MAPS™ 5G N12 Interface Emulator

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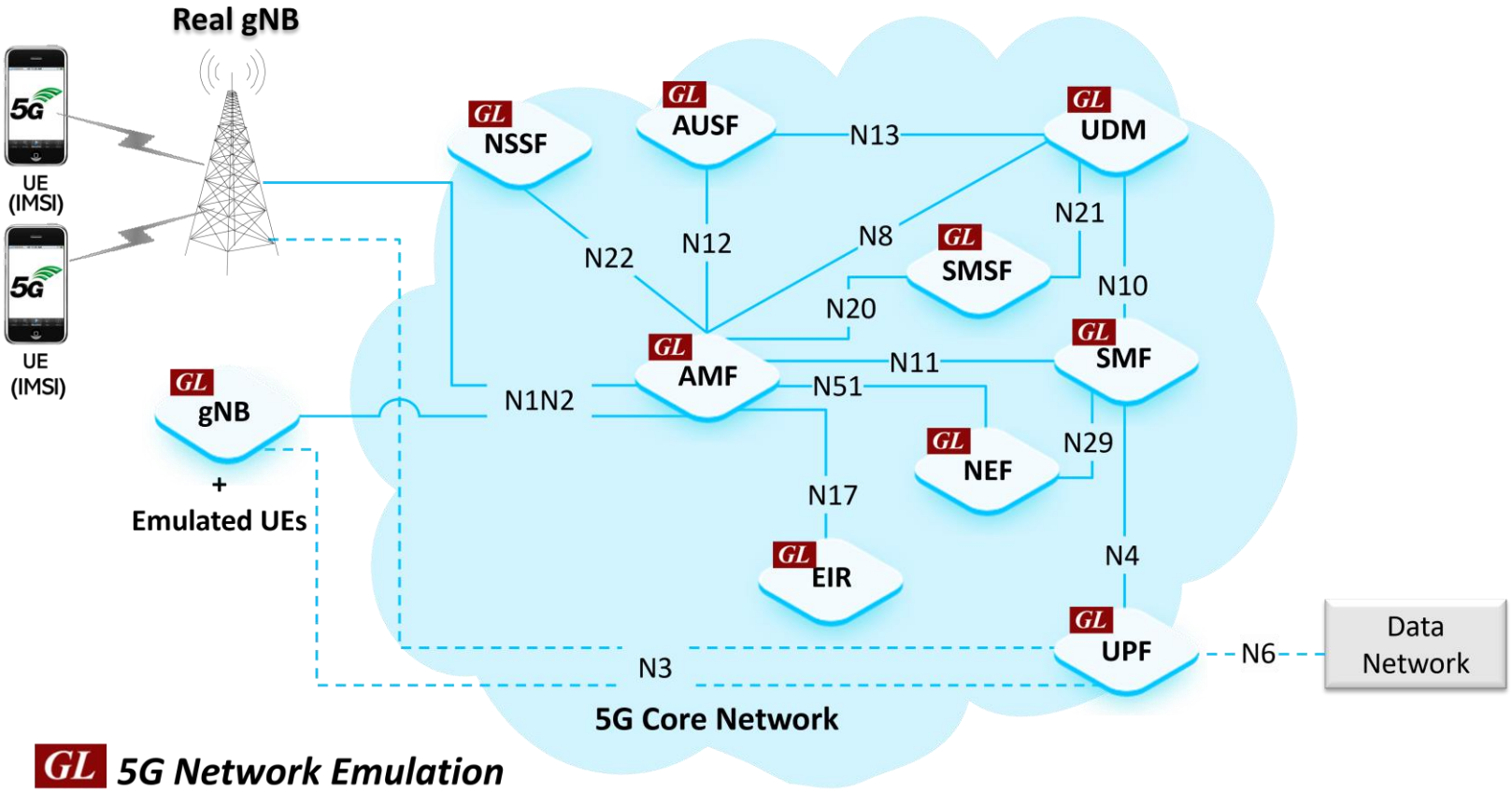
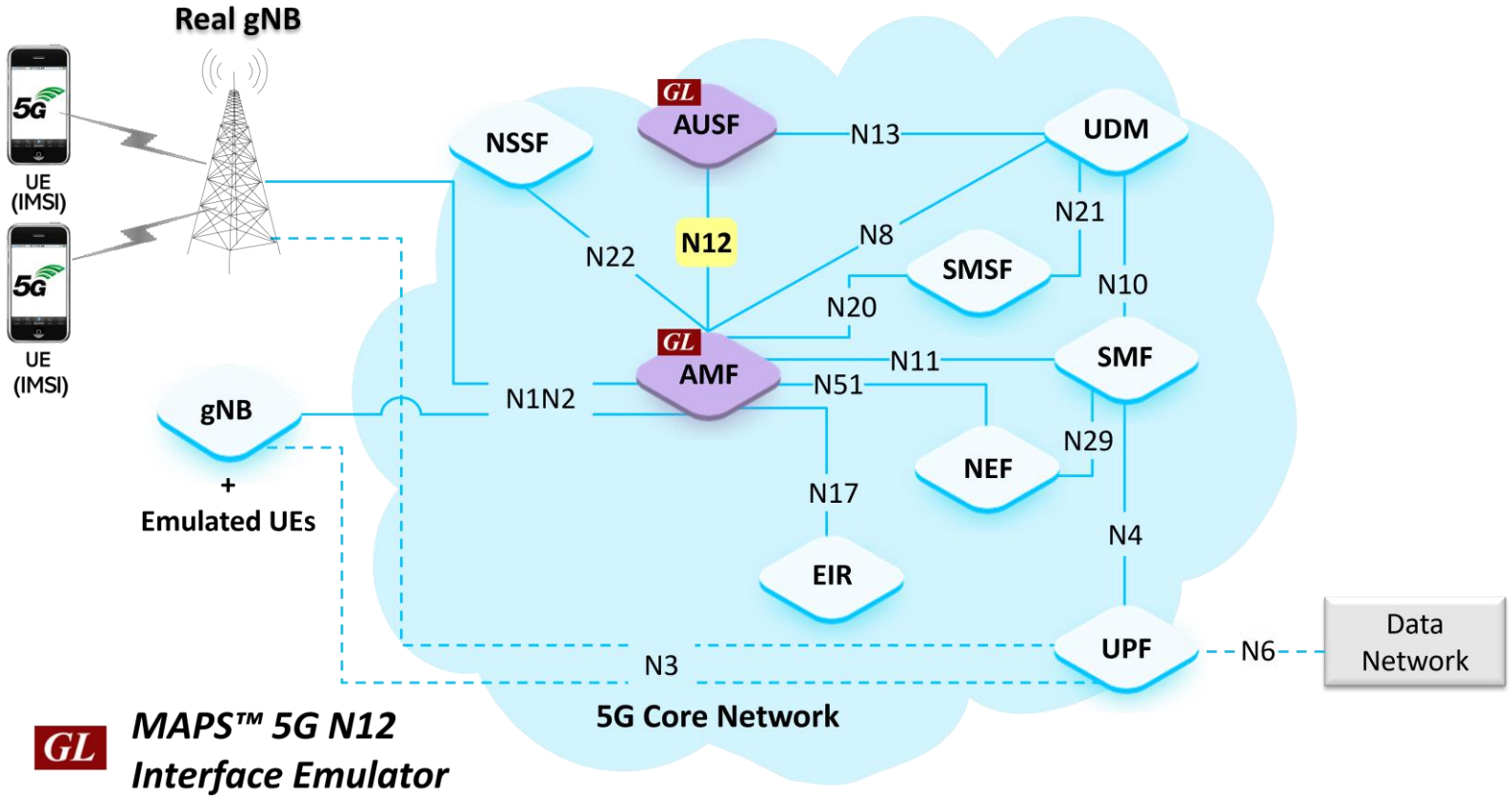
5G Network Diagram



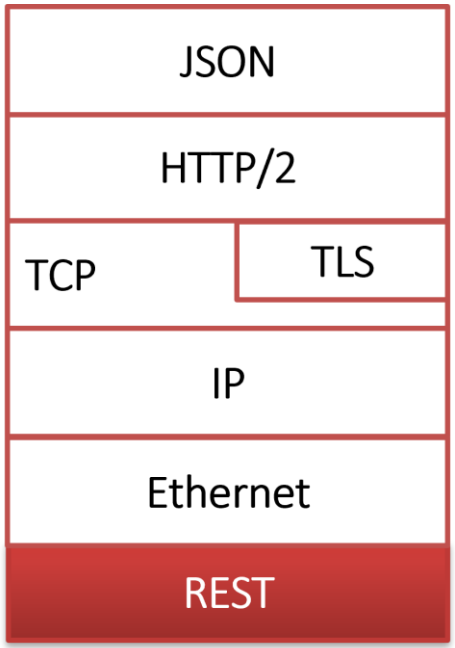
MAPS™ 5G N12 Interface



Main Features

- Emulate Authentication Server Function (AUSF) and Access and Mobility Management Function (AMF) elements
- Supports AKA (Authentication and Key Agreement) and Authentication Result Removal with 5G AKA method services via the Nausf service-based N12 interface
- Services use REST APIs based on HTTP and JSON data format
- Supports TLS and TCP transports
- Supports scripted call generation and automated call reception
- Supports customization of call flow and message templates to create valid and invalid scenarios
- Ready-to-use scripts for quick testing
- Provides Call Statistics and Events Status
- Supports Command Line Interface (CLI) through a client-server model, enabling users to control all features via Python APIs
- Automation, Remote access, and Schedulers to run tests 24/7

Protocol Stack Specification



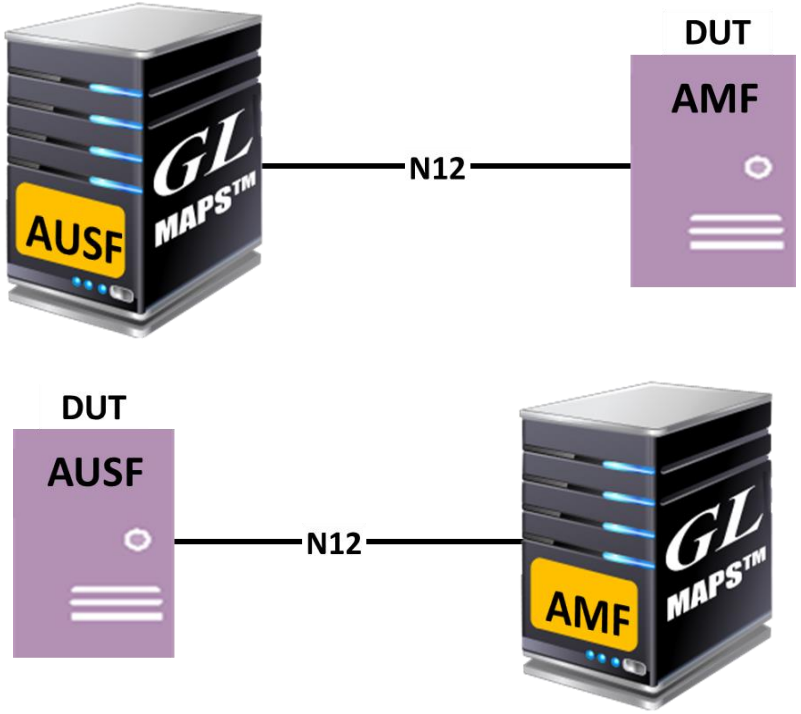
Supported Protocols	Standard / Specification Used
N12 Interface	
N12 Interface (AUSF - AMF)	TS29.509
JavaScript Object Notation (JSON)	IETF RFC 8259
HTTP/2	IETF RFC 7231 IETF RFC 7540/RFC 7541
TLS	IETF RFC 8446
TCP	IETF RFC 793
IPv4	IETF RFC 791 [5] IETF RFC 2460 [6]

MAPS™ 5G N12 Interface Procedures

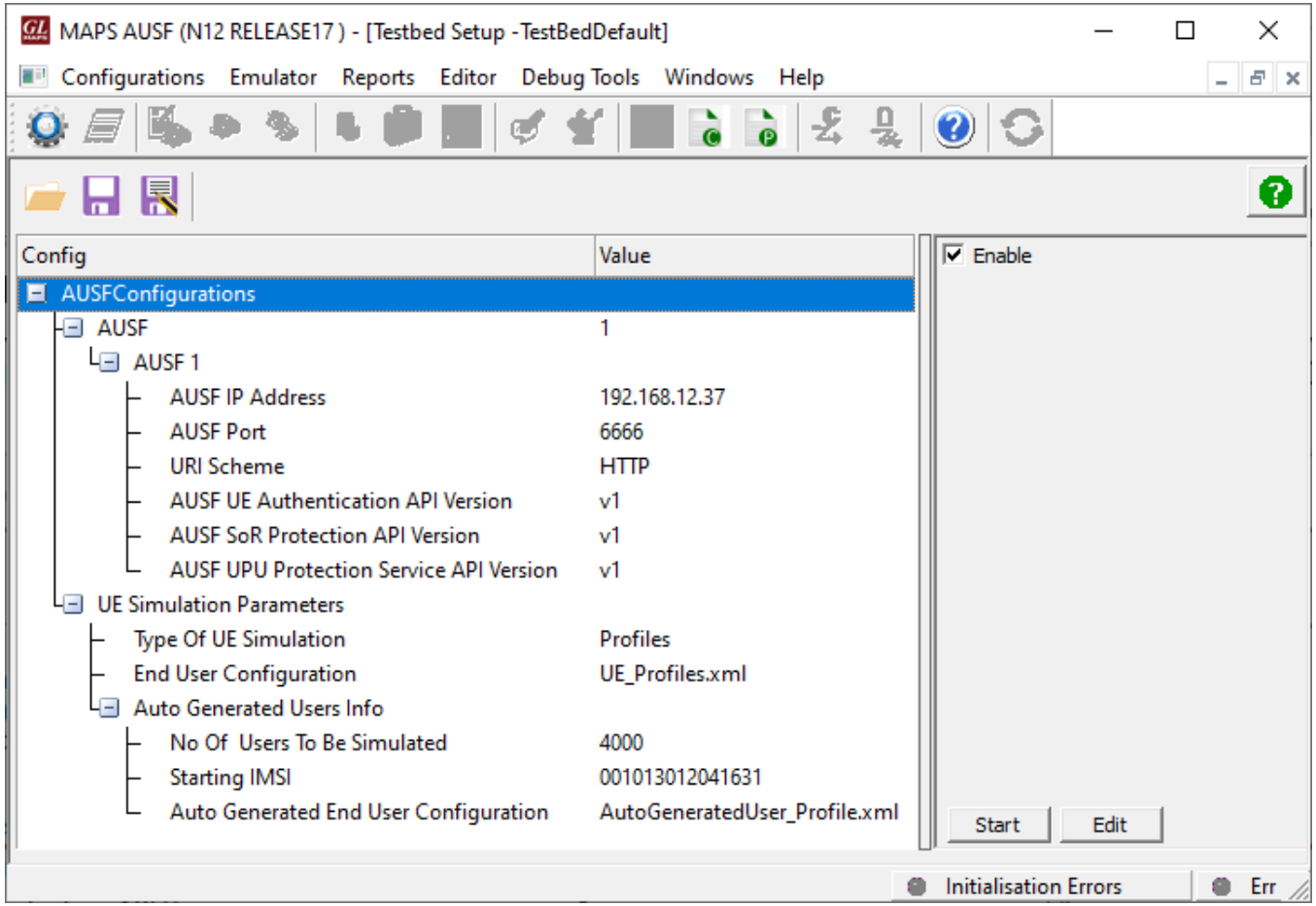
- Nausf_UEAuthentication (Authentication and Key Agreement)
- Authentication Result Removal with 5G AKA method

MAPS™ 5G N12 User Cases

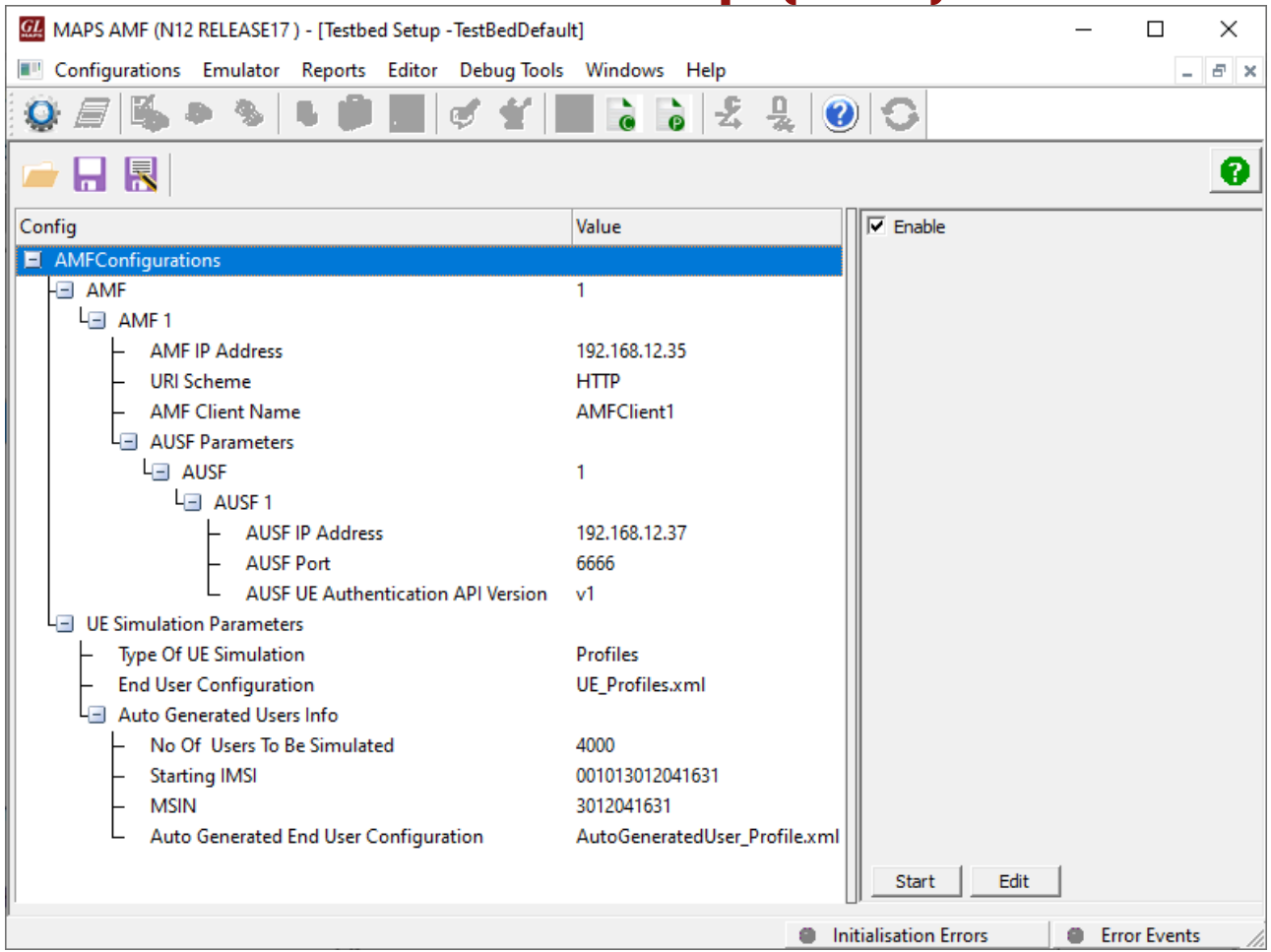
- MAPS™ can emulate any one node (AUSF/AMF) or both AUSF and AMF nodes



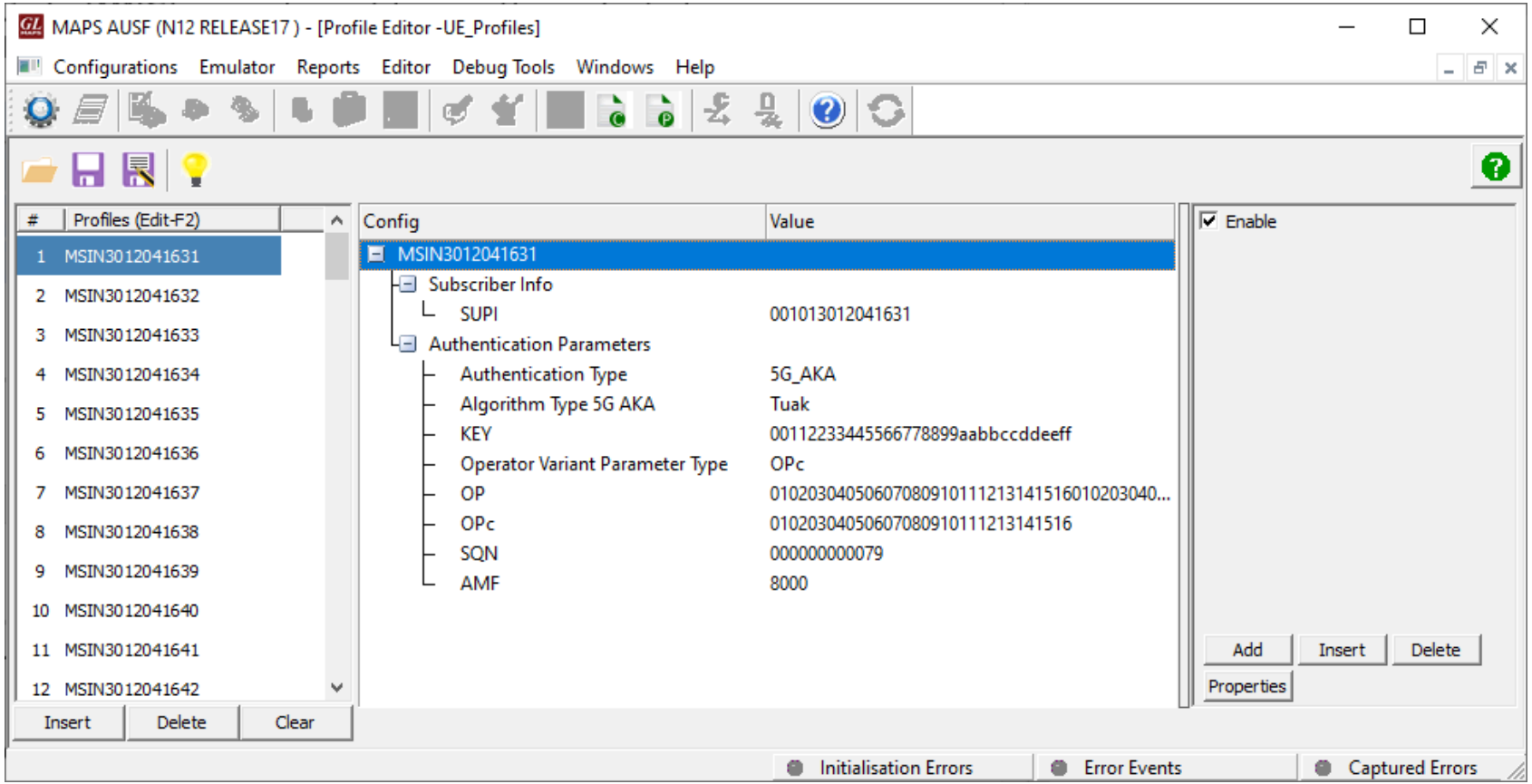
Testbed Setup (AUSF)



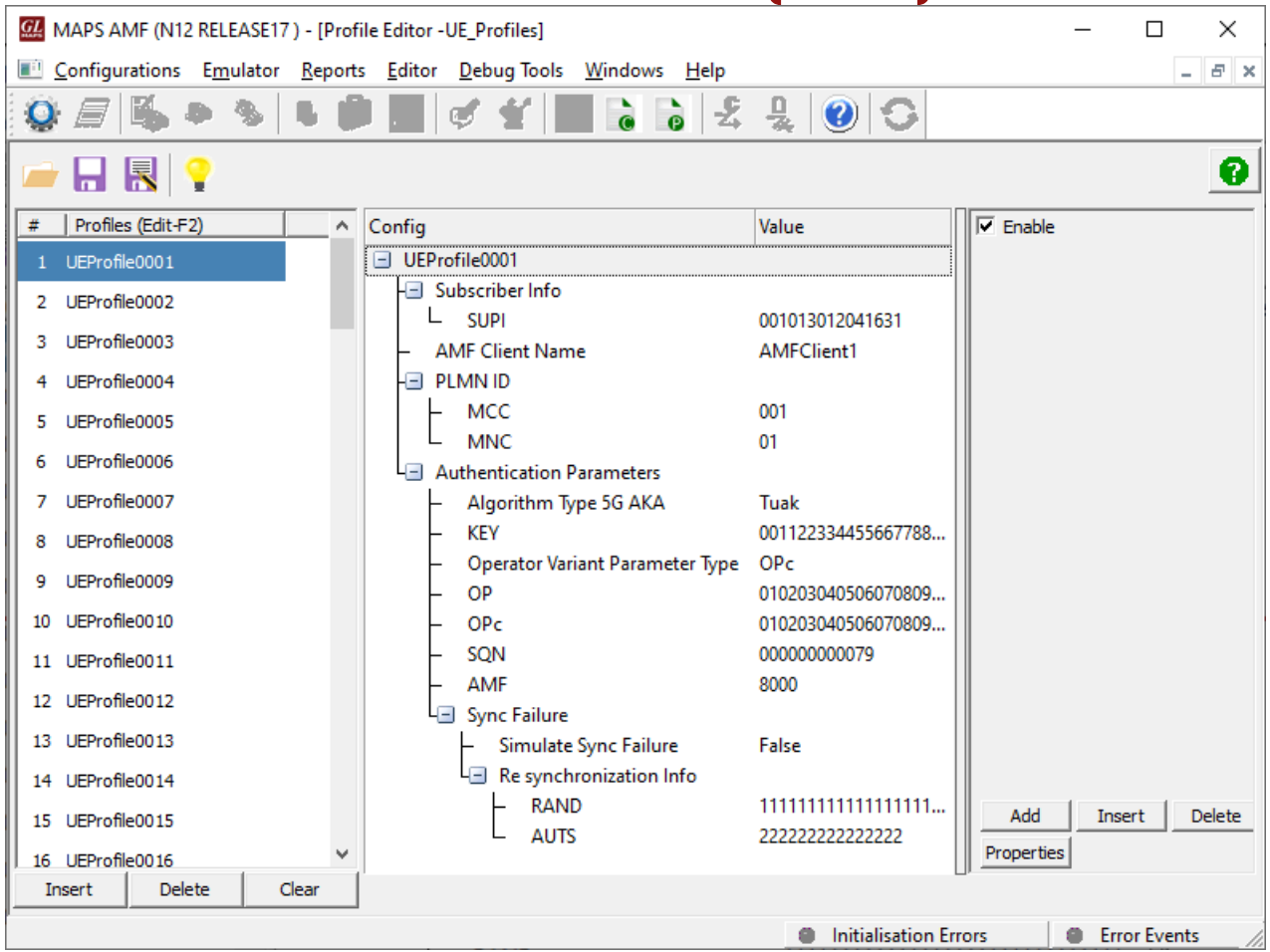
Testbed Setup (AMF)



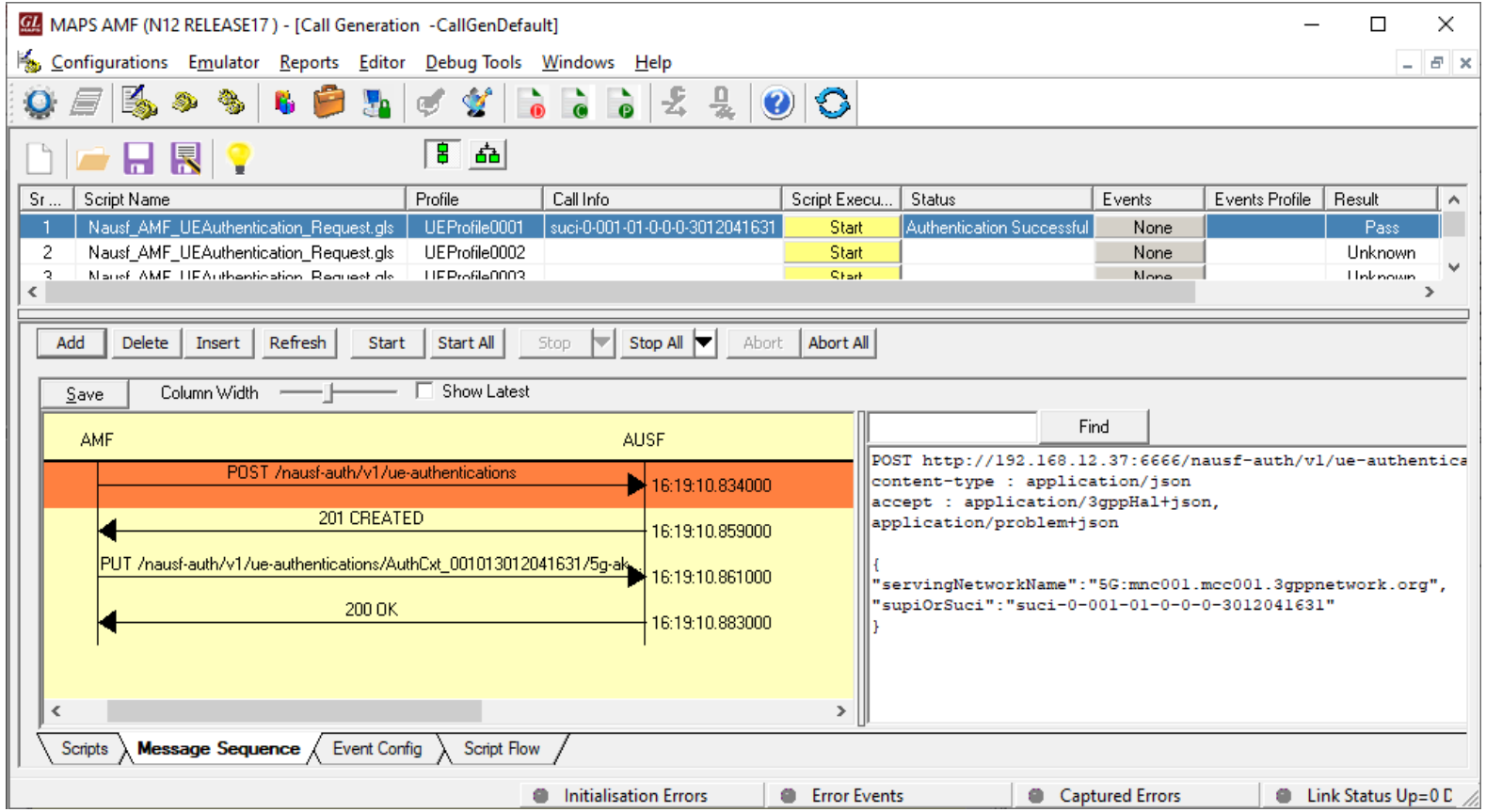
Profile Editor (AUSF)



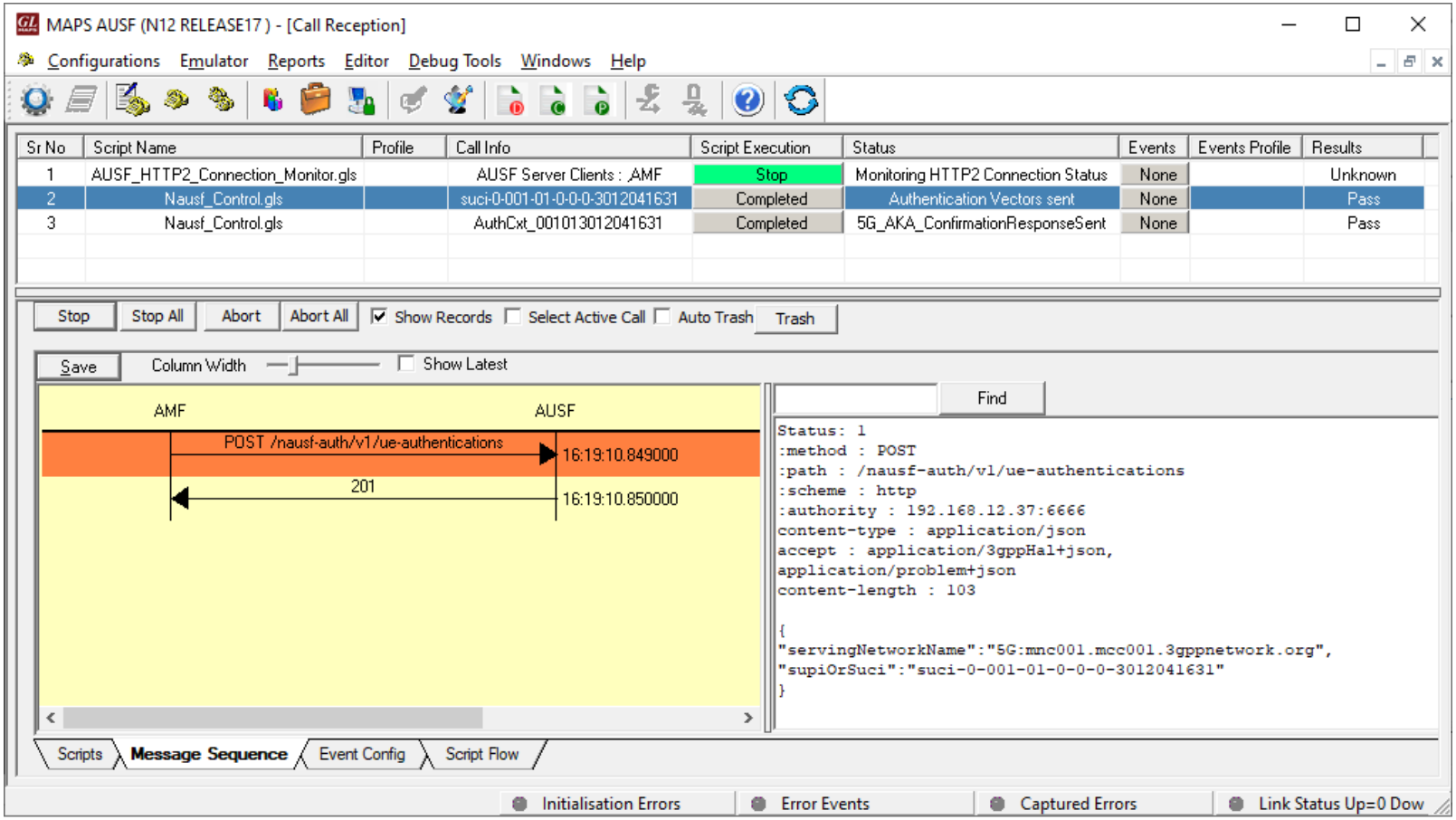
Profile Editor (AMF)



Call Generation

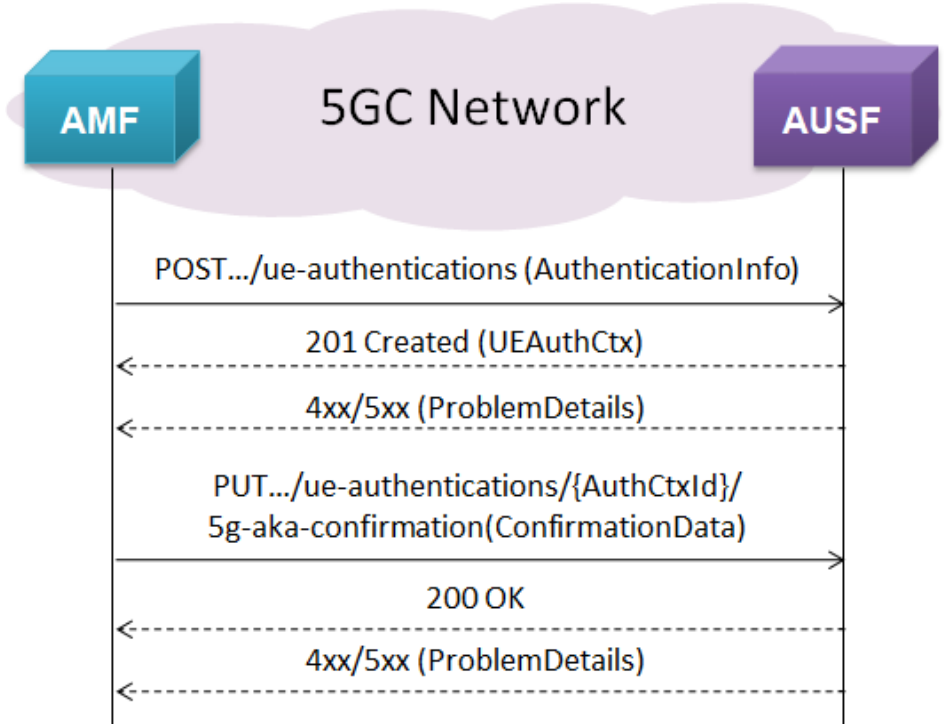


Call Reception



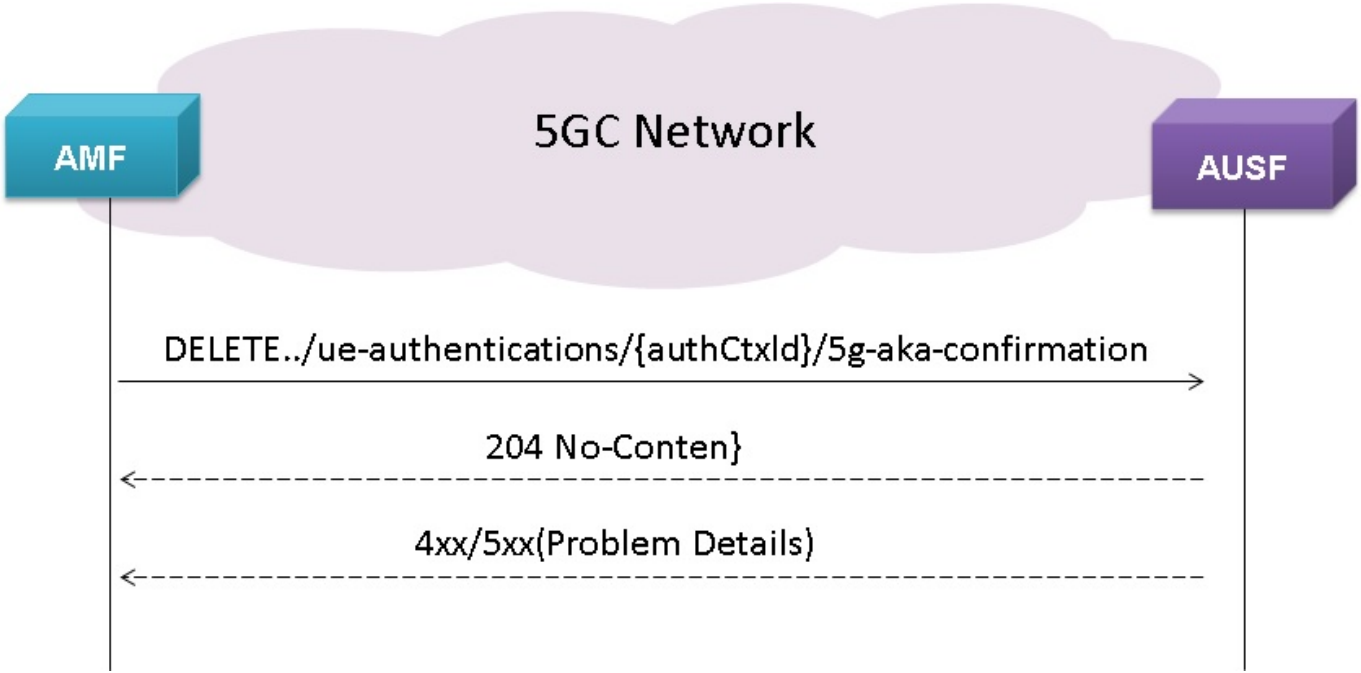
MAPS™ 5G N12 Interface Procedures

UE Authentication Service

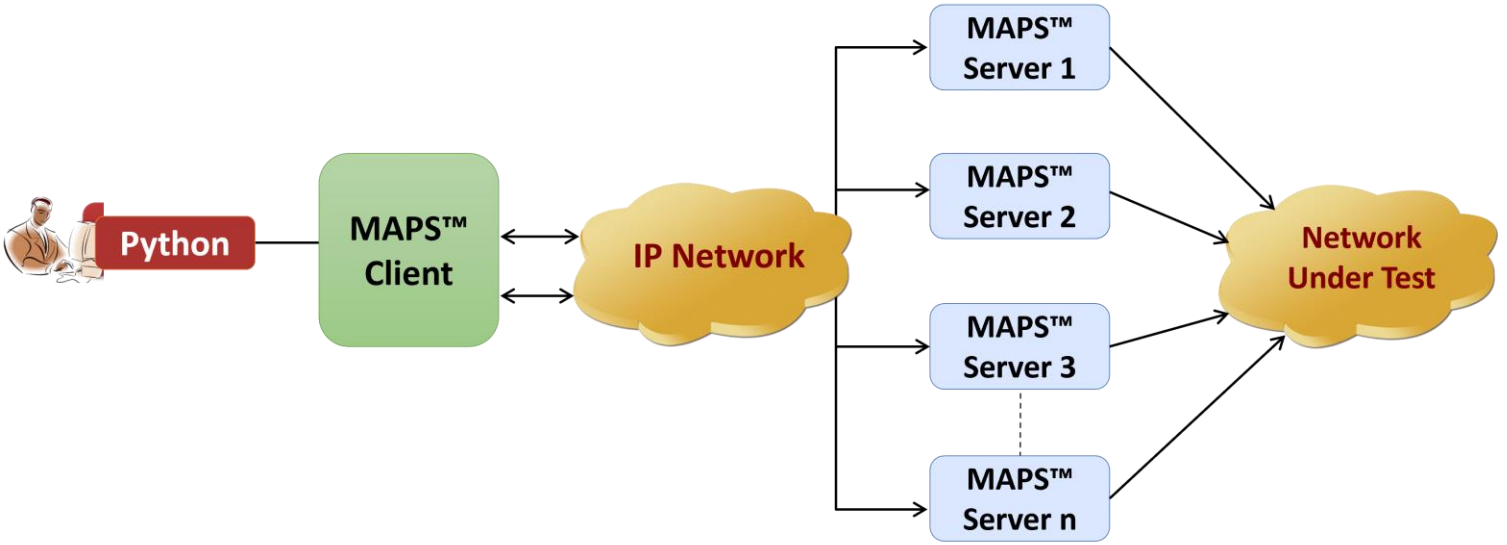


MAPS™ 5G N12 Interface Procedures (Contd.)

Authentication Result Removal with 5G AKA Method



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 3.7.9 Shell

File Edit Shell Debug Options Window Help

```
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:\Program Files\GL Communications Inc\MAPS5G-N12\MAPSCLI\PythonClient\examples\AMF\N12_PlaceCall.py
N12 Server Connection... True
N12 Testbed Starting ... True
N12 Profile Loading... True
N12  Nausf_AMF_UEAuthentication_Request.gls Script Started...
Starting N12 script  True
Authentication Request Initiation ...    True
Authentication Response Status...  Authentication Successful
ConfirmationResponse =  Authentication Successful
MAP MsgCount: 4
***** MAP Message Flow *****
Time Stamp              Route           Message
18:00:21.826            ->              POST - /nausf-auth/v1/ue-authentications
18:00:21.826    ->      POST - /nausf-auth/v1/ue-authentications
{"servingNetworkName":"5G:mnc001.mcc001.3gppnetwork.org","supiOrSuci":"suci-0-001-01-0-0-0-3012041631"}
18:00:21.846            <-              201
18:00:21.846    <-      201
{"5gAuthData":{"autn":"67C1E0025C3E80003DFD7B20037D500D","
B2052AD387221301ACB5BF2"},"_links":{"5g-aka":{"href":"http
_001013012041631/5g-aka-confirmation"}},"authType":"5G_AKA
18:00:21.848            ->              PUT - /nausf-auth/
on
18:00:21.848    ->      PUT - /nausf-auth/v1/ue-authentica
{"resStar":"7C10FC59A44E0771A4E9967B4EE53988"}
18:00:21.867            <-              200
18:00:21.867    <-      200
{"authResult":"AUTHENTICATION_SUCCESS","kseaf":"A7F691225
"imsi-001013012041631"}
Stopping Script... True
N12 Server Disconnecting... True
```

MAPS™ CLI Server

MapsCLI AMF (N12 RELEASE17)

File Edit View

View Latest Command

```
1 :: 2024-1-9 18:00:06.656000 : Start "TestBedDefault.xml" # "_AMF[0].AUSF[0].AUSFIPAddress"="192.168.12.35", "_TypeOfUESimulation"="XML","_DefaultProfile"="UE_Profiles.xml";
1 :: 2024-1-9 18:00:09.400000 : LoadProfile "UE_Profiles.xml"
1 :: 2024-1-9 18:00:11.702000 : StartScript 1 "Nausf_AMF_UEAuthentication_Request.gls" "UEProfile0001" 1 # "IMSI"=( binarystring )001013012041631,"AuthenticationAlgType"="Tuak","CallFlowDebug"=1
1 :: 2024-1-9 18:00:21.822000 : UserEvent 1 "UE_Authentication";
1 :: 2024-1-9 18:00:21.932000 : UserEvent 1 "GetCallStatus";
1 :: 2024-1-9 18:00:23.031000 : UserEvent 1 "GetMessageCount";
1 :: 2024-1-9 18:00:23.142000 : UserEvent 1 "GetMessageInfo"# "Index"=0;
1 :: 2024-1-9 18:00:23.252000 : UserEvent 1 "GetMessageInfo"# "Index"=1;
1 :: 2024-1-9 18:00:23.474000 : UserEvent 1 "GetMessageInfo"# "Index"=2;
1 :: 2024-1-9 18:00:23.577000 : UserEvent 1 "GetMessageInfo"# "Index"=3;
1 :: 2024-1-9 18:00:23.680000 : StopScript 1;
ServerLog:errCode = 0,errString = connection has been gracefully closed for ClientId =1
```

NUM

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Thank you