMF Pointer	63	
DNN Configuration	3	
DNN Configuration 1		
DNN Name	default	
IPv4 Range		
Start IP	192.168.15.121	
End IP	192.168.15.140	
IPv6 Range		
DNN Configuration 2		
DNN Configuration 3		
Traffic Parameters		
Traffic	Enable	
GTP Port for Traffic	2152	
Traffic Type	GateWay	
GateWay Configuration		
IPv4 Gateway Address	192.168.12.1	
Subnet Mask	255.255.252.0	
IPv6 Allocation for UE	Enable	
IPv6 Gateway Address	fe80::48c3:9457:9b6d:3133	
IPv6 Subnet Mask	ffff::	
Packet Load Traffic Configuration		
Primary DNS IP Address	8.8.8.8	
Primary DNS IPv6 Address	2001:4860:4860:8888	
UE Simulation Parameters		
Type Of UE Simulation	Profiles	
End User Configuration	AMF_Profiles.xml	
CSV FileName	C:\Program Files\GL Communications Inc\MAPS...	
Auto Generated Users Info		
No Of Users To Be Simulated	1000	
Starting IMSI	001013012041631	

Buttons: Start, Edit

Footer: Initialisation Errors, Error Events

Testbed Configuration (gNB)

The screenshot displays the MAPS gNB configuration interface for a testbed setup. The main window shows a hierarchical tree view of configuration parameters under the 'gNB' section. The 'gNBConfiguration 1' node is expanded, revealing various settings such as IP addresses, ports, and mode. The 'AMF Pool Configurations' and 'Traffic Parameters' sections are also visible. The 'Enable' checkbox is checked, and the 'Start' and 'Edit' buttons are at the bottom right.

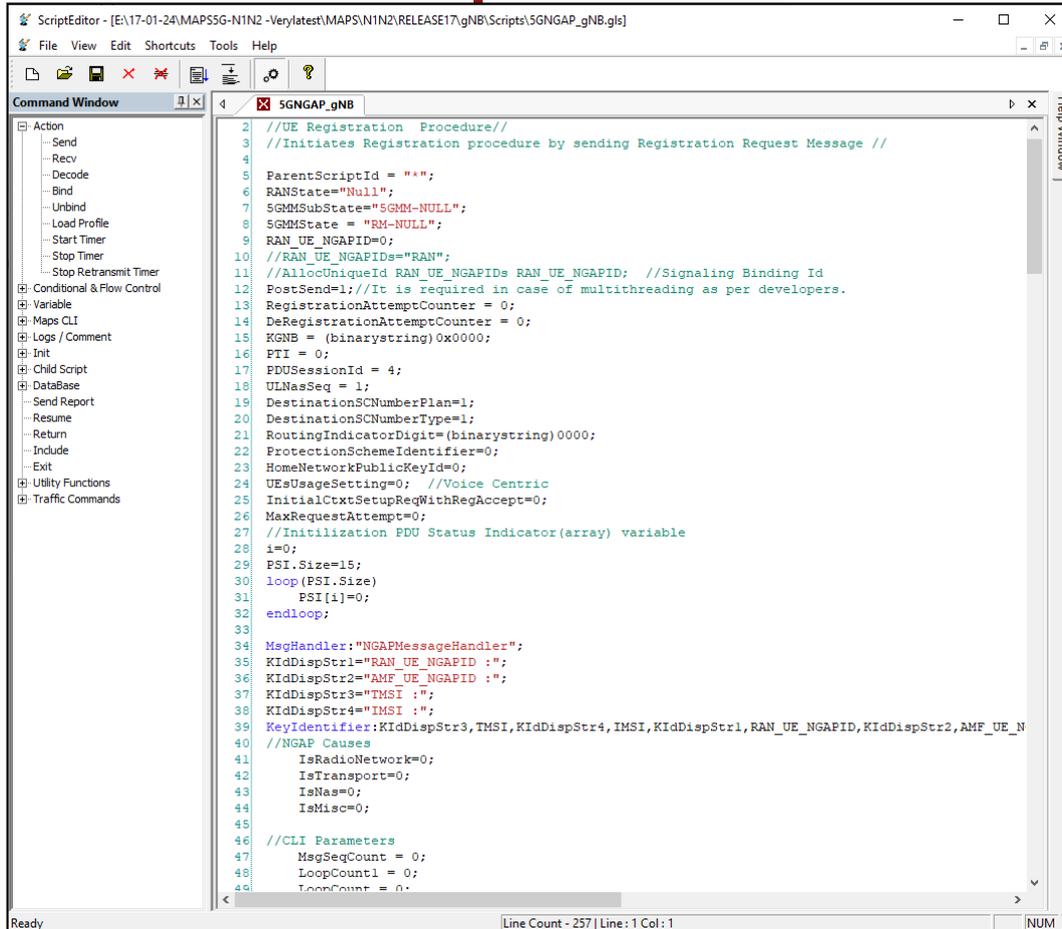
Config	Value	Enable
gNB		<input checked="" type="checkbox"/>
gNBConfiguration	1	
gNBConfiguration 1		
Traffic Adapter Index	2	
gNB IP Address	192.168.13.12	
gNB GTP IP Address	192.168.13.12	
GTP Port For Traffic	2152	
SCTP Mode	Client	
Global RAN Node Type	globalgNB-ID	
gNB ID	10000001	
Ng ENB Configuration	Macro gNB Id	
Macro gNB Id	12345	
Short Macro gNB Id	12345	
Long Macro gNB Id	12345	
N3IWF Name	GLWifi	
RAN Node Name	gNB00000001	
Paging DRX	v128	
Cell Identity	00000001	
Supported TA List	1	
Destination Parameters		
Select AMF Pool	1	
AMF Pool Configurations		
AMF Pool	1	
AMF Pool 1		
AMF	1	
AMF 1		
AMF IP Address	192.168.13.61	
AMF Port	38412	
gNB Port	38412	
Traffic Parameters		
Traffic	Enable	
MobilePCore Traffic		
GTP Client IP Address	192.168.13.12	
Packet Load Traffic Configuration		
PacketLoad Traffic Type	HTTP Traffic	
Management IP Address	192.168.12.60	
Traffic Mode	GTP TO GTP	
External GateWay Configuration For PacketGen		
GTP Gateway for SIP or RTP Generation Over IP		
UE Simulation Parameters		
Type Of UE Simulation	Profiles	
End User Configuration	UE_Profiles.xml	
CSV FileName	C:\Program Files\GL Communications ...	
Auto Generated Users Info		

Profile Configuration (AMF)

The screenshot displays the MAPS AMF (N1N2 RELEASE17) Profile Editor. The main window is titled "MAPS AMF (N1N2 RELEASE17) - [Profile Editor -AMF_Profiles]". The interface includes a menu bar (Configurations, Emulator, Reports, Editor, Debug Tools, Windows, Help) and a toolbar with various icons. A list of profiles is shown on the left, with "MSIN3012041631" selected. The central pane displays the configuration tree for this profile, and the right pane shows the corresponding values.

Config	Value	Enable
MSIN3012041631		<input checked="" type="checkbox"/>
Mobile Identity		
Type Of Identity	SUCI	
IMSI	001013012041631	
SUCI		
SUPI Format	IMSI	
Protection Scheme Identifier	Null Scheme	
Home Network Public Key Identifier	0	
IMEI	359877068325248	
IMEISV	1234567890123001	
MSISDN	3012041631	
Authentication Parameters		
Authentication Type	5G-AKA	
Authentication Algorithm Type	Milenage	
Key	00112233445566778899aabbccddeeff	
Operator Variant Parameter Type	OPc	
OP	0102030405060708091011121314151601...	
OPc	01020304050607080910111213141516	
AMF	8000	
SQN	000000000079	
Integrity and Encryption Algorithm Selection		
NAS Key Set Identifier	7	
Type Of Security Context Flag	Native Security Context	
Required QoS		
Network Initiated Deregistration Parameters		
SMS Call Parameters		
UE Context		
PCSCF IP Address	192.168.12.181	
PCSCF IPv6 Address	fe80::48c3:9457:9b6d:3133	
IMS Voice Over PS Support	Supported	
DNN	internet	
QoS Rule		
Session AMBR		
Traffic Parameters		
PacketCheck Traffic Parameters		
Mobile Traffic Parameters		
TCP Server Ip	192.168.15.80	
TCP port for HTTP	80	
OS Socket	Enable	

Script Editor



The screenshot shows a window titled "ScriptEditor - [E:\17-01-24\MAPSSG-N1N2 -Verylatest\MAPS\N1N2\RELEASE17\gNB\Scripts\5GNGAP_gNB.gls]". The window contains a script for "5GNGAP_gNB". The script is a C program that initializes variables for UE registration, including ParentScriptId, RANState, SGMMSubState, SGMMState, RAN_UE_NGAPID, and RAN_UE_NGAPIDs. It also sets up signaling binding, registration attempt counters, and various network parameters. The script includes a loop for initializing the PDU Status Indicator array and defines a message handler for NGAP messages. The status bar at the bottom indicates "Line Count - 257 | Line: 1 Col: 1".

```
ScriptEditor - [E:\17-01-24\MAPSSG-N1N2 -Verylatest\MAPS\N1N2\RELEASE17\gNB\Scripts\5GNGAP_gNB.gls]
File View Edit Shortcuts Tools Help
Command Window
5GNGAP_gNB
2 //UE Registration Procedure//
3 //Initiates Registration procedure by sending Registration Request Message //
4
5 ParentScriptId = "";
6 RANState="Null";
7 SGMMSubState="SGMM-NULL";
8 SGMMState = "RM-NULL";
9 RAN_UE_NGAPID=0;
10 //RAN_UE_NGAPIDs="RAN";
11 //AllocUniqueId RAN_UE_NGAPIDs RAN_UE_NGAPID; //Signaling Binding Id
12 PostSend=1;//It is required in case of multithreading as per developers.
13 RegistrationAttemptCounter = 0;
14 DeRegistrationAttemptCounter = 0;
15 KGNB = (binarystring)0x0000;
16 PTI = 0;
17 PDUSessionId = 4;
18 ULNasSeq = 1;
19 DestinationSCNumberPlan=1;
20 DestinationSCNumberType=1;
21 RoutingIndicatorDigit=(binarystring)0000;
22 ProtectionSchemeIdentifier=0;
23 HomeNetworkPublicKeyId=0;
24 UEsUsageSetting=0; //Voice Centric
25 InitialCtxtSetupReqWithRegAccept=0;
26 MaxRequestAttempt=0;
27 //Initialization PDU Status Indicator(array) variable
28 i=0;
29 PSI.Size=15;
30 loop(PSI.Size)
31     PSI[i]=0;
32 endloop;
33
34 MsgHandler:"NGAPMessageHandler";
35 KiDDispStr1="RAN_UE_NGAPID :";
36 KiDDispStr2="AMF_UE_NGAPID :";
37 KiDDispStr3="TMSI :";
38 KiDDispStr4="IMSI :";
39 KeyIdentifier:KiDDispStr3,TMSI,KiDDispStr4,IMSI,KiDDispStr1,RAN_UE_NGAPID,KiDDispStr2,AMF_UE_N
40 //NGAP Causes
41 IsRadioNetwork=0;
42 IsTransport=0;
43 IsNas=0;
44 IsMisc=0;
45
46 //CLI Parameters
47 MsgSeqCount = 0;
48 LoopCount1 = 0;
49 LoopCount = 0;
Ready Line Count - 257 | Line: 1 Col: 1 NUM
```

Message Editor

Message Editor - AuthenticationRequest

File View Direction Tools Help

NAS

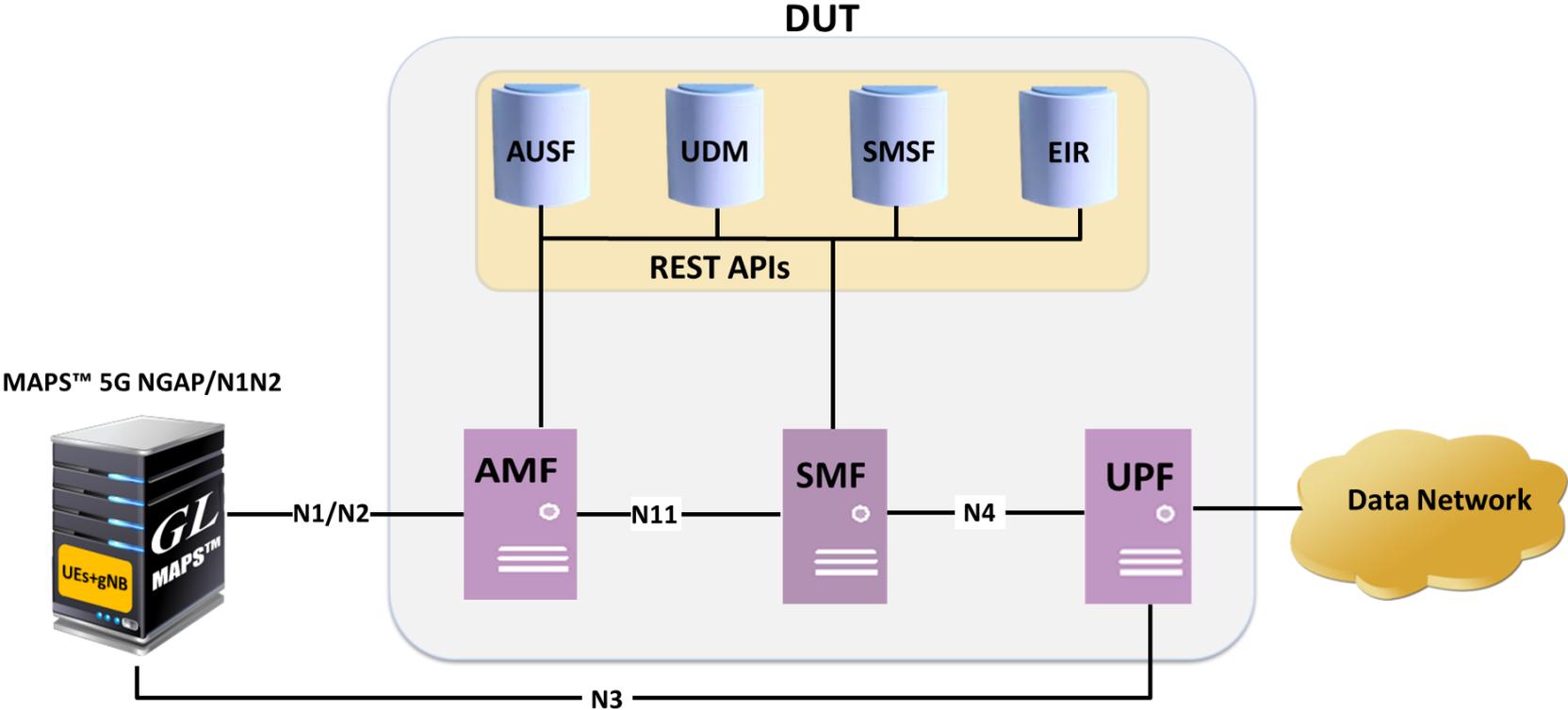
- Extended Protocol Discriminator
- Security Header Type
- MM Message Type
- InformationElements
 - 5GS Registration Type and NAS Key Set Identifier
 - Registration Type
 - Follow-On Request
 - NAS Key Set Identifier
 - Type of Security Context Flag (TSC)
 - 5GS Mobile Identity
 - Length

Registration Request = 65
Registration Accept = 66
Registration Complete = 67
Registration Reject = 68
Deregistration Request (UE originating) = 69
Deregistration Accept (UE originating) = 70
Deregistration Request (UE terminated) = 71
Deregistration Accept (UE terminated) = 72
Service Request = 76
Service Reject = 77
Service Accept = 78
Configuration Update Command = 84
Configuration Update Complete = 85

```
===== NGAP Layer =====
NCAP-PDU = CHOICE
Extensibility Marker = 0
Choice Index = 0
ProcedureCode = INTEGER
Contents = 4 id-DowmlinkNASTransport
procedureCriticality = ENUMERATOR
Contents = 0 reject(0)
Value = Open Type
Length = 29
Extensibility Marker = 0
ProtocolIE-Container = SEQUENCE OF
Iteration Count = 3
ProtocolIE-Container = Instance 0
ProtocolIE-ID = INTEGER
Contents = 10 id-AMF-UE-NGAP-ID
procedureCriticality = ENUMERATOR
Contents = 0 reject(0)
Value = Open Type
Length = 3
AMF-UE-NGAP-ID = INTEGER
```

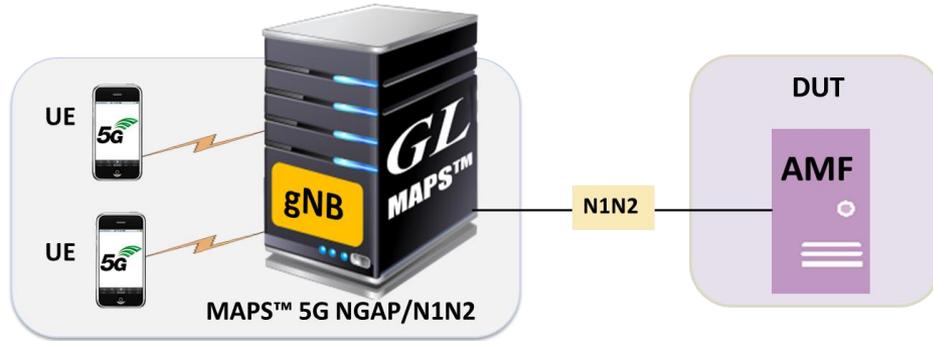
Ready NUM

MAPS™ gNB Emulator testing 5G Core Network

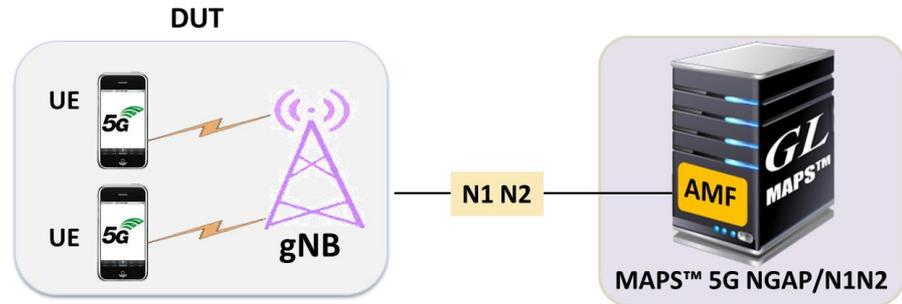


MAPS™ 5G N1N2 Use Cases

MAPS™ N1N2 configured as AMF to test gNB (DUT)

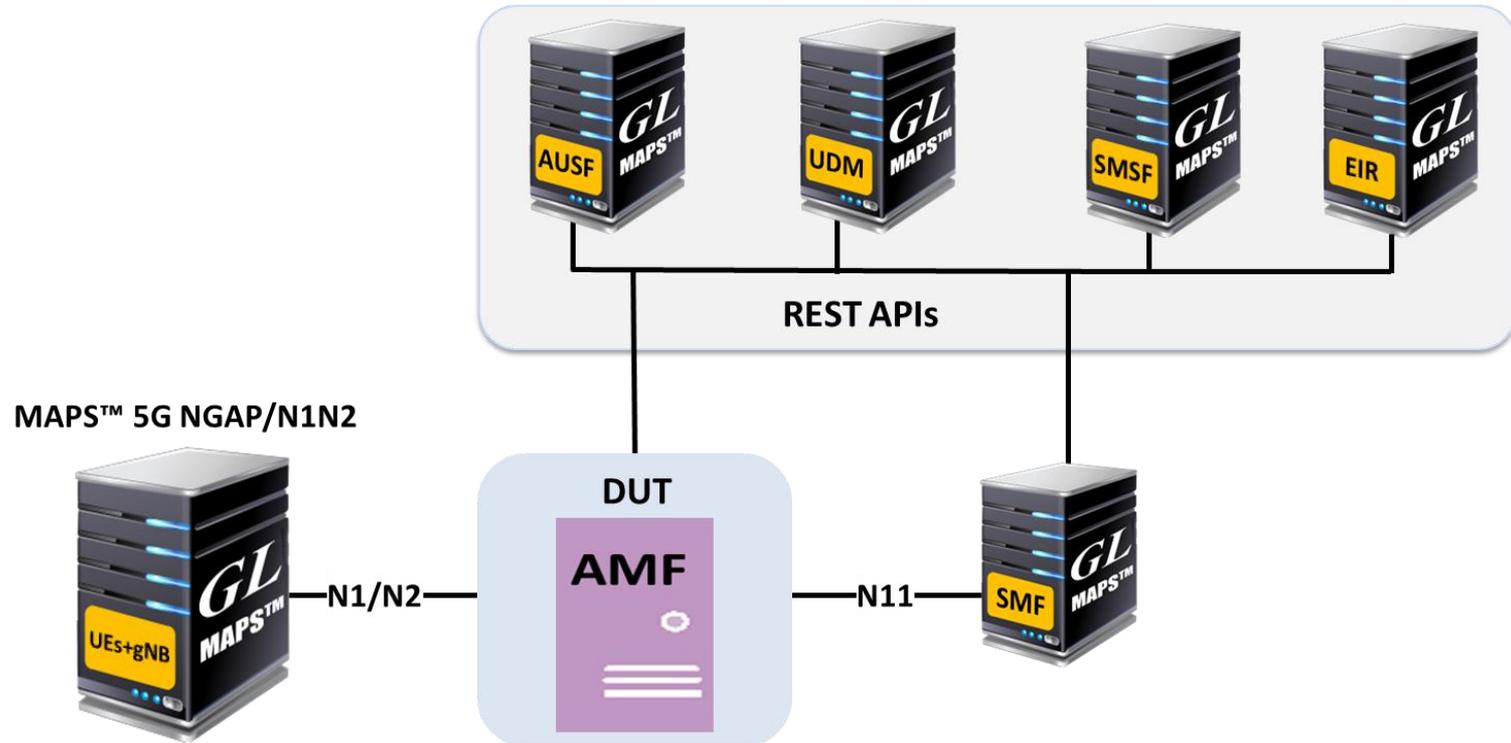


MAPS™ N1N2 configured as gNB to test AMF (DUT)



MAPS™ 5G N1N2 Use Cases (Contd.)

Wrap Around Testing of AMF



MAPS™ 5G N1N2 Interface – Call Generation

The screenshot displays the MAPS gNB (N1N2 RELEASE17) - [Call Generation - CallGenDefault] application. The interface includes a menu bar (Configurations, Emulator, Reports, Editor, Debug Tools, Windows, Help) and a toolbar. A table at the top lists test scripts:

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events Profile	Result	Total Iterations	Completed Iterations
1	5NGAP_UESessionControl.gls	MSIN3012041631	TMSI_0x80FBD308JMSI_001013012	Start	UE CONTEXT RELEASED	..	Pass	1	1
2	5NGAP_UESessionControl.gls	MSIN3012041632		Start	..	..	Unknown	1	0
3	5NGAP_UESessionControl.gls	MSIN3012041633		Start	..	..	Unknown	1	0
4	5NGAP_UESessionControl.gls	MSIN3012041634		Start	..	..	Unknown	1	0
5	5NGAP_UESessionControl.gls	MSIN3012041635		Start	..	..	Unknown	1	0

Below the table is a toolbar with buttons: Add, Delete, Insert, Refresh, Start, Start All, Stop, Stop All, Abort, Abort All. The main area shows a message sequence diagram for gNB 0 and AMF 0. The diagram illustrates the flow of messages between the gNB and the AMF, including registration requests, authentication, security mode commands, context setup, and session establishment/release.

The detailed view on the right shows the structure of an NGAP-PDU:

```
===== NGAP Layer =====
NGAP-PDU = InitiatingMessage (0)
InitiatingMessage = 15 id-InitialUEMessage
ProcedureCode = 0 reject (0)
procedureCriticality = 0 reject (0)
Value =
  InitialUEMessage
  ProtocolIE-Container = 6 Items
  Item = 0
  ProtocolIE-Field =
    ProtocolIE-ID = 85 id-RAN-UE-NGAP-ID
    procedureCriticality = 0 reject (0)
    Value =
      RAN-UE-NGAP-ID = 2
    Item = 1
    ProtocolIE-Field =
      ProtocolIE-ID = 38 id-NAS-PDU
      procedureCriticality = 0 reject (0)
      Value =
        NAS-PDU =
          x7E004171000D0100F110000
        Item = 2
        ProtocolIE-Field =
          ProtocolIE-ID = 121 id-UserLocationInform
          procedureCriticality = 0 reject (0)
          Value =
            UserLocationInformation
            userLocationInformationNR =
              nR-CDI =
                pLMNIdentity =
                  MCC = 001
                  MNC = 01
                  nRCellIdentity = 000000000
                tAI =
                  pLMNIdentity =
                    MCC = 001
                    MNC = 01
                    tAC = x000001
                Item = 3
                ProtocolIE-Field =
                  ProtocolIE-ID = 90 id-RRCEstablishmentCa
                  procedureCriticality = 0 reject (0)
```

MAPS™ 5G N1N2 Interface – Call Reception

MAPS AMF (N1N2 RELEASE17) - [Call Reception]

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Profile	Results
1	NGAPManagementHandler.gs		RANName: gnb000000001, gNBId: 0x10000001, ConnectionId: 1001	Stop	NG Setup Successful	SendAMFConfigurationUpdate		Pass
2	AMFSessionControl.gs		MSIN: 3012041631	Completed	UE-CONTEXT RELEASED	None		Pass

Stop Stop All Abort Abort All Show Records Select Active Call Auto Trash Trash Show Hidden Calls

Save Column Width Show Latest

gNB 0 AMF

- InitiateUEMessage, Registration Request → 16:50:59.792000
- DownlinkNAS Transport, Authentication Request ← 16:50:59.821000
- UplinkNAS Transport, Authentication Response → 16:50:59.991000
- DownlinkNAS Transport, Security Mode Command ← 16:51:00.006000
- UplinkNAS Transport, Security Mode Complete → 16:51:00.108000
- InitialContextSetupRequest, Registration Accept ← 16:51:00.210000
- InitialContextSetupResponse → 16:51:00.390000
- UplinkNAS Transport, Registration Complete → 16:51:00.395000
- UplinkNAS Transport, UL NAS Transport, Session Establishment Request → 16:51:00.400000
- PDUSessionResourceSetupRequest, DL NAS Transport, Session Establishment Accept ← 16:51:00.423000
- PDUSessionResourceSetupResponse → 16:51:00.590000
- UplinkNAS Transport, UL NAS Transport, Session Establishment Request → 16:51:00.596000
- PDUSessionResourceSetupRequest, DL NAS Transport, Session Establishment Accept ← 16:51:00.606000
- PDUSessionResourceSetupResponse → 16:51:00.690000
- UplinkNAS Transport, UL NAS Transport, Session Release Request → 16:52:00.783000
- PDUSessionResourceReleaseCommand, DL NAS Transport, Session Release Command ← 16:52:00.809000
- PDUSessionResourceReleaseResponse → 16:52:00.884000
- UplinkNAS Transport, UL NAS Transport, Session Release Complete → 16:52:00.984000
- UplinkNAS Transport, UL NAS Transport, Session Release Request → 16:52:00.988000
- PDUSessionResourceReleaseCommand, DL NAS Transport, Session Release Command ← 16:52:00.989000
- PDUSessionResourceReleaseResponse → 16:52:01.085000
- UplinkNAS Transport, UL NAS Transport, Session Release Complete → 16:52:01.088000

Find

```

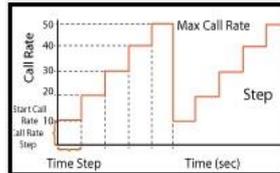
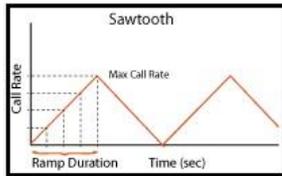
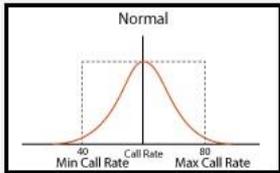
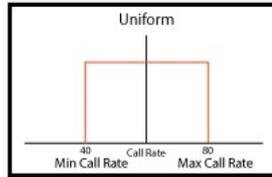
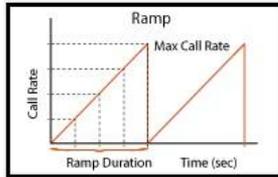
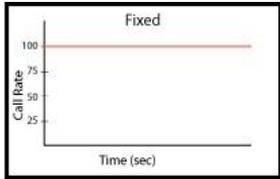
===== NGAP Layer =====
NGAP-PDU                               = InitiatingMessage (0)
InitiatingMessage                       = 15 id-InitialUEMessage
ProcedureCode                           = 0 reject(0)
procedureCriticality                     = 0 reject(0)
Value                                    =
InitialUEMessage
ProtocolIE-Container                    = 6 Items
Item                                     = 0
ProtocolIE-Field                        =
ProtocolIE-ID                           = 86 id-RAN-UE-NGAP-ID
procedureCriticality                     = 0 reject(0)
Value                                    =
RAN-UE-NGAP-ID                          = 2
Item                                     = 1
ProtocolIE-Field                        =
ProtocolIE-ID                           = 38 id-NAS-PDU
procedureCriticality                     = 0 reject(0)
Value                                    =
NAS-PDU                                  = x7E004171000D0100F1100000000032140E
Item                                     = 2
ProtocolIE-Field                        =
ProtocolIE-ID                           = 121 id-UserLocationInformation
procedureCriticality                     = 0 reject(0)
Value                                    =
UserLocationInformation
UserLocationInformationNR                =
nR-CGI                                  =
gNBIDentity                             =
MCC                                       = 001
MNC                                       = 01
nRCellIdentity                          = 0000000000
tAI                                       =
gNBIDentity                             =
MCC                                       = 001
MNC                                       = 01
tAC                                       = x000001
Item                                     = 3
ProtocolIE-Field                        =
ProtocolIE-ID                           = 90 id-RRCEstablishmentCause
procedureCriticality                     = 0 reject(0)
Value                                    =
RRCEstablishmentCause                   = 3 mo-Signalling(3)
Item                                     = 4
ProtocolIE-Field                        =
ProtocolIE-ID                           = 3 id-AMFSetID
procedureCriticality                     = 0 reject(0)
                    
```

Scripts Message Sequence Event Config Script Row

● Initialisation Errors ● Error Events ● Captured Errors ● Link Status Up=1 Down=0

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.



The screenshot shows the 'MAPS gNB (N1N2 RELEASE15) - [Load Generation - LoadGendefault]' window. The interface includes a menu bar (Configurations, Emulator, Reports, Editor, Debug Tools, Windows, Help) and a toolbar. The main configuration area contains the following settings:

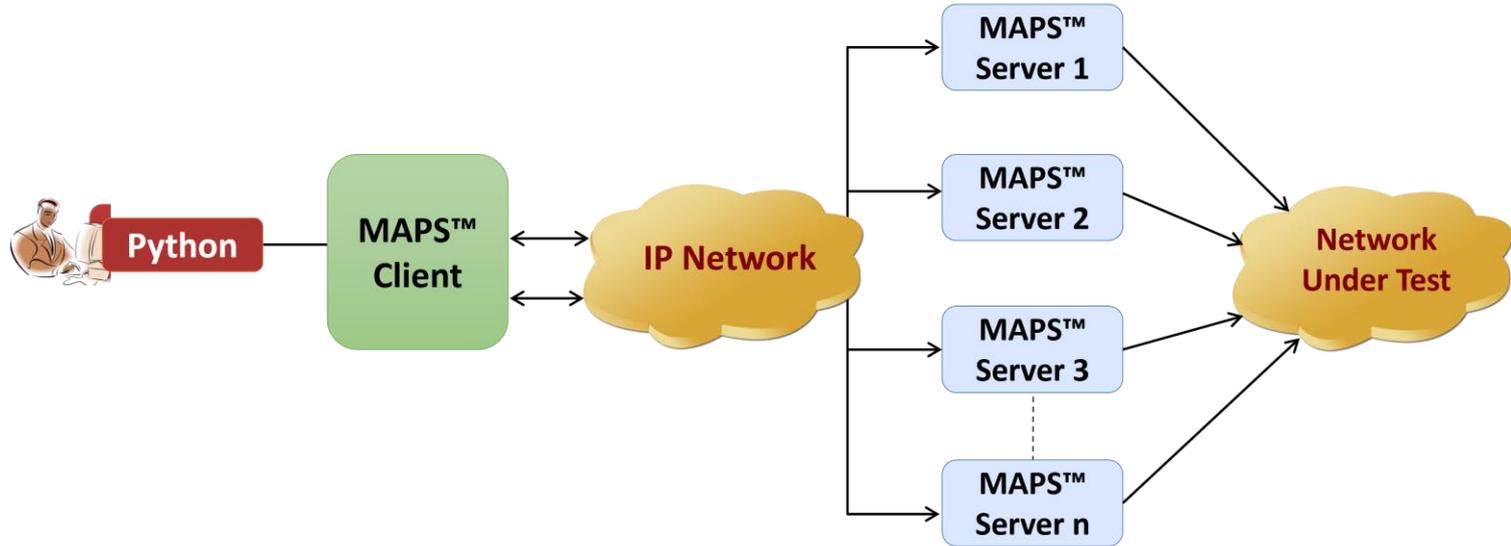
- Total Calls To Generate: * (no limit)
- Max Active Calls: 100
- Unique Distributions Per Script:
- Multi Distributions:
- Statistical Distribution: Fixed
- Call Rate: 25

Below these settings is a table for 'Scripts' and a list of 'Profiles'.

Scripts	Profiles
SGNGAP_UESessionControl	MSIN30 12041631
	MSIN30 12041632
	MSIN30 12041633
	MSIN30 12041634
	MSIN30 12041635
	MSIN30 12041636
	MSIN30 12041637

At the bottom, there are controls for 'Stop Time' (Days, Hours, Minutes) and 'Start Time' (00:00:00.000), along with 'Pause' and 'Start' buttons.

MAPS™ API Architecture



- API wraps our proprietary scripting language in standard languages familiar to the user:
 - Python
- Clients and Servers support a “Many-to-Many” relationship, making it very easy for users to develop complex test cases involving multiple signaling protocols

CLI/API Support

Python Client

```
Python 3.7.5 Shell
File Edit Shell Debug Options Window Help
Python 3.7.5 (tags/v3.7.5:5c02a39a0b, Oct 15 2019, 00:11:34) [MSC v.1916 64 bit (AMD64)] on win32
Type "help", "copyright()", "credits()" or "license()" for more information.
>>>
** RESTART: C:\Program Files\GL Communications Inc\MAPSSG-NIN2\MAPSCLI\PythonClient\examples\gNB\NIN2_PlaceCall_Default.py
NIN2 Server Connection... True
NIN2 Testbed Starting ... 0
True
NIN2 Profile Loading... True
Check NGAP Link Status... True
NIN2 Call Initiated... True
Call Status... RM-REGISTER-INITIATED
Call Status... REGISTRATION-COMPLETED

PDU Session Initiate for Dnn lms ... True
PDU Session Established

PDU Session Initiate for Dnn internet ... True
PDU Session Established

De-register Initiated... True
Total Signalling Messages: 25
NIN2 Call's LastMSGRcv.....
Time Stamp Route Message
12:11:23.444 <- UEContextReleaseCommand, , ,

**** NIN2 Call Message Flow ****
CLI(gNB) <-> DUT(AMF)

Time Stamp Route Message
12:11:10.624 -> InitialUEMessage, Registration Request
12:11:11.537 <- DownlinkNASTransport, Authentication Request, ,
12:11:11.532 -> UplinkNASTransport, Authentication Response
12:11:11.637 <- DownlinkNASTransport, Security Mode Command, ,
12:11:11.650 -> UplinkNASTransport, Security Mode Complete
12:11:11.503 <- InitialContextSetupRequest, Registration Accept, ,
12:11:11.929 -> InitialContextSetupResponse
12:11:11.937 -> UplinkNASTransport, Registration Complete
12:11:12.046 -> UplinkNASTransport, UL NAS Transport, Session Establishment Request
12:11:12.244 <- EDDSessonResourceSetupRequest, DL NAS Transport, , Session Establishment Acc
12:11:12.324 -> EDDU Session Resource Setup Response
12:11:12.464 -> UplinkNASTransport, UL NAS Transport, Session Establishment Request
12:11:12.639 <- EDDSessonResourceSetupRequest, DL NAS Transport, , Session Establishment Acc
12:11:12.707 -> EDDU Session Resource Setup Response
12:11:12.859 -> UplinkNASTransport, UL NAS Transport, Session Release Request
12:11:12.946 <- EDDSessonResourceReleaseCommand, DL NAS Transport, , Session Release Command
12:11:12.956 -> EDDU Session Resource Release Response
12:11:12.969 -> UplinkNASTransport, UL NAS Transport, Session Release Complete
12:11:12.983 -> UplinkNASTransport, UL NAS Transport, Session Release Request
12:11:12.245 <- EDDSessonResourceReleaseCommand, DL NAS Transport, , Session Release Command
12:11:12.255 -> EDDU Session Resource Release Response
12:11:12.262 -> UplinkNASTransport, UL NAS Transport, Session Release Complete
12:11:12.293 -> UplinkNASTransport, Deregistration Request
12:11:12.444 <- UEContextReleaseCommand, , ,
12:11:12.453 -> UEContextReleaseComplete
NIN2 Script Stopping... True
NIN2 Server Disconnecting... True
>>>

***** RESTART: C:\Program Files\GL Communication
-g-NIN2\MAPSCLI\PythonClient\examples\gNB\NIN2_PlaceCall_Default.py *****
```

MAPS™ CLI Server

```
MapsCLI gNB (NIN2 RELEASE17)
File Edit View
View Latest Command

1: 2024-2-19 12:19:37.252000 : Start 'TestBedDefault.xml' # "_gNB[0].gNBIPAddress[0]"="192.168.12.28", "_TypeOfUESimulation"="XML";
1: 2024-2-19 12:19:51.469000 : LoadProfile 'UE_Profiles.xml'
1: 2024-2-19 12:19:59.012000 : StartScript 1 'SGNGAP_UESessionControl.gls' 'MSIN3012041631' 1 * 'MSIN'=(binarystring)3012041631,'TMSI'=(binarystring)001013012041631,'
1: 2024-2-19 12:20:01.201000 : UserEvent 1 'IsTransportUp';
1: 2024-2-19 12:20:03.600000 : UserEvent 1 'StartRegistration';
1: 2024-2-19 12:20:05.250000 : UserEvent 1 'SessionEstablish';
1: 2024-2-19 12:20:05.580000 : UserEvent 1 'SessionEstablish';
1: 2024-2-19 12:20:15.852000 : UserEvent 1 'DeRegister';
1: 2024-2-19 12:20:26.244000 : UserEvent 1 'GetMessageCount';
1: 2024-2-19 12:20:26.349000 : UserEvent 1 'GetLastReceivedMessage';
1: 2024-2-19 12:20:26.454000 : UserEvent 1 'GetMessageCount';
1: 2024-2-19 12:20:26.574000 : UserEvent 1 'GetMessageInfo' # 'Index'=0;
1: 2024-2-19 12:20:26.679000 : UserEvent 1 'GetMessageInfo' # 'Index'=1;
1: 2024-2-19 12:20:26.783000 : UserEvent 1 'GetMessageInfo' # 'Index'=2;
1: 2024-2-19 12:20:26.888000 : UserEvent 1 'GetMessageInfo' # 'Index'=3;
1: 2024-2-19 12:20:27.008000 : UserEvent 1 'GetMessageInfo' # 'Index'=4;
1: 2024-2-19 12:20:27.113000 : UserEvent 1 'GetMessageInfo' # 'Index'=5;
1: 2024-2-19 12:20:27.218000 : UserEvent 1 'GetMessageInfo' # 'Index'=6;
1: 2024-2-19 12:20:27.338000 : UserEvent 1 'GetMessageInfo' # 'Index'=7;
1: 2024-2-19 12:20:27.443000 : UserEvent 1 'GetMessageInfo' # 'Index'=8;
1: 2024-2-19 12:20:27.548000 : UserEvent 1 'GetMessageInfo' # 'Index'=9;
1: 2024-2-19 12:20:27.653000 : UserEvent 1 'GetMessageInfo' # 'Index'=10;
1: 2024-2-19 12:20:27.773000 : UserEvent 1 'GetMessageInfo' # 'Index'=11;
1: 2024-2-19 12:20:27.878000 : UserEvent 1 'GetMessageInfo' # 'Index'=12;
1: 2024-2-19 12:20:28.103000 : UserEvent 1 'GetMessageInfo' # 'Index'=13;
1: 2024-2-19 12:20:28.208000 : UserEvent 1 'GetMessageInfo' # 'Index'=14;
1: 2024-2-19 12:20:28.313000 : UserEvent 1 'GetMessageInfo' # 'Index'=15;
1: 2024-2-19 12:20:28.418000 : UserEvent 1 'GetMessageInfo' # 'Index'=16;
1: 2024-2-19 12:20:28.538000 : UserEvent 1 'GetMessageInfo' # 'Index'=17;
1: 2024-2-19 12:20:28.643000 : UserEvent 1 'GetMessageInfo' # 'Index'=18;
1: 2024-2-19 12:20:28.748000 : UserEvent 1 'GetMessageInfo' # 'Index'=19;
1: 2024-2-19 12:20:28.973000 : UserEvent 1 'GetMessageInfo' # 'Index'=20;
1: 2024-2-19 12:20:29.078000 : UserEvent 1 'GetMessageInfo' # 'Index'=21;
1: 2024-2-19 12:20:29.198000 : UserEvent 1 'GetMessageInfo' # 'Index'=22;
1: 2024-2-19 12:20:29.303000 : UserEvent 1 'GetMessageInfo' # 'Index'=23;
1: 2024-2-19 12:20:29.408000 : UserEvent 1 'GetMessageInfo' # 'Index'=24;
1: 2024-2-19 12:20:30.728000 : StopScript 1;
ServerLog:errCode = 0,errString = connection has been gracefully closed for ClientId =1

NUM
```

Thank you