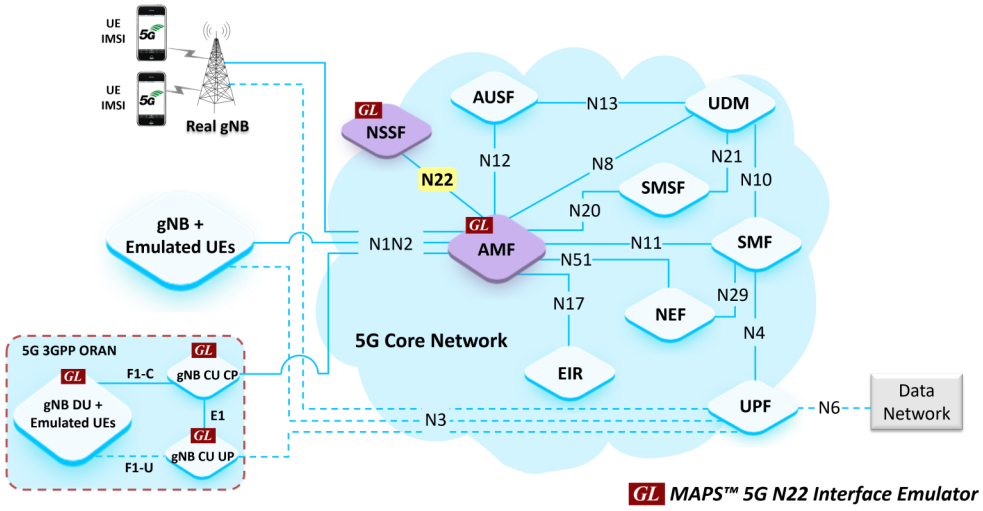
MAPS™ 5G N22 Interface Emulator



Overview

GL's MAPS™ 5G System as a service-based architecture, includes a set of Network Functions (NFs) providing services as defined in 3GPP TS 29.531 (Release 17) specification. The service-based interfaces use HTTP/2 protocol with JavaScript Object Notation (JSON) as the application layer serialization protocol.

GL's MAPS™ N22 emulate Network Slice Selection Function (NSSF) within the 5G Core offering services to the Access and Mobility Management Function (AMF) via the Nnssf service-based N22 interface. The above network architecture represents the service-based architecture, with focus on N22 between NSSF and AMF. Here, node NSSF can act as "NF Producer", which refers to TS29.531 (Release 17) Specification.

The AMF and NSSF are the entities in 5G Core Network (5GC), which supports the following services

- Nnssf_NSSelection
- Nnssf_NSSAIAvailability

Besides emulating network elements AMF and NSSF functions, 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 allow user to create conformance test cases based on their test plan.

MAPS™ 5G N22 Interface emulator supports powerful utilities such as Script Editor and Profile Editor which allow new scenarios to be created or existing scenarios to be modified using 5G N22's JSON messages and parameters

For more information, please visit MAPS™ 5G N22 Interface Emulator webpage.

Main Features

- Emulate AMF and NSSF elements
- Supports Nsmf_EvenExposure (Subscribe, Unsubscribe, Notify service operations) and UE Subscription for notification of one-time event detection (PDU session establishment Event, PDU session release Event, QFI allocation Event, UE IP address/prefix change Event)
- 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 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

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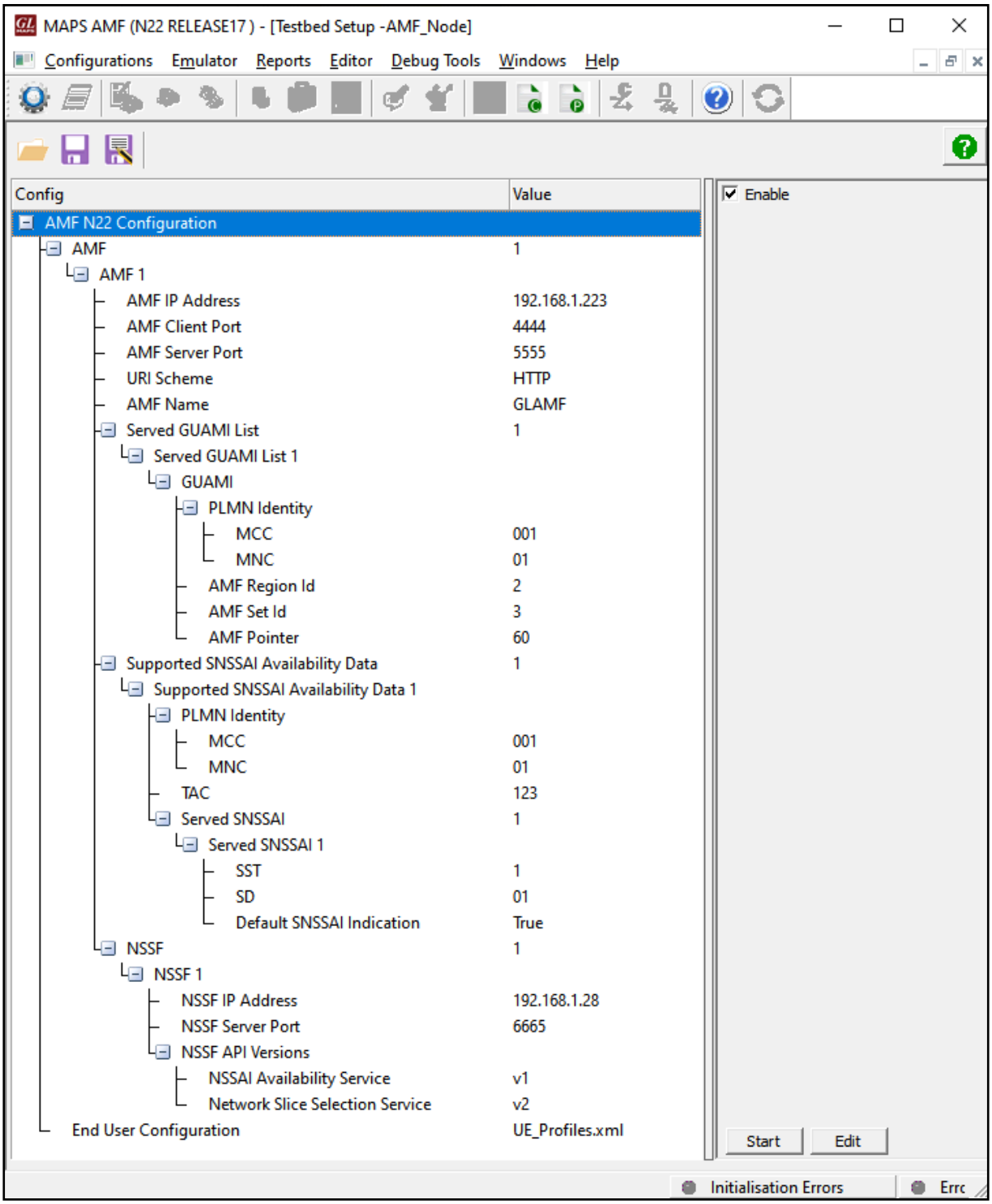
Testbed Configuration

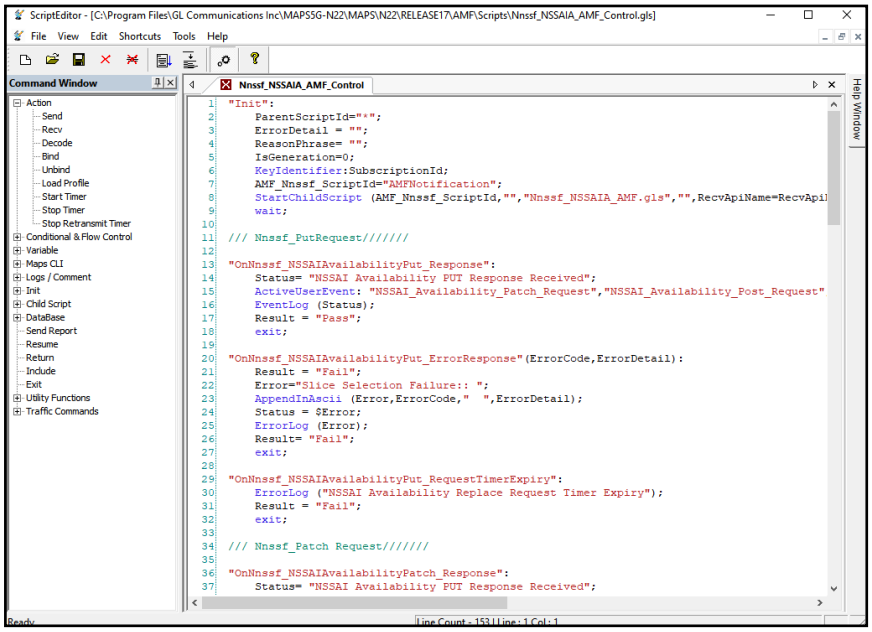
The testbed setup window allow user to setup the required test configurations in N22 interface. It includes a list of variables that are declared and assigned before starting the script. Testbed Setup defines the MAPS™ parameters which communicates with the rest of the test network. End user configuration profile is used to configure MAPS™ 5G 22 interface with the supported AMF and NSSF parameters.



Testbed Setup

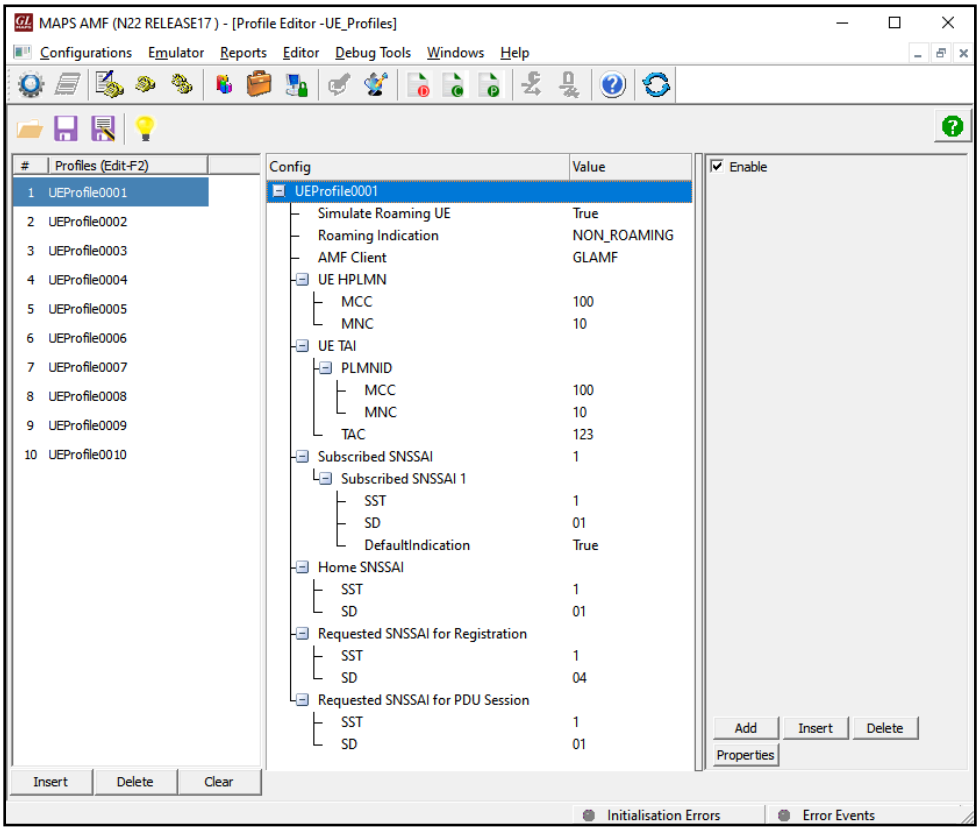
Pre-processing Tools

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.



Script Editor

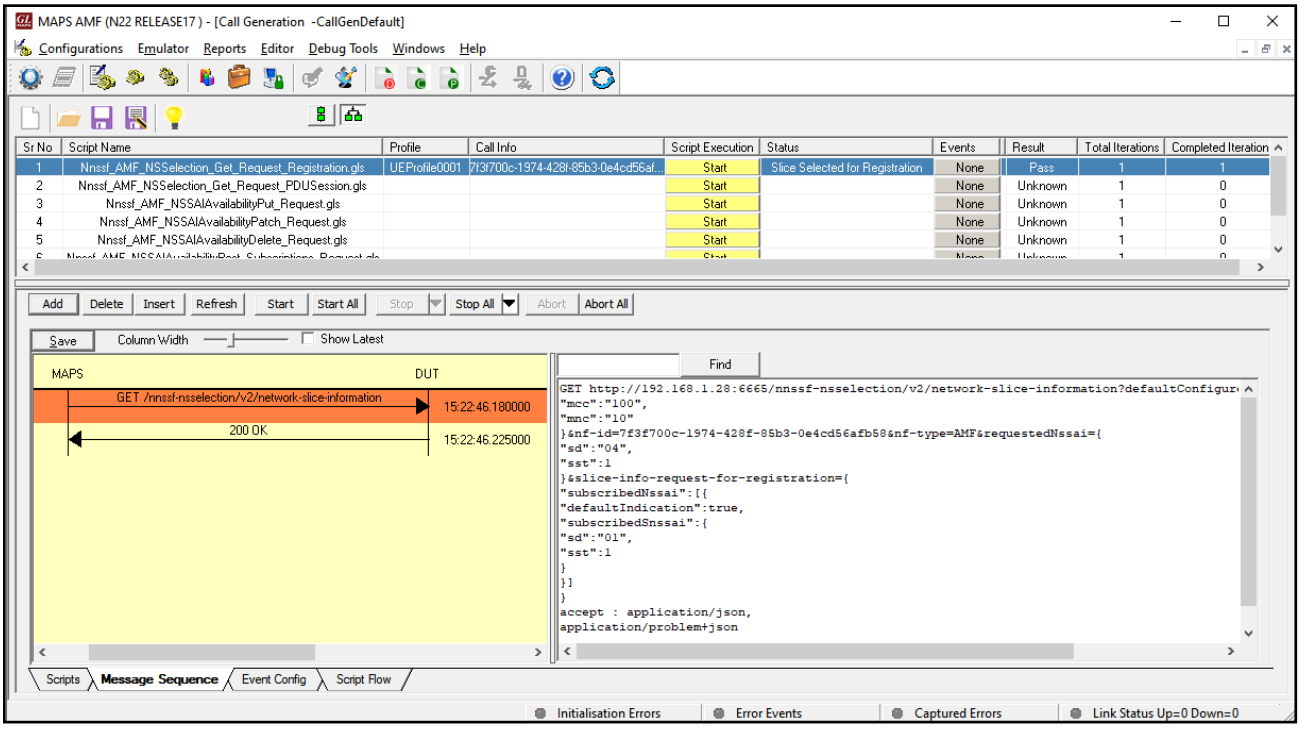
PROFILE EDITOR - This feature allow loading profile to edit the values of variables using GUI, replacing the original value of variables in the message template. An XML file defines a set of multiple profiles with varying parameter values which allow user to configure call instances in call generation to receive calls. The **UE_Profiles** include 5G parameters, that is required to configure multiple UEs to emulate Signaling and Traffic.



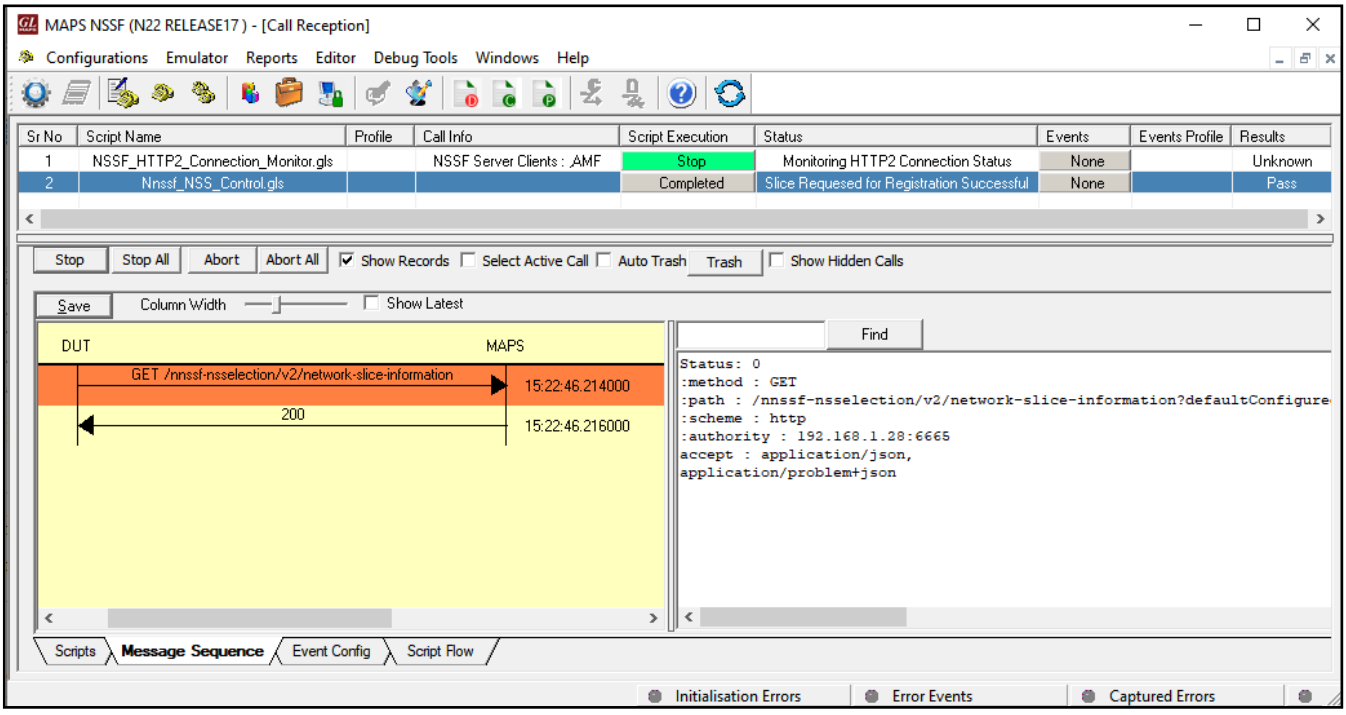
Profile Editor

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 user to create multiple entries using quick configuration feature. The editor allow 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.



Call Generation



Call Reception

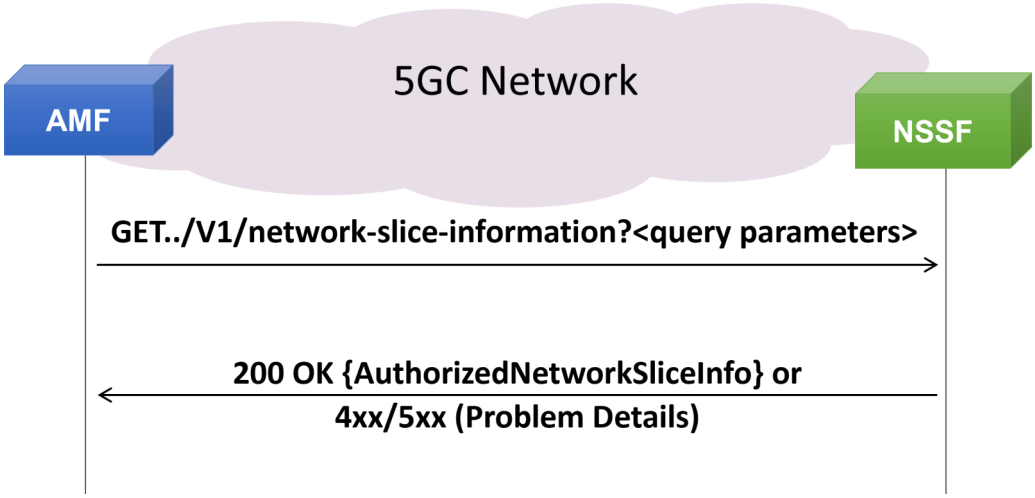
Nnssf_NSSelection Service

Get service operation of Nnssf_NSSelection service

This service is used during Registration, PDU Session Establishment and UE Configuration update procedures.

The Get operation shall be used in the non-roaming or roaming scenario to retrieve:

- The Allowed NSSAI, Configured NSSAI, target AMF Set or the list of AMF(s)
- The Mapping Of Allowed NSSAI
- The Mapping Of Configured NSSAI
- NSI ID(s) associated with the Network Slice instances of the Allowed NSSAI
- NRF(s) used to select NFs/services within the selected Network Slice instance(s) and NRF to determine the list of candidate AMF (s) from the AMF Set, during Registration procedure and
- Information on whether the S-NSSAI(s) not included in the Allowed NSSAI which were part of the Requested NSSAI are rejected in the serving PLMN or in the current TA
- The NRF to be used to select NFs/services within the selected network slice instance, and optionally the NSI ID associated with the S-NSSAI provided in the input, during the PDU Session Establishment procedure



Nnssf_NSSAIAvailability Service

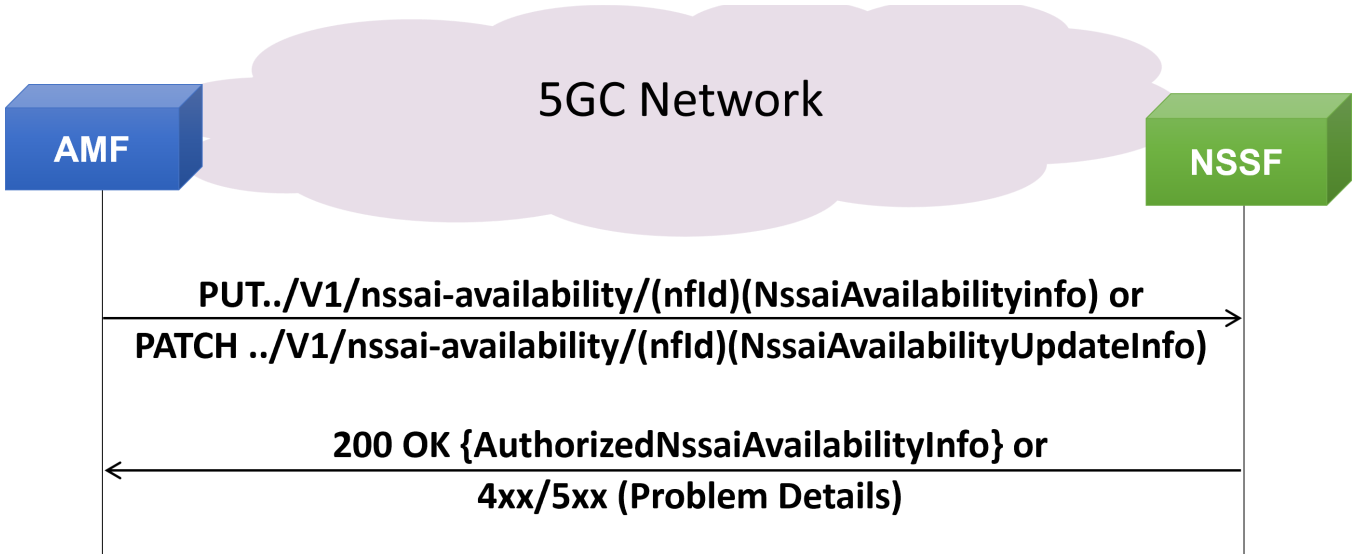
The Nnssf_NSSAIAvailability service is used by the NF service consumer (e.g AMF) to update the S-NSSAI(s) the AMF supports on a per TA basis on the NSSF, subscribe and unsubscribe the notification of any changes to the NSSAI availability information on a per TA basis, of the S-NSSAIs available per TA (unrestricted) and the restricted S-NSSAI(s) per PLMN in that TA in the serving PLMN of of the UE

For the Nnssf_NSSAIAvailability service the following service operations are defined used by AMF:

- Update
- Subscribe
- Unsubscribe
- Notify
- Delete

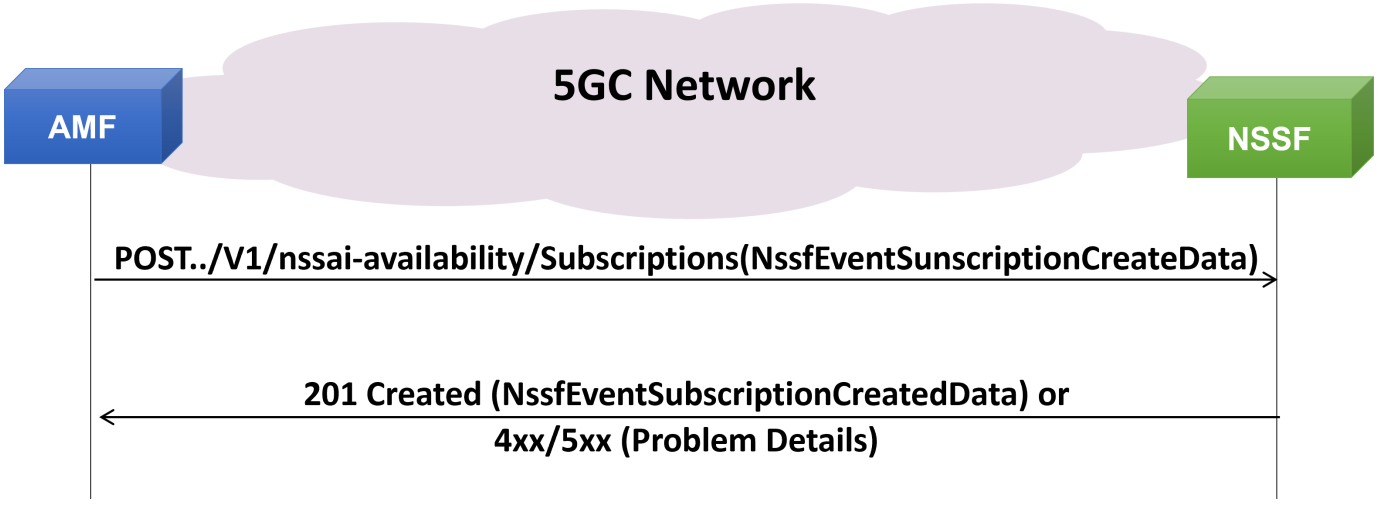
Update Service Operation

The Update operation is used by AMF to update the NSSF with the S-NSSAIs (Single Network Slice Selection Assistance Information) the AMF supports per TA, and get the availability of the S-NSSAIs per TA



Subscribe Service Operation

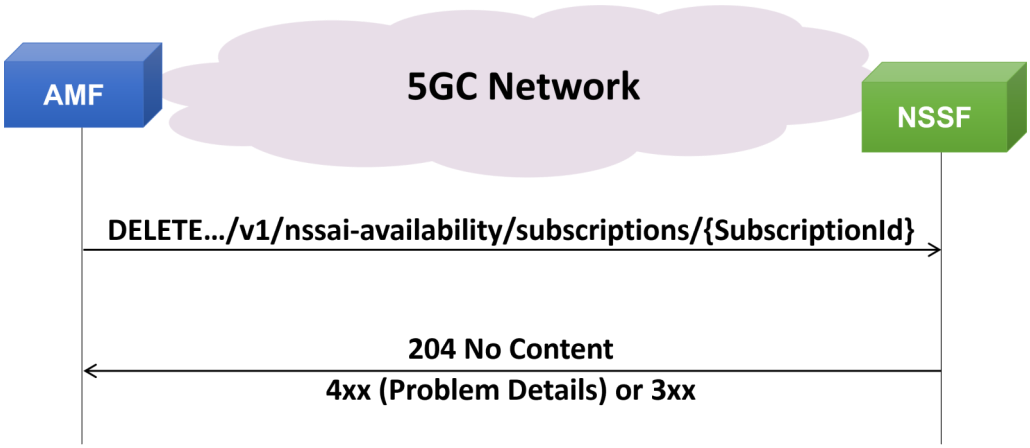
The Subscribe Operation is used by AMF to subscribe to a notification of any changes in status of the NSSAI availability information (e.g. S-NSSAIs available per TA and the restricted S-NSSAI(s) per PLMN in that TA in the serving PLMN of the UE) upon this is updated by another AMF



Nnssf_NSSAIAvailability Service (Contd.)

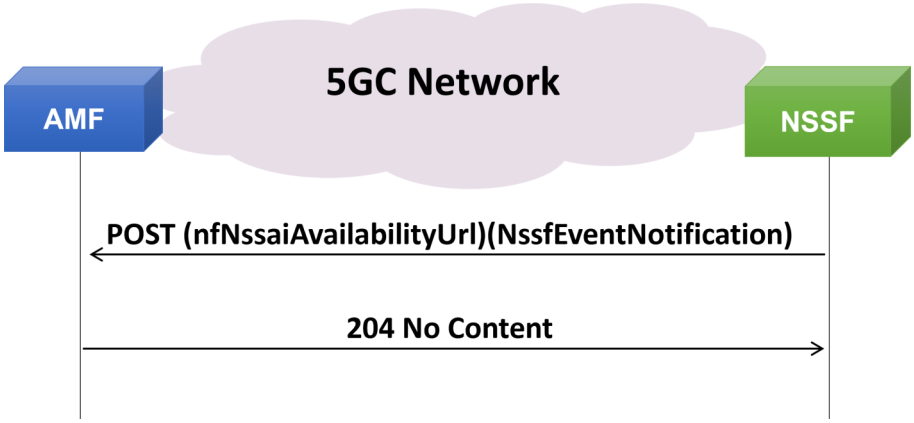
Unsubscribe Service Operation

The Unsubscribe operation is used by AMF to unsubscribe to a notification of any previously subscribed changes to the NSSAI availability information .



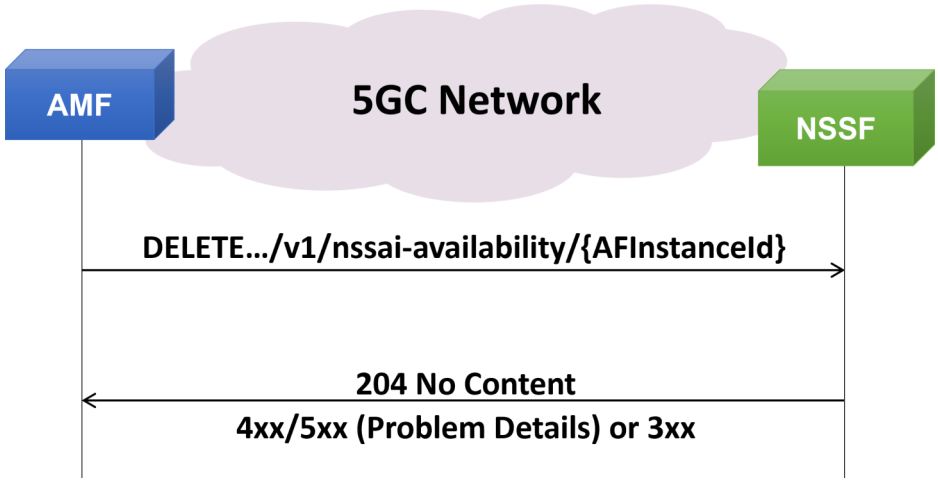
Notify Service Operation

The Notify Service operation is used by the NSSF to update AMF with any status change, on a per TA basis, of the S-NSSAIs available per TA (unrestricted) and the S-NSSAIs restricted per PLMN in that TA in the serving PLMN of the UE.

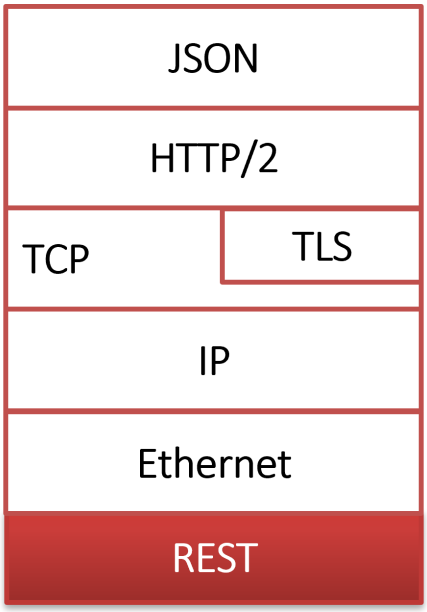


Delete Service Operation

The Delete Service operation is used by AMF to delete the NSSAI availability information stored for the NF service consumer in the NSSF.



Supported Protocols and Specifications



Supported Protocols	Standard / Specification
N22 Interface (NSSF-AMF)	3GPP TS 29.531 (Release 17)
JavaScript Object Notation (JSON)	IETF RFC 8259
HTTP2	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]

Buyer's Guide

Item No	Product Description
PKS510	MAPS™ 5G N22 Interface Emulator (Requires PKS502)
PKS305	MAPS™ 5G Multi-Interface Emulation

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)

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.

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