MAPS™- 5G N4 Interface Emulator

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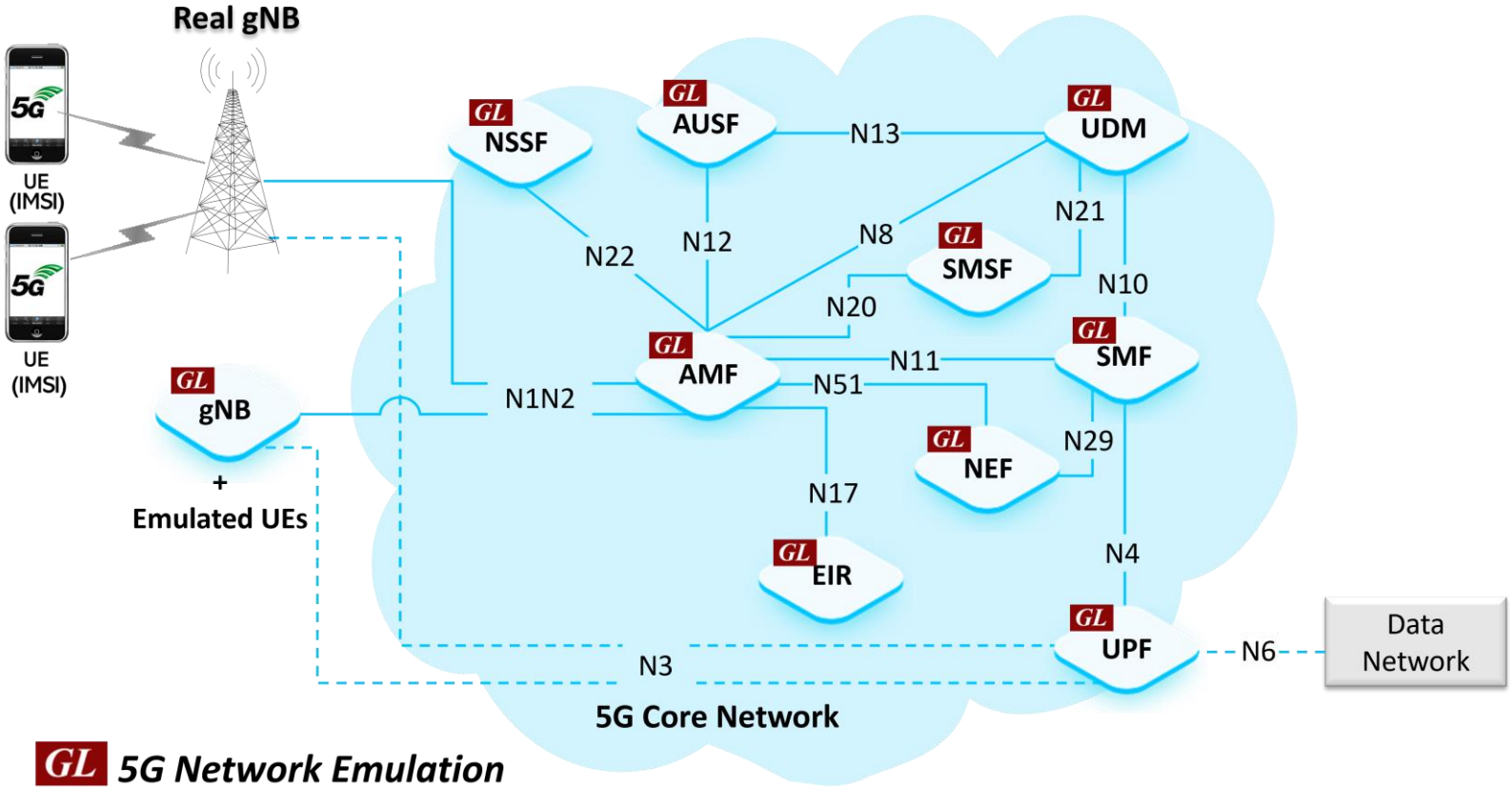
5G Network Diagram



GL 5G Network Emulation

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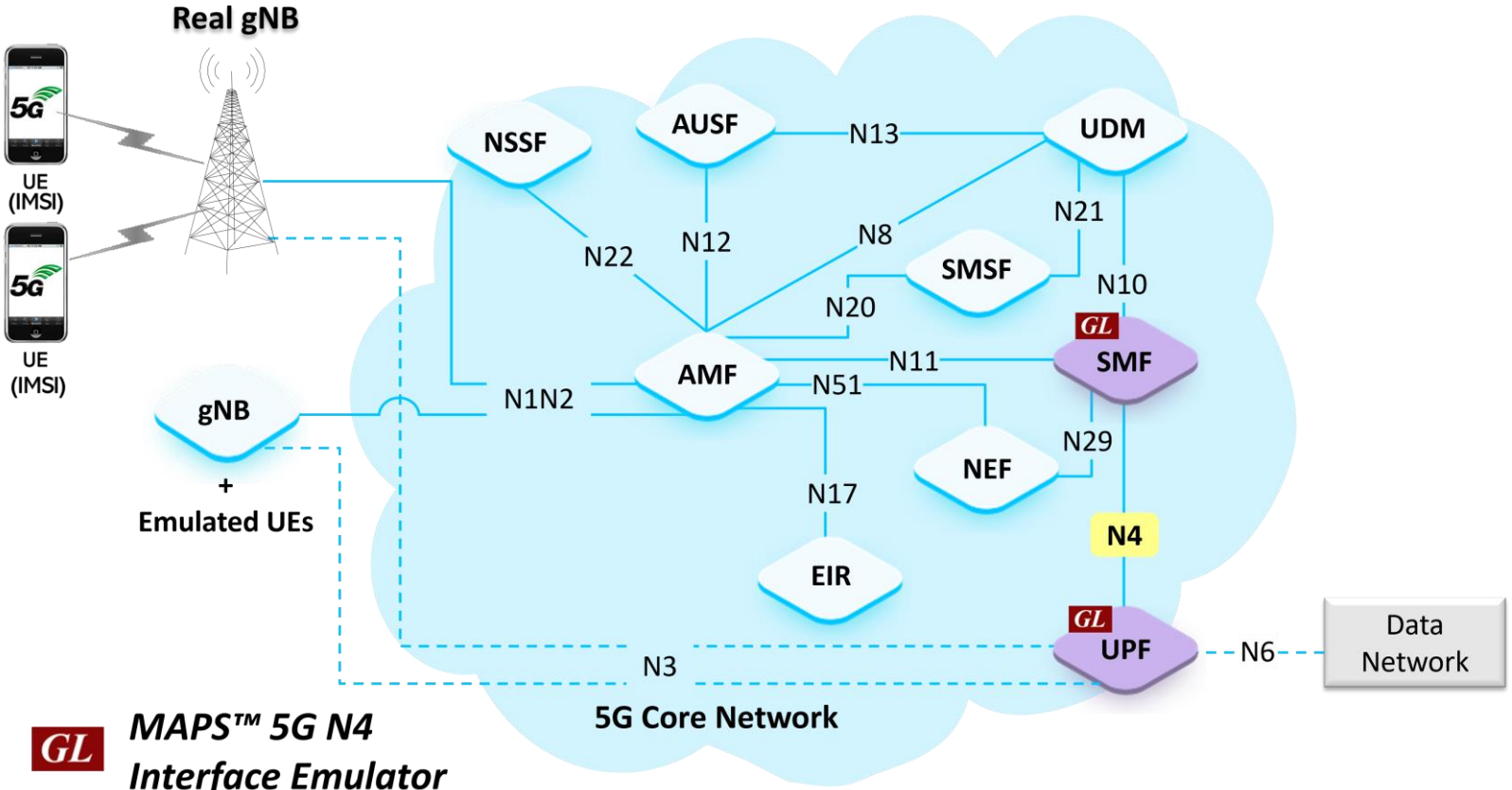
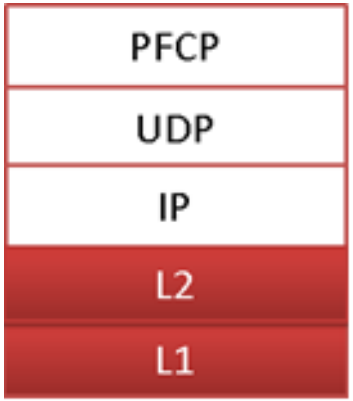
MAPS™ 5G N4 Interface Emulator Architecture



Features

- Emulate Session Management Function (SMF) and User Plane Function (UPF) elements
- Supports 5G Control plane and User plane
- Supports Mobile Traffic type
- Supports Command Line Interface (CLI) through a client-server model, enabling users to control all features via Python APIs
- Generates and process PFCP (valid and invalid) messages
- Supports PDU Session Establishment, Modification, Release and Reporting of traffic data usage procedures
- Supports GTP Traffic (GTP User Plane Data), HTTP traffic generation capability

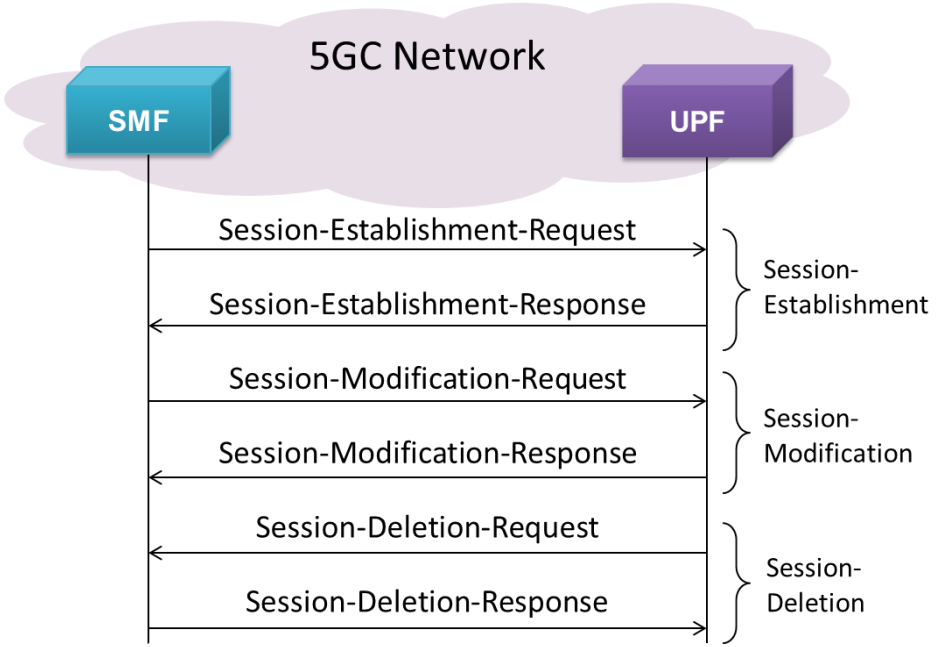
Protocol Stack Specification



Supported Protocols	Standard / Specification Used
N4 Interface	
N4 Interface (SMF - UPF)	TS29.244
PFCP	3GPP TS 23.501 [28] 3GPP TS 23.502 [29]
UDP	IETF RFC 768
IPv4	IETF RFC 791 [5] IETF RFC 2460 [6]

- PFCP entity supports IPv4 protocol

MAPS™ 5G Call Scenarios



- PFCP Session Establishment Procedure
  - Session Establishment Request
  - Session Establishment Accept
- PFCP Session Modification Procedure
  - Session Modification Request
  - Session Modification Response
- PFCP Session Deletion Procedure
  - Session Deletion Request
  - Session Deletion Response

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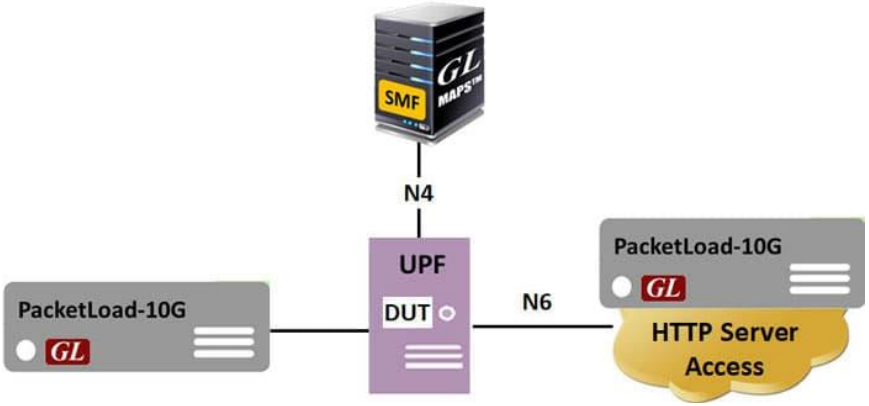
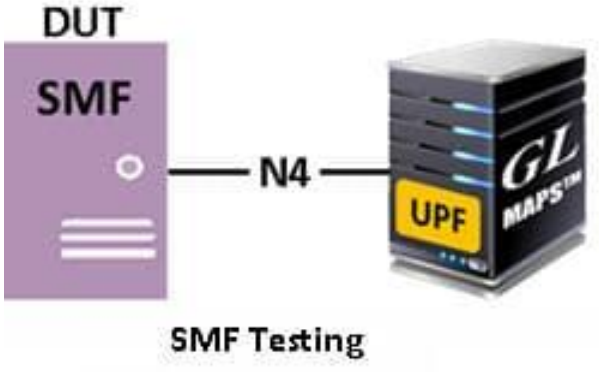
MAPS™ 5G N4 Single Interface Testing – Use Cases

UPF Testing



SMF Testing



- In SMF Testing, SMF node is the device under test and all the other nodes (AMF, UDM, UPF)UPF node interacting with the SMF node are emulated
- In UPF Testing, UPF node is the device under test and all the other nodes (gNodeB, SMF, Data Network) SMF node interacting with the UPF node are emulated

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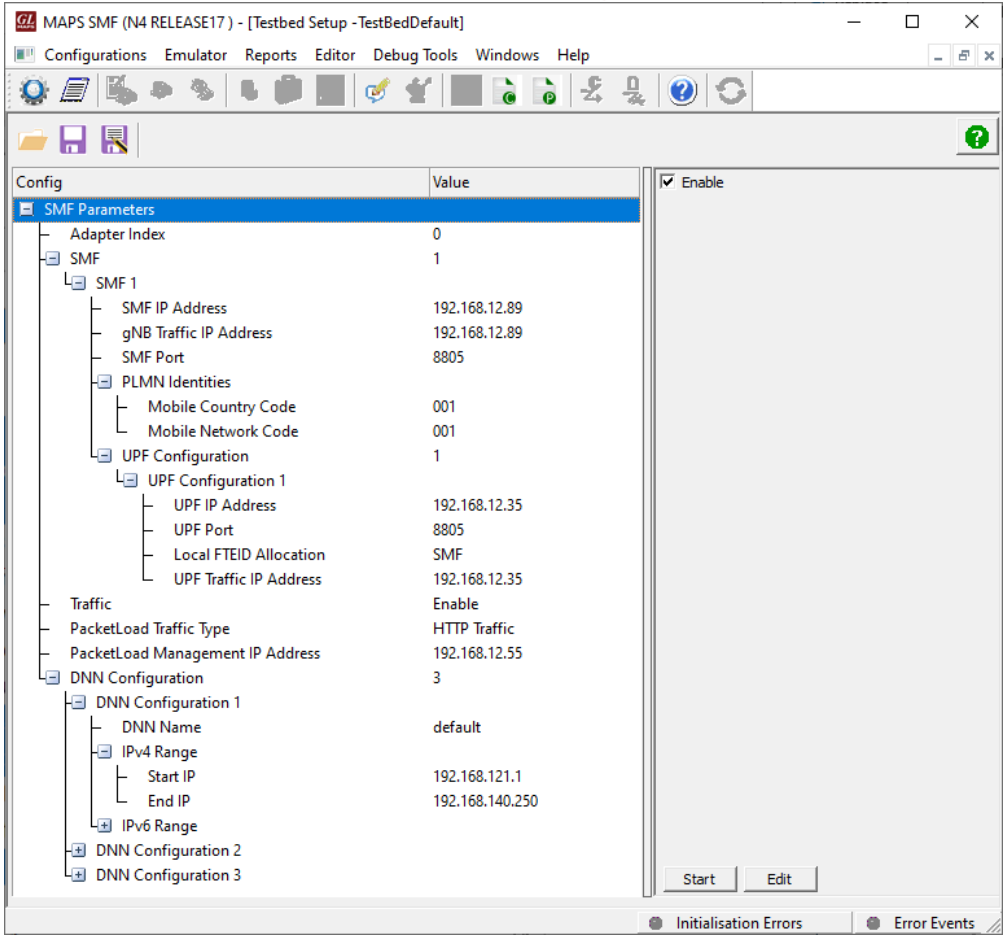
Testbed Configuration



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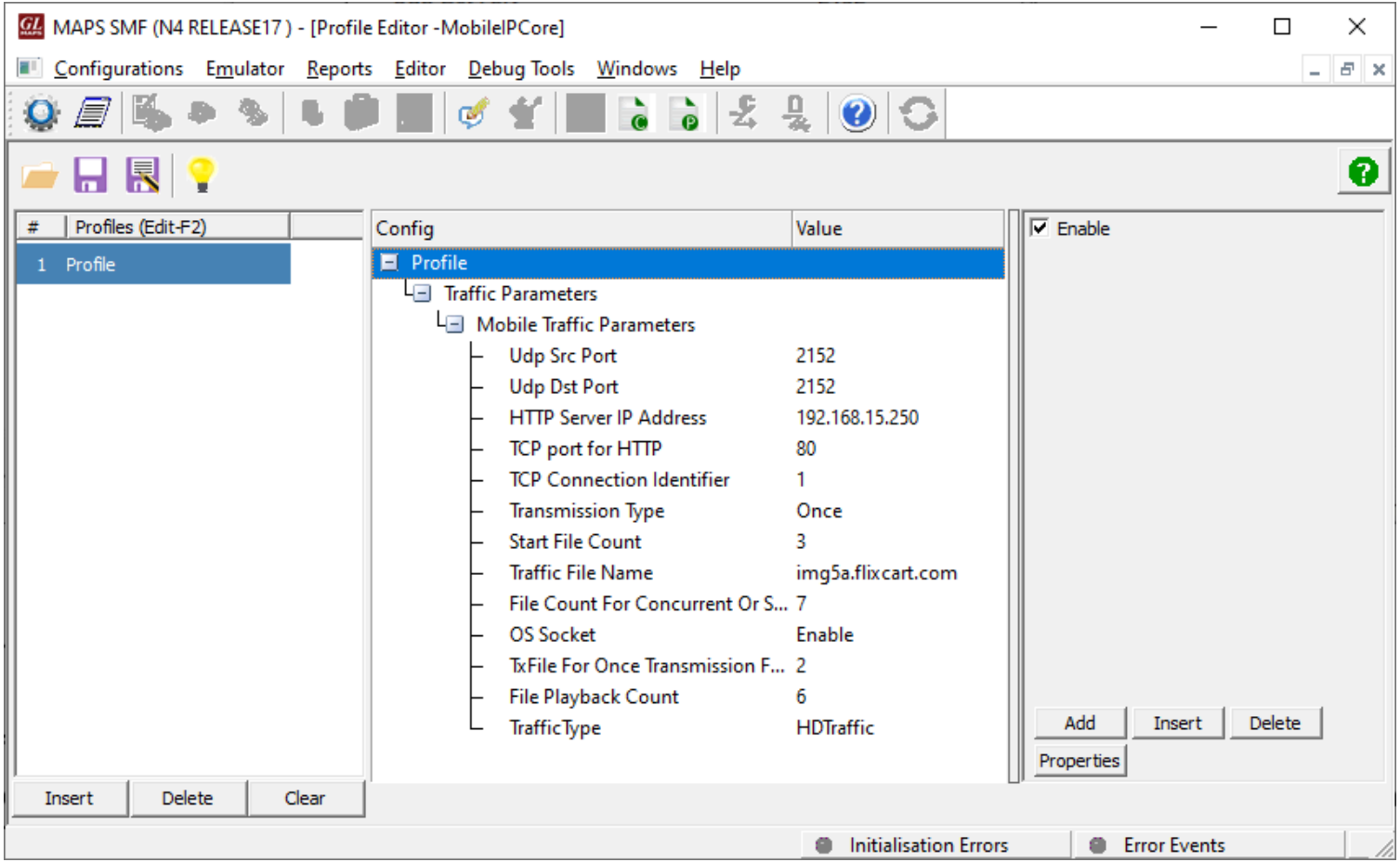
Profile Configuration



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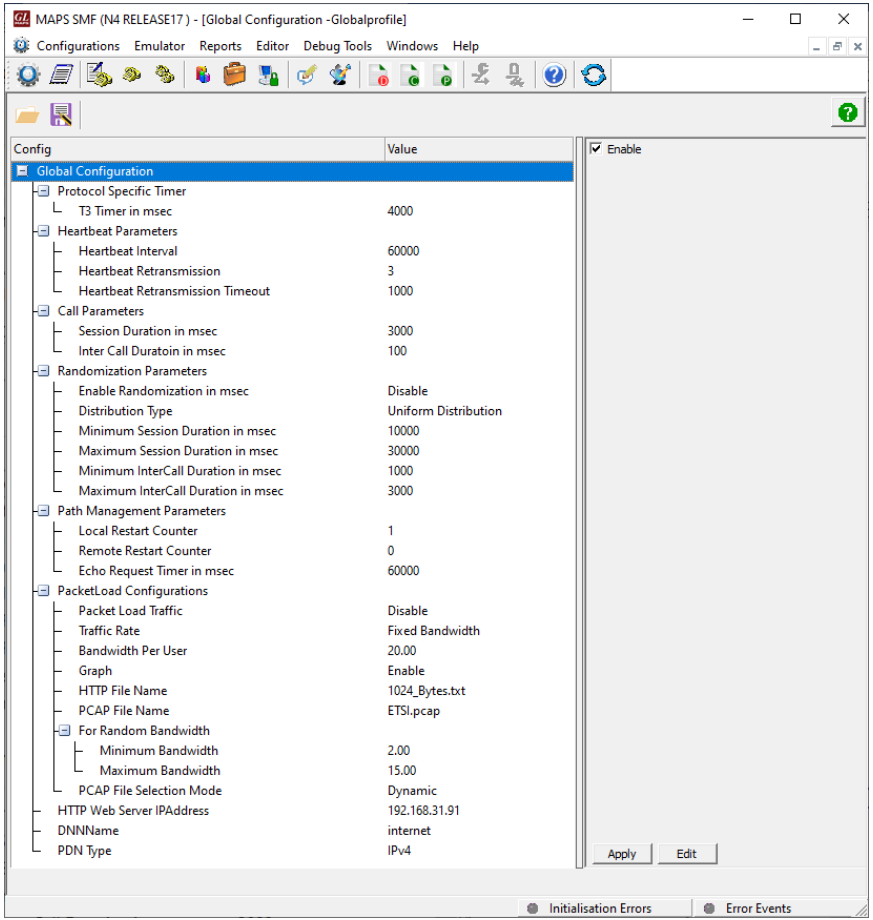
Global Configuration



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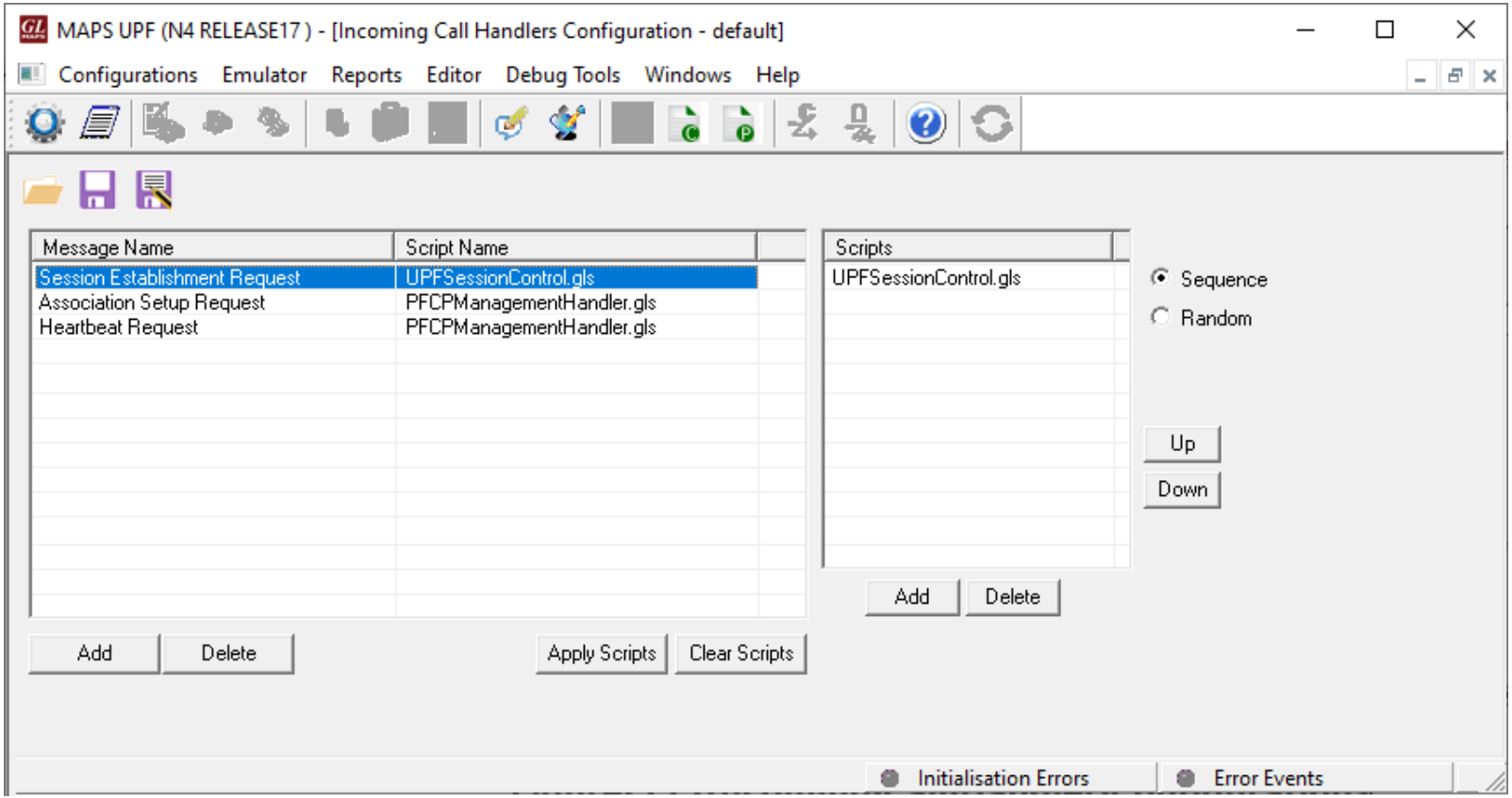
Incoming Call Handler Configuration



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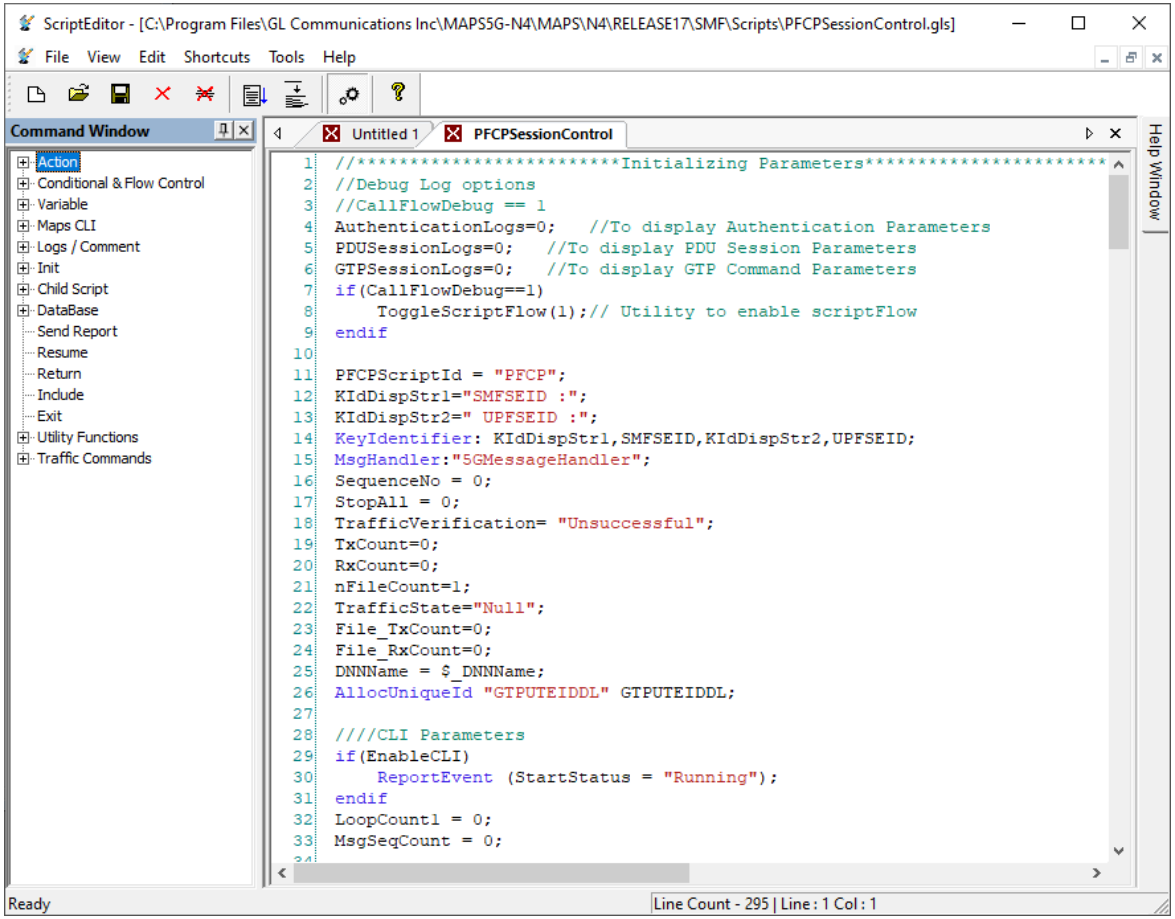
Script Editor



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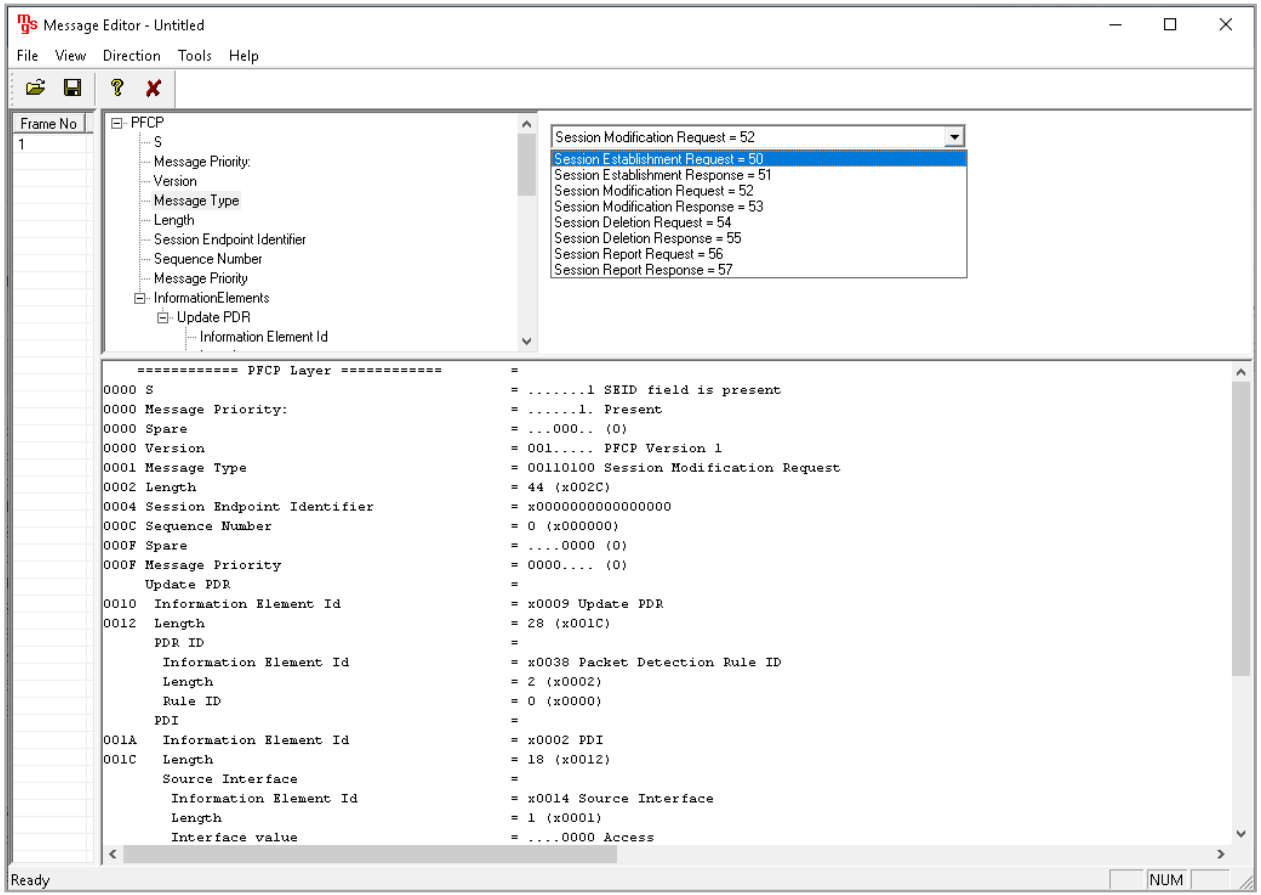
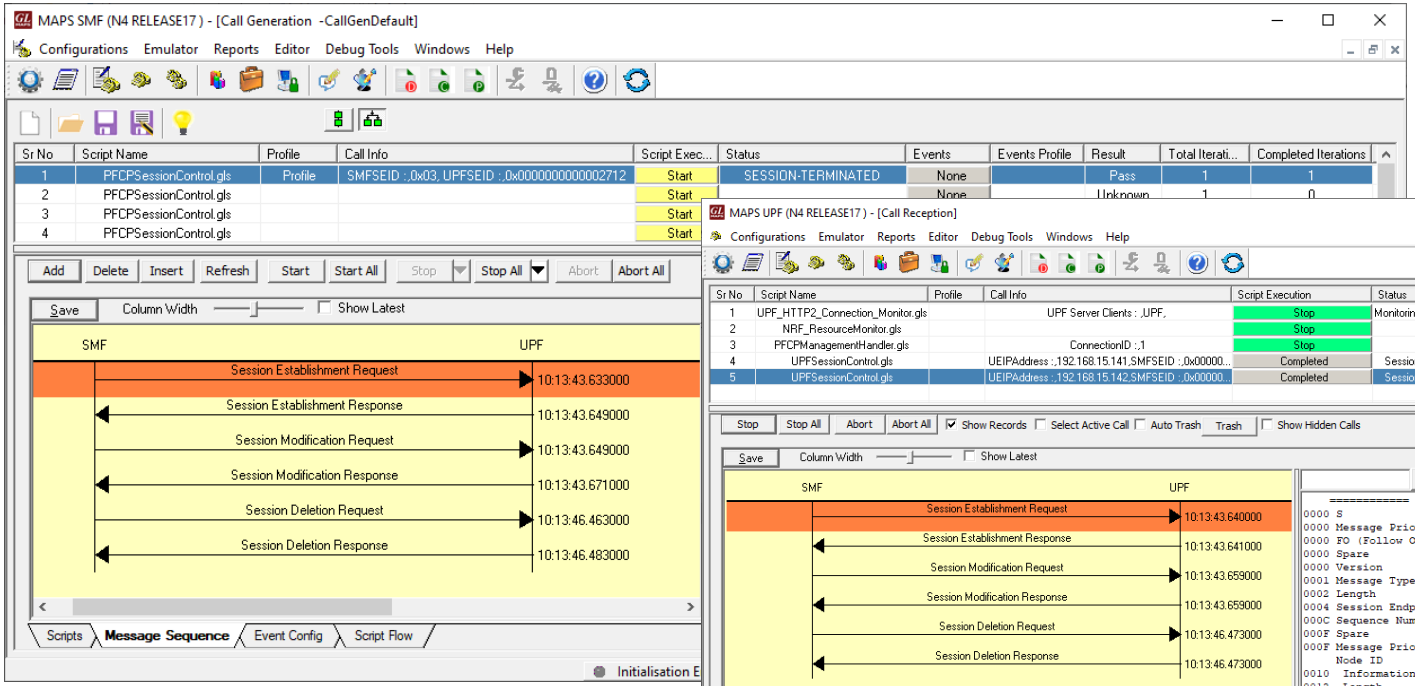
Message Editor

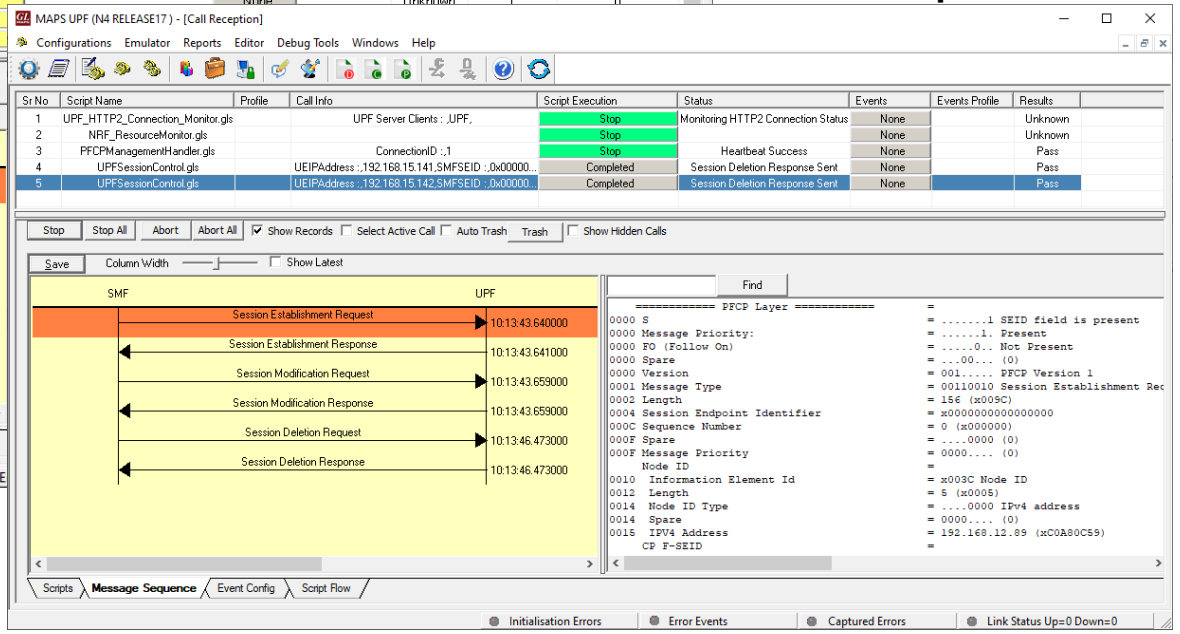


MAPS™ 5G N4 Interface – Call Emulation

Call Generation



Call Reception



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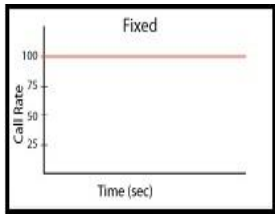
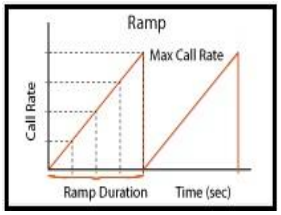
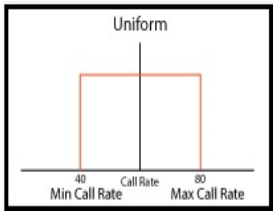
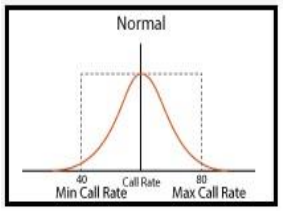
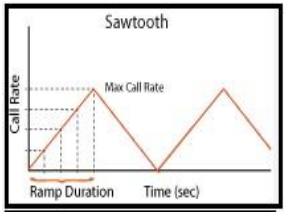
Load Generation

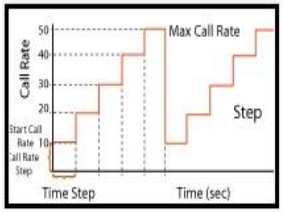


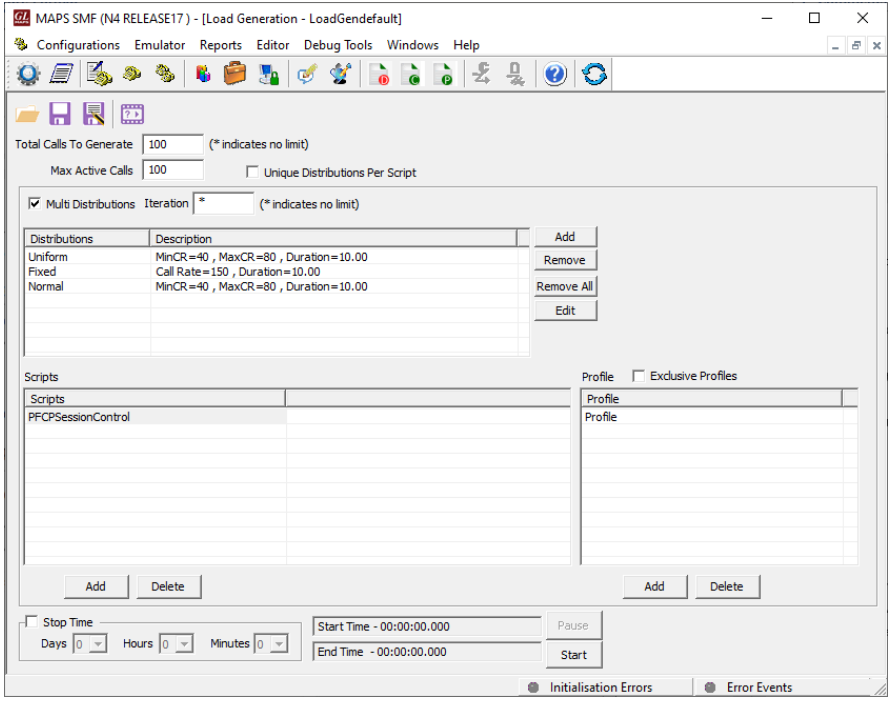












- Stability/Stress and Performance testing using Load Generation
- Different types of Load patterns to distribute load
- User can load multiple patterns for selected script
- User configurable Test Duration, CPS, Maximum and Minimum Call Rate etc.

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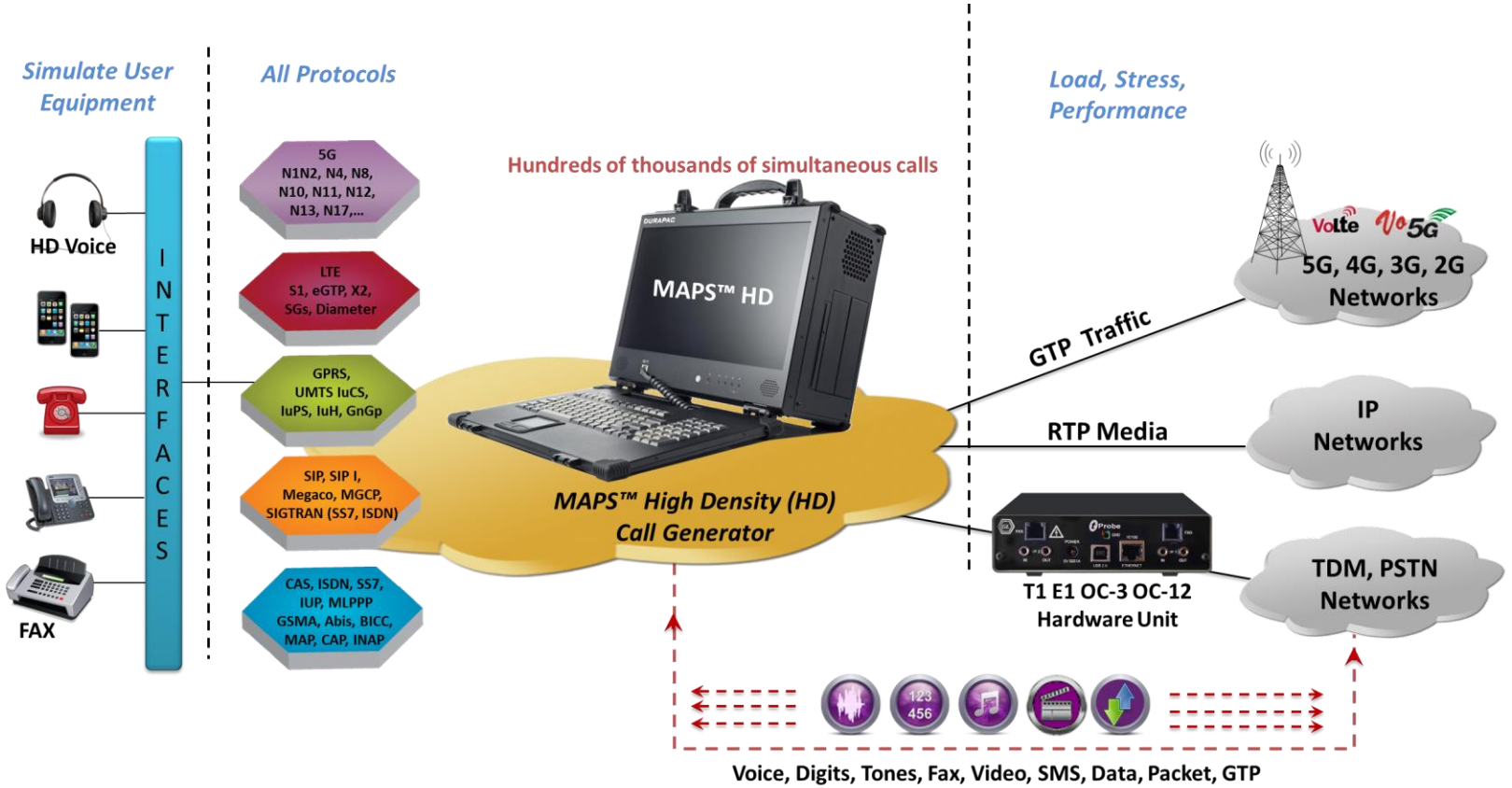
Traffic Emulation



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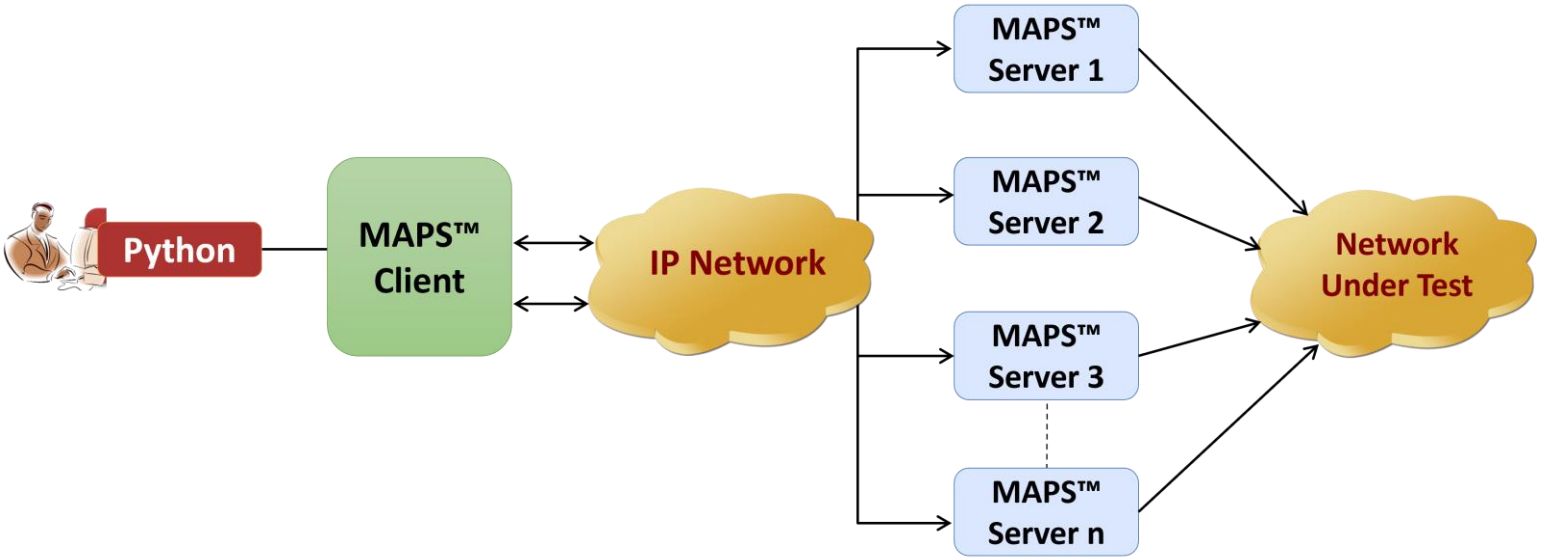
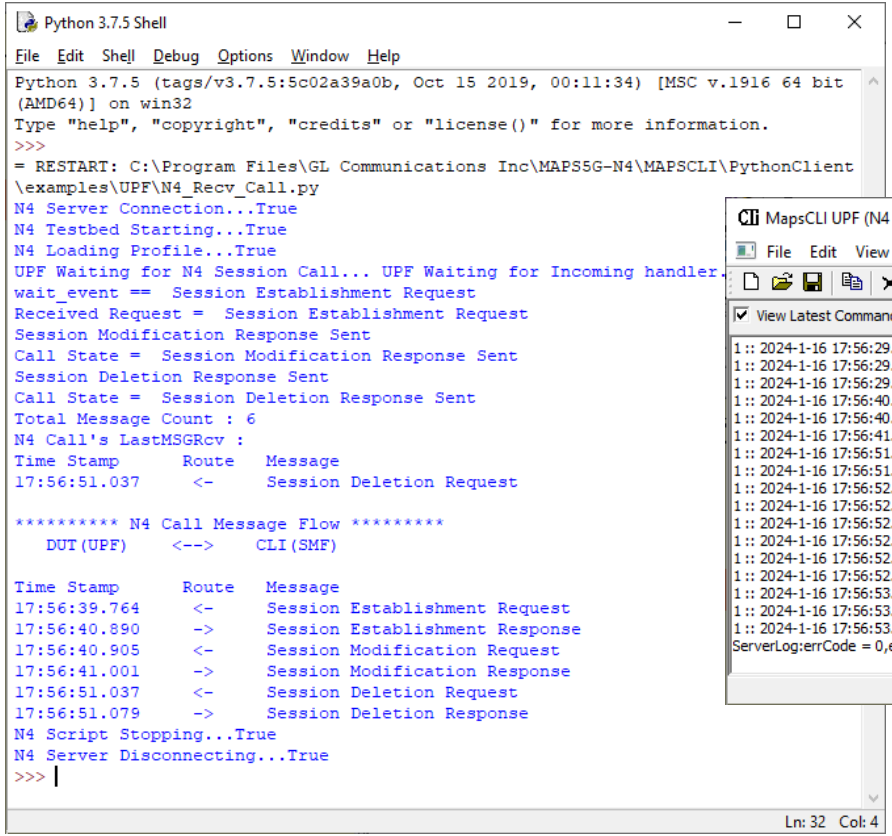
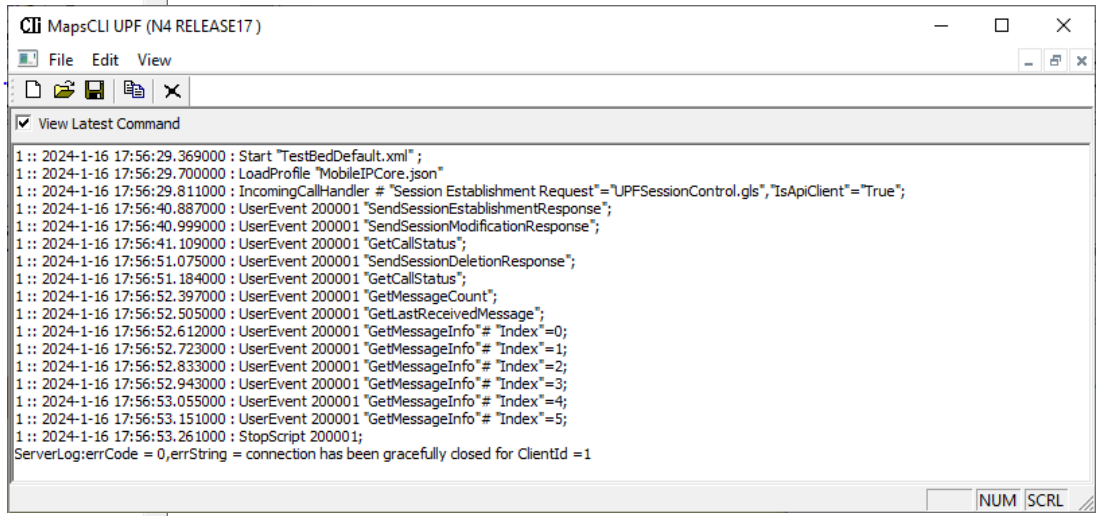
MAPS™ API Architecture



- 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

Python Client and MAPS™ CLI Server





Thank you