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# MAPS™ 5G N12 Interface Emulator

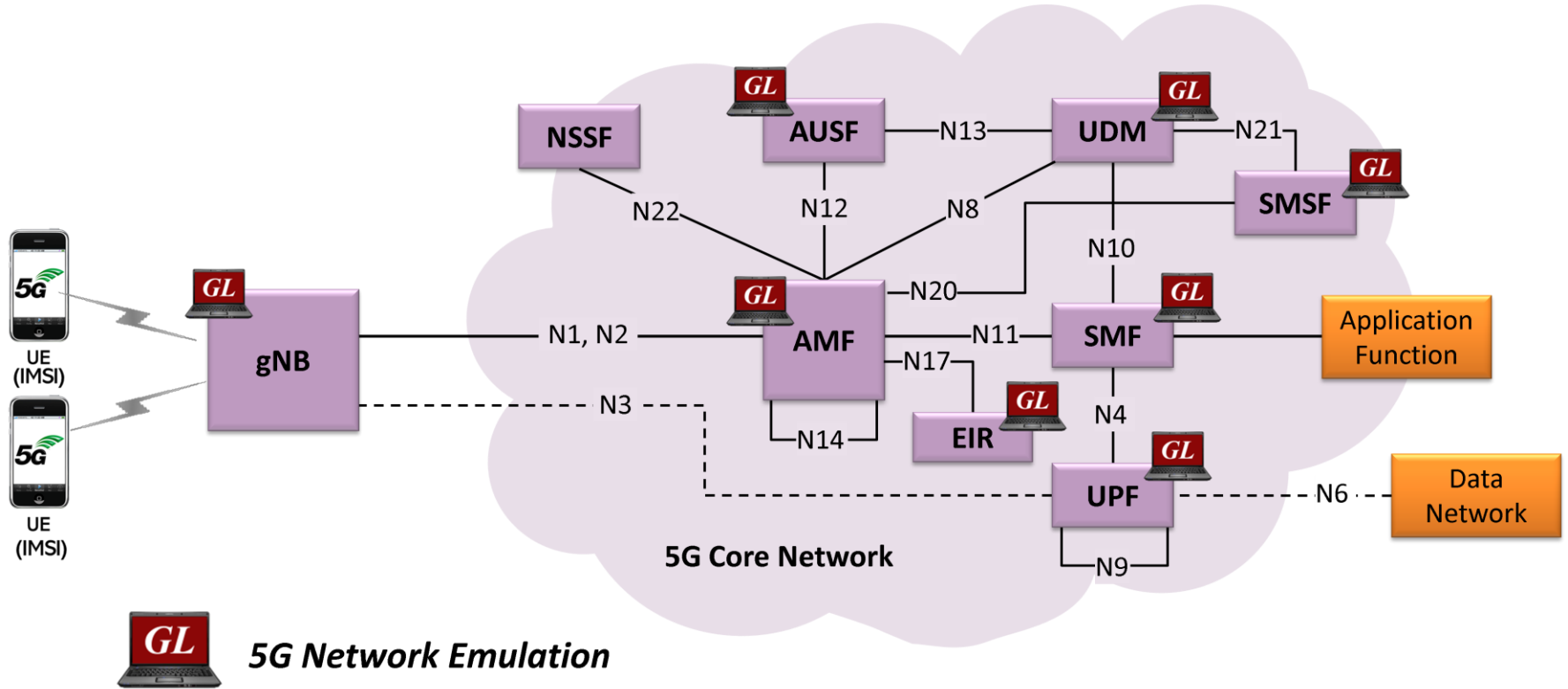
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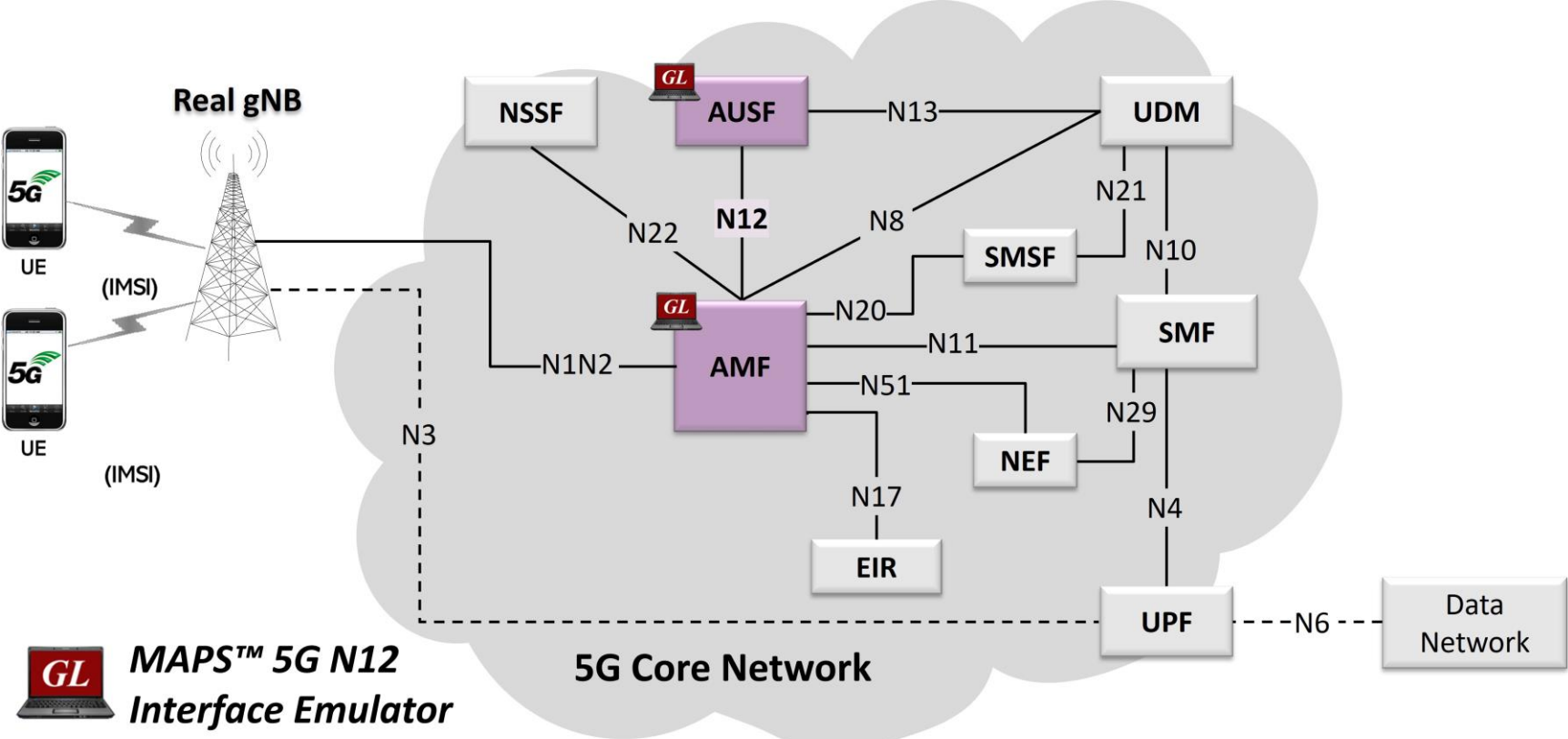


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# 5G Network Diagram



# MAPS™ 5G N12 Interface

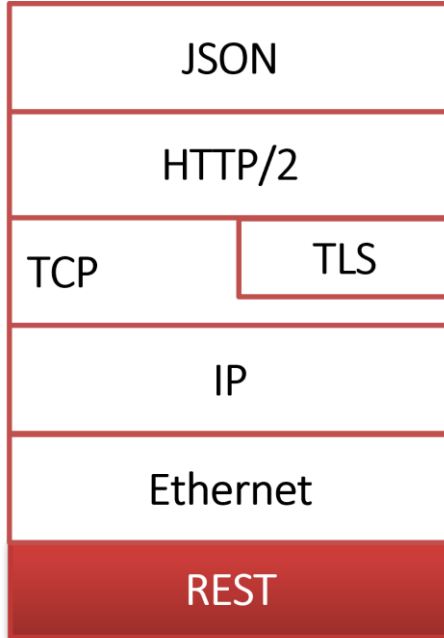


 **MAPS™ 5G N12**  
**Interface Emulator**

# 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
- Automation, Remote access, and Schedulers to run tests 24/7

# Protocol Stack Specification



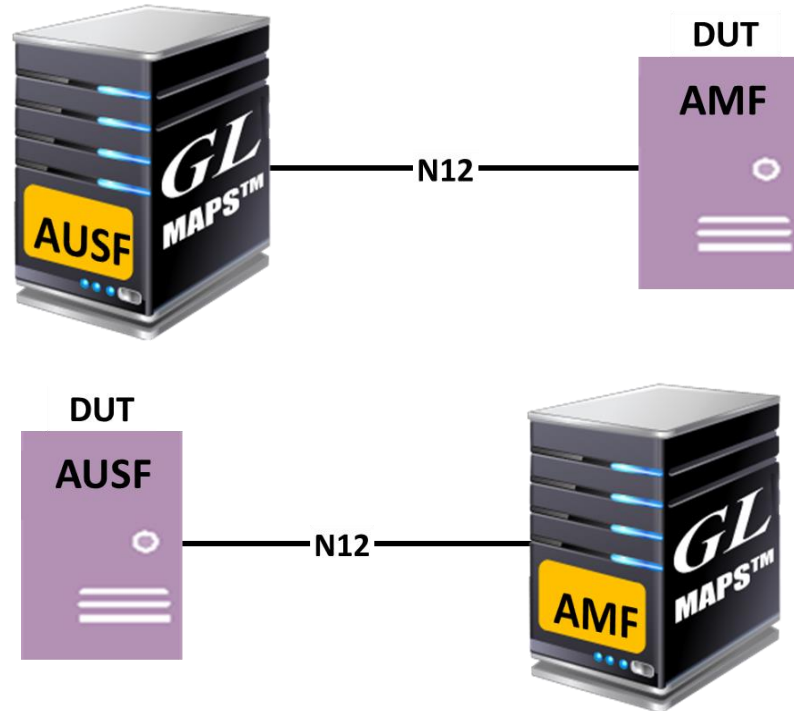
Supported Protocols	Standard / Specification Used
<b>N12 Interface</b>	
N12 Interface (AUSF - AMF)	TS29.509 Release 17, version 0.0.0
JavaScript Object Notation (JSON)	IETF RFC 8259
HTTP/2	IETF RFC 7231 IETF RFC 7540/RFC 7541
TLS	IETF RFC 8446
TCP	IETF RFC 793
IPv4	IETF RFC 791 [5] IETF RFC 2460 [6]

# 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)

The screenshot shows the MAPS AUSF (N12 RELEASE15) configuration window. The window title is "MAPS AUSF (N12 RELEASE15) - [Testbed Setup - TestBedDefault]". The menu bar includes "Configurations", "Emulator", "Reports", "Editor", "Debug Tools", "Windows", and "Help". The toolbar contains various icons for configuration, simulation, and help. The main area displays a configuration tree with the following settings:

Config	Value
<b>AUSFConfiguration</b>	
AUSF IP Address	192.168.1.28
AUSF Port	6666
URI Scheme	HTTP
AUSF UE Authentication API Version	v1
AUSF SoR Protection API Version	v1
AUSF UPU Protection Service API Version	v1
UE Simulation Parameters	
Type Of UE Simulation	Profiles
End User Configuration	UE_Profiles.xml
+ Auto Generated Users Info	

On the right side of the configuration table, there is a checkbox labeled "Enable" which is checked. Below the configuration table, there are "Start" and "Edit" buttons. At the bottom of the window, there are two status indicators: "Initialisation Errors" and "Error Events".



# Testbed Setup (AMF)

The screenshot shows the MAPS AMF (N12 RELEASE15) configuration window. The title bar reads "MAPS AMF (N12 RELEASE15) - [Testbed Setup - TestBedDefault]". The menu bar includes "Configurations", "Emulator", "Reports", "Editor", "Debug Tools", "Windows", and "Help". The toolbar contains various icons for file operations and system functions. The main area is a configuration table with columns "Config" and "Value".

Config	Value
AMF	
AMF IP Address	192.168.1.216
AMF Port	6665
URI Scheme	HTTP
AUSF Configuration	
AUSF IP Address	192.168.1.28
AUSF Port	6666
AUSF UE Authentication API Version	v1
UE Simulation Parameters	
Type Of UE Simulation	Profiles
End User Configuration	UE_Profiles.xml
Auto Generated Users Info	

On the right side of the configuration table, there is a checkbox labeled "Enable" which is checked. Below the table are "Start" and "Edit" buttons. At the bottom of the window, there are two status indicators: "Initialisation Errors" and "Error Events".

# Profile Editor (AUSF)

MAPS AUSF (N12 RELEASE15)

Configurations Emulator Reports Editor Debug Tools Windows Help

Profile Editor -UE\_Profiles

#	Profiles (Edit-F2)	Config	Value	Enable
1	MSIN3012041631	MSIN3012041631		<input checked="" type="checkbox"/>
2	MSIN3012041632			
3	MSIN3012041633			
4	MSIN3012041634			
5	MSIN3012041635			
6	MSIN3012041636			
7	MSIN3012041637			
8	MSIN3012041638			
9	MSIN3012041639			
10	MSIN3012041640			
11	MSIN3012041641			
12	MSIN3012041642			

Subscriber Info

- SUPI: 001013012041631

Authentication Parameters

- Authentication Type: 5G\_AKA
- Algorithm Type 5G AKA: Tuak
- KEY: 0123456789abcdef0123456789abcdef
- Operator Variant Parameter Type: OPc
- OP: 0102030405060708091011121314151601020304050607080910111213141...
- OPc: 01020304050607080910111213141516
- SQN: 000000000079
- AMF: 8000

Add Insert Delete Properties

Initialisation Errors Error Events Captured Errors Link Status Up=0 D

# Profile Editor (AMF)

MAPS AMF (N12 RELEASE15)

Configurations Emulator Reports Editor Debug Tools Windows Help

Profile Editor -UE\_Profiles

#	Profiles (Edit-F2)	Config	Value
1	UEProfile0001	UEProfile0001	
2	UEProfile0002		
3	UEProfile0003		
4	UEProfile0004		
5	UEProfile0005		
6	UEProfile0006		
7	UEProfile0007		
8	UEProfile0008		
9	UEProfile0009		
10	UEProfile0010		
11	UEProfile0011		
12	UEProfile0012		
13	UEProfile0013		
14	UEProfile0014		
15	UEProfile0015		

Subscriber Info

- SUPI: 001013012041631

PLMN ID

- MCC: 001
- MNC: 01

Authentication Parameters

- Algorithm Type 5G AKA: Tuak
- KEY: 0123456789abcdef0123456789abcdef
- Operator Variant Parameter Type: OPc
- OP: 010203040506070809101112131415161020304050607080910111213141516
- OPc: 01020304050607080910111213141516
- SQN: 00000000079
- AMF: 8000

Sync Failure

- Simulate Sync Failure: False
- Resynchronization Info
  - RAND: 11111111111111111111111111111111
  - AUTS: 22222222222222222222222222222222

Enable

Add Insert Delete Properties

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

# Call Generation

MAPS AMF (N12 RELEASE15) - [Call Generation - CallGenDefault]

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Result	Total Iteratio
1	Nausf_AMF_UEAuthentication_Request.gls	UEProfile0001	suci-0-001-01-0-0-0-3012041631	Start	Authentication Successful	None	Pass	1
2	Nausf_AMF_UEAuthentication_Request.gls			Start		None	Unknown	1
3	Nausf_AMF_UEAuthentication_Request.gls			Start		None	Unknown	1
4	Nausf_AMF_UEAuthentication_Request.gls			Start		None	Unknown	1

Add Delete Insert Refresh Start Start All Stop Stop All Abort Abort All

Save Column Width Show Latest

AMF AUSF

```

POST /nausf-auth/v1/ue-authentications 09:15:03.80900
201 CREATED 09:15:03.82500
PUT /nausf-auth/v1/ue-authentications/AuthCxt_001013012041631/5g-aka-confirmation 09:15:03.82900
200 OK 09:15:03.85300
    
```

Find

```

POST http://192.168.1.28:6666/nausf-auth/v1/ue-auth
content-type : application/json
accept : application/3gppHal+json,
application/problem+json

{
  "servingNetworkName": "5G:mnc001.mcc001.3gppnetwork.
  "supiOrSuci": "suci-0-001-01-0-0-0-3012041631"
}
    
```

Scripts Message Sequence Event Config Script Flow

Initialisation Errors Error Events Captured Errors Link Statu

# Call Reception

GL MAPS.AUSF (N12 RELEASE15) - [Call Reception]

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Results
1	Nausf_Control.gls		suci-0-001-01-0-0-0-3012041631	Completed	Authentication Vectors sent	None	Pass
2	Nausf_Control.gls		AuthCtx_001013012041631	Completed	Authentication Successful	None	Pass
3	Nausf_Control.gls		suci-0-001-01-0-0-0-3012041631	Completed	Authentication Vectors sent	None	Pass
4	Nausf_Control.gls		AuthCtx_001013012041631	Completed	Authentication Successful	None	Pass

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

Save Column Width  Show Latest

AMF AUSF

PUT /nausf-auth/v1/ue-authentications/AuthCtx\_001013012041631 09:14:42.533000

200 09:14:42.535000

Find

Status: 3  
:method : PUT  
:path : /nausf-auth/v1/ue-authentications/AuthCtx\_001013012041631  
:scheme : http  
:authority : 192.168.1.28:6666  
content-type : application/json  
accept : application/json, application/problem+json  
content-length : 46

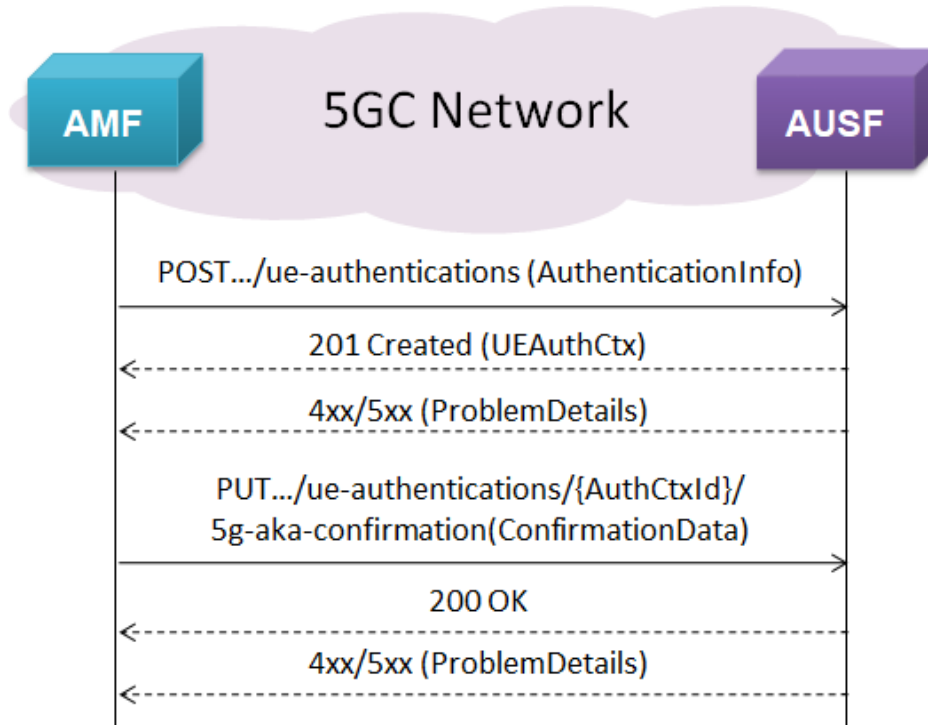
```
{
  "resStar": "434C3C54DE4CB4BCDBE121BC9F7916A5"
}
```

Scripts **Message Sequence** Event Config Script Flow

Initialisation Errors Error Events Captured Errors Link S

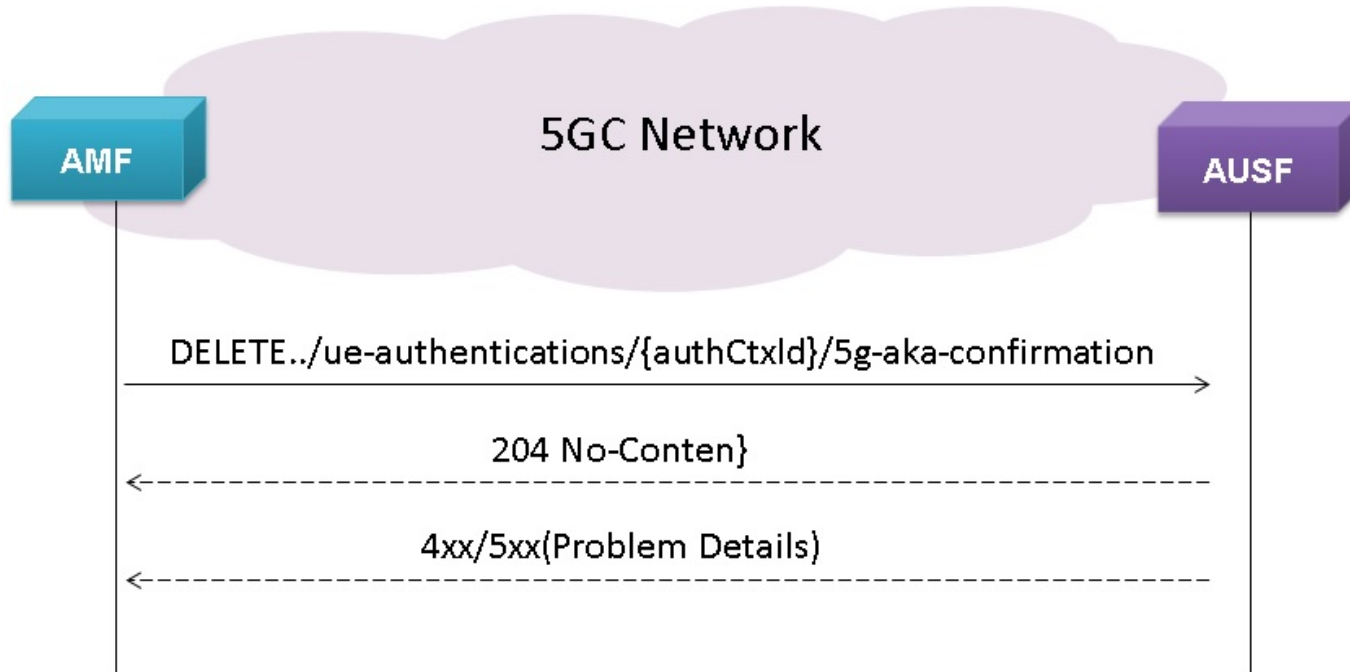
# MAPS™ 5G N12 Interface Procedures

## UE Authentication Service



# MAPS™ 5G N12 Interface Procedures (Contd.)

## Authentication Result Removal with 5G AKA Method



**Thank you**