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# MAPS™ UMTS for IuPC Interface Emulator

(Positioning Calculation Application Part (PCAP) Signaling)

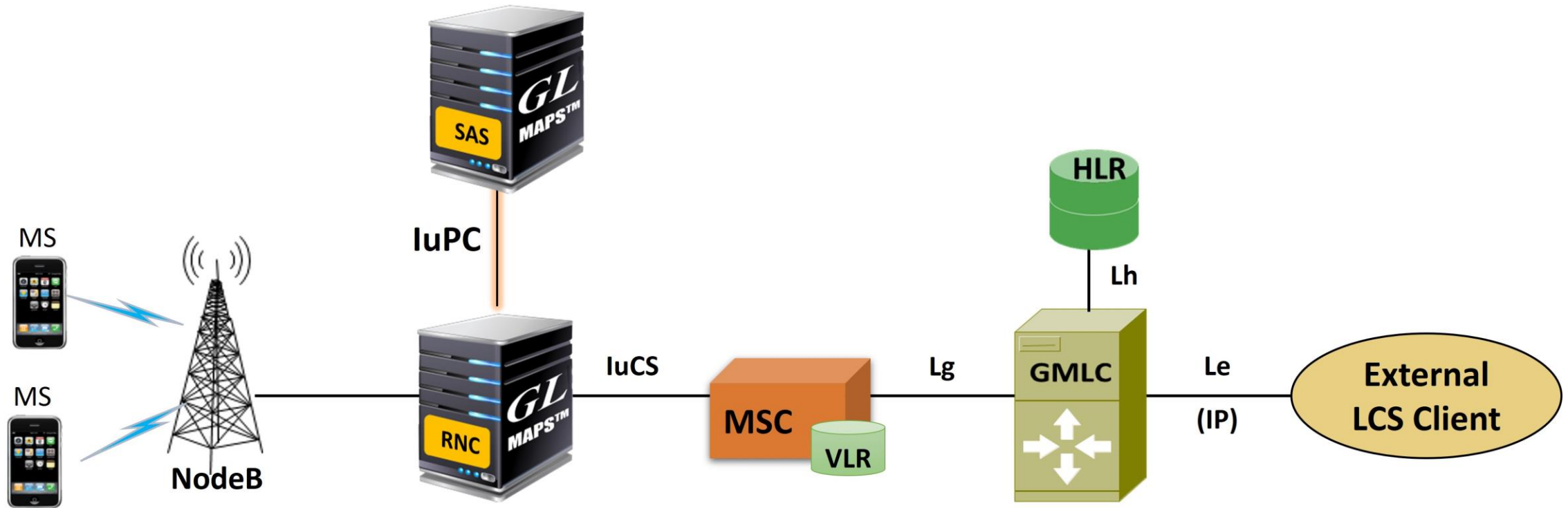
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# MAPS™ UMTS for IuPC Interface



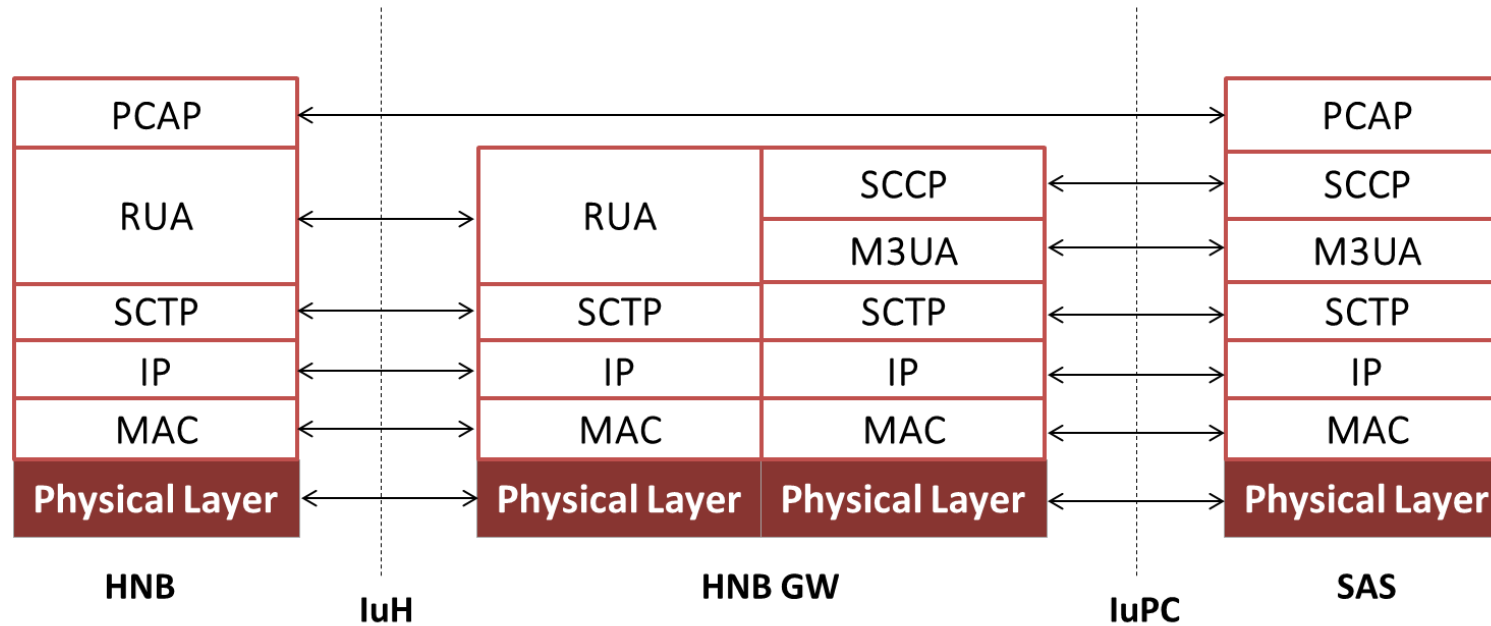
(Location Services)  
MAPS™ IuPC Interface Emulator



# Features

- Useful tool to perform Location services testing between RNC <-> SAS over IuPC interface in UTRAN.
- Emulator can be configured as RNC, SAS nodes and study the call flow and exchange of signaling messages between any of these nodes.
- User-friendly GUI for Positioning Calculation Application Part (PCAP) message exchange over M3UA/SCTP and SCCP.
- The following are the supported PCAP procedures –
  - Position Calculation Service
  - Information Exchange Service
  - SAS Centric Position Service
- Logging of all messages in real-time.
- Supports customization of placing and answering calls using Profile editor and Message editor.
- Ready-to-use scripts for quick testing.
- Provides protocol trace with full message decoding of the PCAP messages.
- Script based and protocol independent software architecture.
- Provides call reports with associated captured events and error events during call generation.

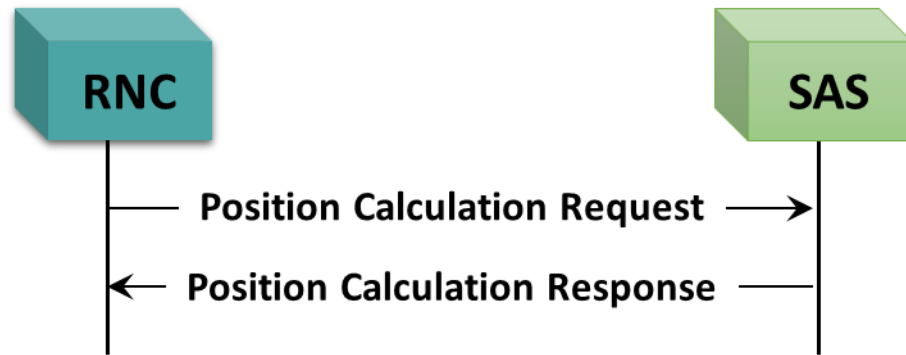
# UMTS IuPC Protocol Stack



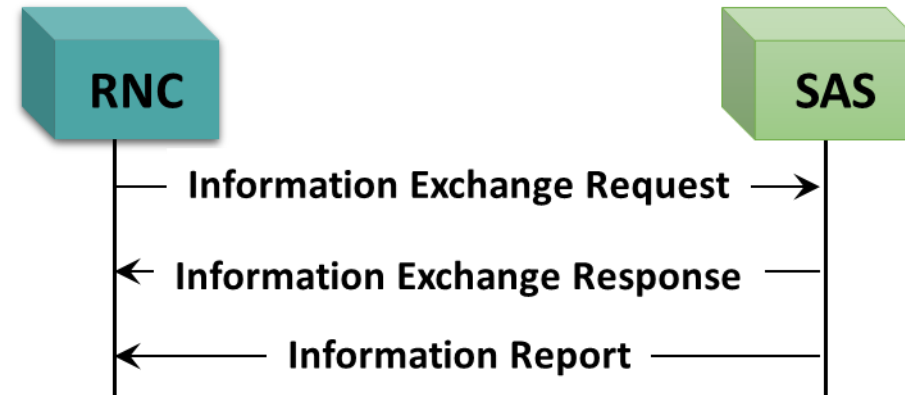
Supported Protocols	Standard / Specification Used
Positioning Calculation Application Part (PCAP)	3GPP TS 25.453
M3UA	RFC 3332
SCCP	Q.713, CCITT (ITU-T) Blue Book
SCTP	RFC 4960

# UMTS IuPC Interface Procedures

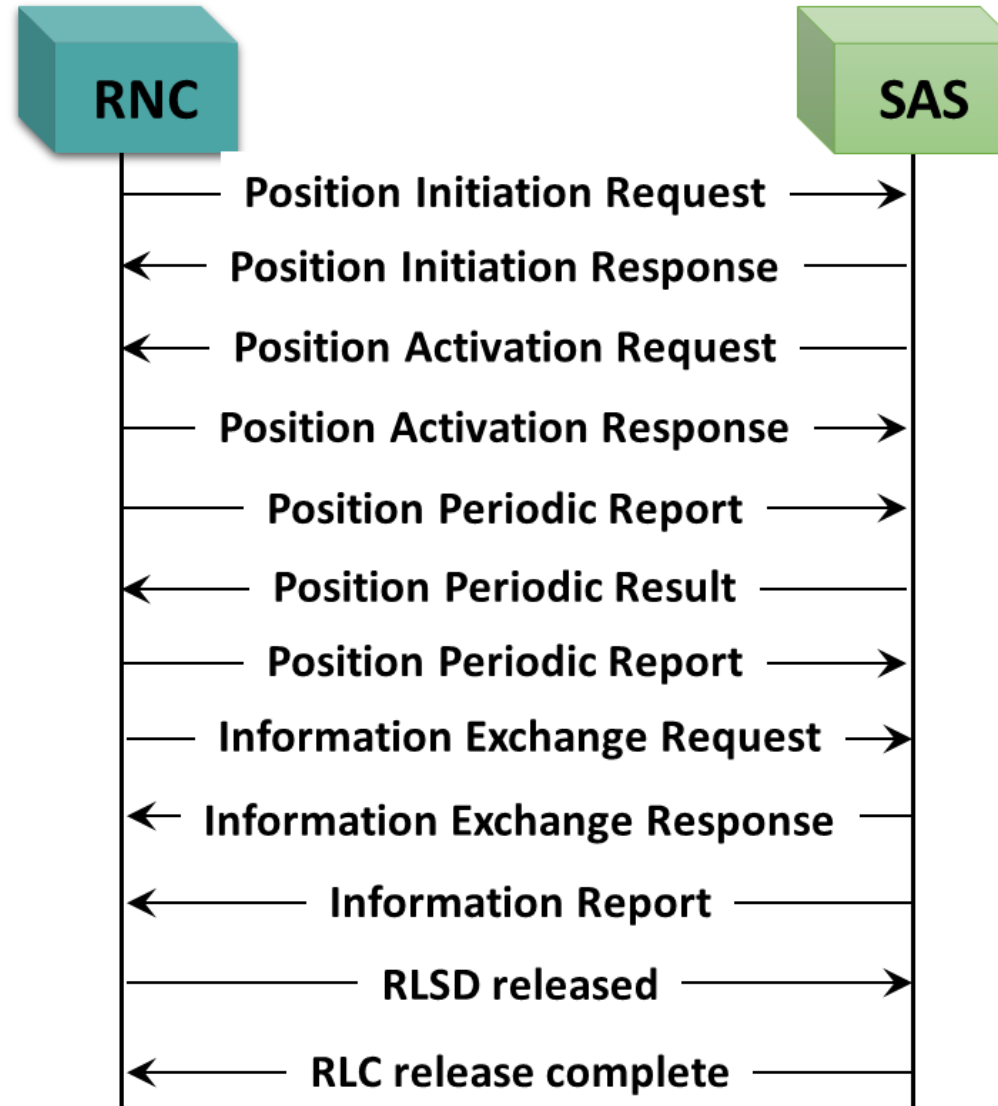
## Position Calculation Services



## Information Exchange Services



# UMTS IuPC SAS Centric Position Service



# Testbed Configuration

MAPS (Message Automation Protocol Simulation) RNC (UMTS luPC 3GPP)

Configurations Emulator Reports Editor Debug Tools Windows Help

Testbed Setup - TestBedDefault

Config	Value	Enable
RNC Configurations		<input checked="" type="checkbox"/>
RNC	1	
RNC 1		
RNC IP Address	192.168.1.27	
RNC Port	2945	
SCTP Mode	server	
M3UA Termination Type	IPSP	
RNC Point Code	5,5,5	
Signaling Link Selection	1	
Network Indicator	National	
M3UA Routing Context Indicator	Absent	
M3UA Routing Context	1	
M3UA NetworkAppearance Indi...	Absent	
M3UA Network Appearance	1	
RNC SCCP Routing Indicator	Route on GT	
RNC SCCP Point Code Indicator	Absent	
RNC E164 Global Title Address	234674369	
RNC Address Indicator	International	
Nature Of RNC Address Indicator	International Number	
PLMN Identifiers		
Mobile Country Code	450	
Mobile Network Code	80	
Location Area Identifiers		
SAS Parameters		
SAS IP Address	192.168.1.27	
SAS Port	2945	
SAS Point Code	6,6,6	

Start Edit

Initialisation Errors Error Events Captured Errors L

# Profile Configuration

MAPS (Message Automation Protocol Simulation) RNC (UMTS luPC 3GPP)

Configurations Emulator Reports Editor Debug Tools Windows Help

Profile Editor - RNC\_Profiles

#	Profiles (Edit-F2)	Config	Value	Enable
1	RNCProfile0001	RNCProfile0001		<input checked="" type="checkbox"/>
2	RNCProfile0002			
3	RNCProfile0003			
4	RNCProfile0004			
5	RNCProfile0005			
6	RNCProfile0006			
7	RNCProfile0007			
8	RNCProfile0008			
9	RNCProfile0009			
10	RNCProfile0010			
11	RNCProfile0011			
12	RNCProfile0012			
13	RNCProfile0013			
14	RNCProfile0014			
15	RNCProfile0015			
16	RNCProfile0016			
17	RNCProfile0017			
18	RNCProfile0018			
19	RNCProfile0019			
20	RNCProfile0020			

Mobile ID

- IMSI: 9017000000000638
- IMEI: 3456789876545647
- Type Of Identity: IMSI

Positioning Initiation Request Parameters

- LCS Client Type: PLMN Operator Services
- Location Type: Current Graphic Location
- Request Type Event: Change Of Service Area
- Report Area: Geographical Area
- Accuracy Code: 1
- Enable Periodic Position Reporting: False
- Reporting Amount: 10
- Reporting Interval in sec: 3

Position Calculation Request Parameters

- SAS Position Resposne Time: s1
- Enable Periodic Position Calculation: Disable
- Amount of PositionCalculation Request: 2
- PeriodicReporting Interval in sec: 10

OTDOA Measurement result

- UE SFNSFNTIMEDifferenceType2: 2
- STD Resolution: 02
- NoOfMeasurements: 02
- STDOOfMeasurements: 03
- MeasurementDelay: 500

GANSS MeasurementResults

Add Insert Delete Properties

Initialisation Errors Error Events Captured Errors L



# Incoming Call Handler Configuration

The screenshot displays the MAPS (Message Automation Protocol Simulation) SAS (UMTS luPC 3GPP) - [Incoming Call Handlers Con... window. The window title bar includes the GL logo and the text "MAPS (Message Automation Protocol Simulation) SAS (UMTS luPC 3GPP) - [Incoming Call Handlers Con...". The menu bar contains "Configurations", "Emulator", "Reports", "Editor", "Debug Tools", "Windows", and "Help". The toolbar includes icons for settings, file operations, and help.

The main area is divided into two panes. The left pane contains a table with the following data:

Message Name	Script Name
ASP Up	M3UA.gls
ASP Down	M3UA.gls
ASP Active	M3UA.gls
ASP Inactive	M3UA.gls
SSA subsystem-allowed	SCMG.gls
SSP subsystem-prohibited	SCMG.gls
SDR subsystem-out-of-service-request	SCMG.gls
SST subsystem-status-test	SCMG.gls
PositionInitiationRequest	LCS_Controller.gls
PositionCalculationRequest	Rx_PositionCalculation.gls

The right pane is titled "Scripts" and contains a list with "LCS\_Controller.gls". To the right of this list are radio buttons for "Sequence" (selected) and "Random". Below the list are "Up" and "Down" buttons. At the bottom of the right pane are "Add" and "Delete" buttons.

At the bottom of the main area are "Add" and "Delete" buttons. Below these are "Apply Scripts" and "Clear Scripts" buttons. The status bar at the bottom shows "Initialisation Errors" and "Error Events" with corresponding icons.

# Script Editor

The screenshot displays the Script Editor application window. The title bar reads "ScriptEditor - [C:\Program Files\GL Communications Inc\MAPS-IuPC\MAPS\UMTS IuPC\3GPP\RNC\Scripts\LCS\_Co...". The menu bar includes "File", "View", "Edit", "Shortcuts", "Tools", and "Help". The toolbar contains icons for file operations and editing. On the left, a "Command Window" pane shows a tree view of command categories: Action, Conditional & Flow Control, Variable, Maps CLI (with sub-items: Send Client Response, CLI Command, Report Event), Logs / Comment (with sub-items: Error Log, Event Log, Log File, Add Comment), Init, Child Script, DataBase (with sub-items: Send Report, Resume, Return, Include, Exit), Utility Functions, and Traffic Commands. The main editor area shows a script titled "LCS\_Controller" with the following code:

```
1
2 //Initialize Variables
3
4 IuPCScriptId="IuPC";
5 ScriptIdCounter = 0;
6 AppendInAscii (IuPCScriptId,ScriptIdCounter);
7 ProtocolStandard="IuPC";
8 IuPCState = "IDLE";
9 IMSIstr="IMSI:";
10 KeyIdentifier: IMSIstr,IMSI;
11 StopAll=0;
12 SCCPEstablished = "False";
13 IuPCStatus = "Null";
14 Status = $IuPCStatus;
15 StartTime = 0;
16 InitTimeOut = 100;
17
18 //LogActiveCallInfoTimer should be set to a value greater
19 LogActiveCallInfoTimeOut = 300000;
20 starttimer LogActiveCallInfoTimer LogActiveCallInfoTimeOu
21     AllocUniqueId "TransactionId" TransactionId ;
22     IsGeneration = 1;
23 starttimer InitTimer InitTimeOut msec;
```

The status bar at the bottom shows "Ready", "Line Count - 237 | Line : 1 Col : 1", and a "NUM" button.

# Message Editor

The screenshot shows the Message Editor application window titled "Message Editor - PositionActivationRequest". The interface includes a menu bar (File, View, Direction, Tools, Help) and a toolbar with icons for file operations and help. On the left, a "Frame No" table shows frame 1. The main area displays a tree view of the message structure:

- PCAP
  - PCAP-PDU
    - InitiatingMessage
      - ProcedureCode
      - Criticality
      - transactionID
        - longTID
      - PositionActivationRequest
        - ProtocolE-Container
          - ProtocolE-Field
            - ProtocolE-ID
            - Criticality

A dropdown menu is open over the "InitiatingMessage" field, showing the following values:

- InitiatingMessage = 0 (selected)
- SuccessfulOutcome = 1
- UnsuccessfulOutcome = 2
- Extensible Item = 3

Below the tree view, the "MTP3 User Adaptation Layer" details are displayed in a hex dump format:

```
===== MTP3 User Adaptation Layer ===== =  
0000 Version = 00000001 Release 1.0  
0002 Message Class = 00000001 Transfer  
0003 Transfer Message Type = 00000001 Payload Data  
0004 Message Length = 68 (x00000044)  
Protocol Data =  
0008 Tag = x0210 Transfer Protocol Data  
000A Length = 43 (x002B)  
Originating Point Code =  
000E Point Code = 0.26.2(..000000 11010010)  
Destination Point Code =  
0012 Point Code = 0.1.2(..000000 00001010)
```

The status bar at the bottom shows "Ready" and a "NUM" button.

# IuPC over IP Call Generation

MAPS (Message Automation Protocol Simulation) RNC (UMTS IuPC 3GPP) - [Call Generation]

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Profile	Result	Total Iter...	Completed Iterations
1	LCS_Controller.gls	RNCProfile0001	MSI:0x9017000000000...	Start	SCCP Connection...	None		Pass	1	1
2	LCS_Controller.gls	RNCProfile0002		Start		None		Unknown	1	0
3	LCS_Controller.gls	RNCProfile0003		Start		None		Unknown	1	0

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

Save Column Width Show Latest

RNC SAS

```

PositionInitiationRequest → 17:45:24.307000
← CC connection confirm 17:45:24.332000
← PositionActivationRequest 17:45:24.332000
PositionActivationResponse → 17:45:24.334000
← PositionInitiationResponse 17:45:24.358000
InformationExchangeInitiationRequest → 17:45:26.855000
← InformationExchangeInitiationResponse 17:45:26.879000
← InformationReport 17:45:26.879000
RLSD released → 17:45:26.880000
← RLC release complete 17:45:26.898000
                    
```

Find

```

===== MTP3 User Adaptation Layer =====
0000 Version = 00000001 Release 1.0
0002 Message Class = 00000001 Transfer
0003 Transfer Message Type = 00000001 Payload Data
0004 Message Length = 112 (x00000070)
Protocol Data =
0008 Tag = x0210 Transfer Protocol Data
000A Length = 101 (x0065)
Originating Point Code =
000E Point Code = 5.5.5(...101000 00101101)
Destination Point Code =
0012 Point Code = 6.6.6(...110000 00110110)
0014 Service Indicator = ....0011 SCCP
0015 Network Indicator = .....10 National Network
0016 Message Priority = .....00 Priority Code 0
0017 Signalling Link Selection = 1 (x01)

Parameter Padding = x000000
===== SCCP Layer =====
0018 Message Type = 00000001 CR connection request
Mandatory Fixed Parameters =
Source Local Reference Parameter =
0019 Source Local Reference = 12 (x000000C)
Protocol Class Parameter =
001C Class = ....0010 Class 2
                    
```

Scripts Message Sequence Event Config Script Flow Capture Events

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

# IuPC over IP Call Reception

GL MAPS (Message Automation Protocol Simulation) SAS (UMTS IuPC 3GPP) - [Call Reception]

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events
1	M3UA.gls			Stop	ASP Active	Send-ASPDown
2	SCMG.gls			Stop	Subsystem-Allowed	Initiate SST
3	LCS_Controller.gls		IMSI: 0x9017000000000638	Completed	SCCP Connection Released	None

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

Save Column Width  Show Latest

RNC SAS

```

PositionInitiationRequest → 17:45:24.318000
← CC connection confirm 17:45:24.320000
← PositionActivationRequest 17:45:24.321000
PositionActivationResponse → 17:45:24.345000
← PositionInitiationResponse 17:45:24.346000
InformationExchangeInitiationRequest → 17:45:26.867000
← InformationExchangeInitiationResponse 17:45:26.868000
← InformationReport 17:45:26.868000
RLSD released → 17:45:26.888000
← RLC release complete 17:45:26.888000
                    
```

Find

```

===== MTP3 User Adaptation Layer =====
0000 Version = 00000001 Release 1.0
0002 Message Class = 00000001 Transfer
0003 Transfer Message Type = 00000001 Payload Data
0004 Message Length = 112 (x00000070)
      Protocol Data =
0008 Tag = x0210 Transfer Protocol Data
000A Length = 101 (x00065)
      Originating Point Code =
000E Point Code = 5.5.5(..101000 00101101)
      Destination Point Code =
0012 Point Code = 6.6.6(..110000 00110110)
0014 Service Indicator = ....0011 SCCP
0015 Network Indicator = .....10 National Network
0016 Message Priority = .....00 Priority Code 0
0017 Signalling Link Selection = 1 (x01)

      Parameter Padding = x000000
===== SCCP Layer =====
0018 Message Type = 00000001 CR connection request
      Mandatory Fixed Parameters =
0019 Source Local Reference Parameter = 12 (x00000C)
      Protocol Class Parameter =
001C Class = ....0010 Class 2
                    
```

Scripts Message Sequence Event Config Script Flow Capture Events

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

# Events Log

MAPS (Message Automation Protocol Simulation) RNC (UMTS luPC 3GPP) - [Events]

Configurations Emulator Reports Editor Debug Tools Windows Help

Event Log | Error Events | Captured Errors

Date/Time	Captured Events	Call Trace Id	Script Name	Script Id
2020-7-14 17:33:04.006000	PositionInitiationRequestSent	IMSI:0x9017000000000638	LCS_Controller.gls	CGProtScriptId-11-964...
2020-7-14 17:33:04.026000	SCCP Connection Established	IMSI:0x9017000000000638	LCS_Controller.gls	CGProtScriptId-11-964...
2020-7-14 17:33:04.027000	Position Activation Request Received	IMSI:0x9017000000000638	LCS_Controller.gls	CGProtScriptId-11-964...
2020-7-14 17:33:04.028000	Position Activation Response Sent	IMSI:0x9017000000000638	LCS_Controller.gls	CGProtScriptId-11-964...
2020-7-14 17:33:04.046000	Position Initiation Response Received	IMSI:0x9017000000000638	LCS_Controller.gls	CGProtScriptId-11-964...
2020-7-14 17:33:08.946000	Information Exchange Initiated	IMSI:0x9017000000000638	LCS_Controller.gls	CGProtScriptId-11-964...
2020-7-14 17:33:08.969000	Information Exchange Initiation Response Received	IMSI:0x9017000000000638	LCS_Controller.gls	CGProtScriptId-11-964...

Save Events

Capture Events to file

Clear

File Formats

File Format

.Txt

.Csv

.Log4Net

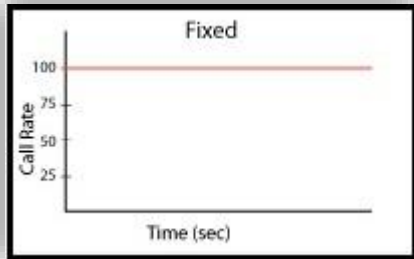
OK Cancel

● Initialisation Errors ● Error Events ● Captured Er

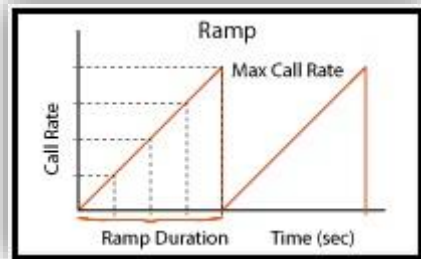
# Load Generation

- 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.

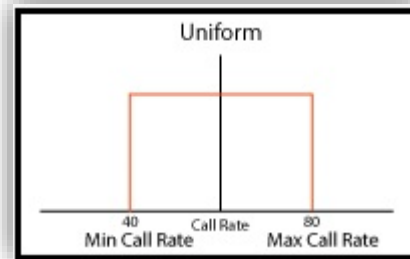
**Fixed**



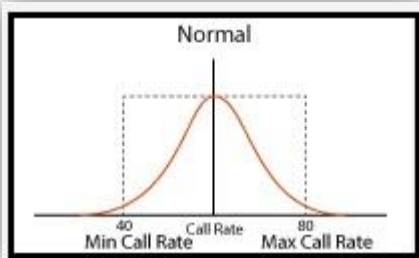
**Ramp**



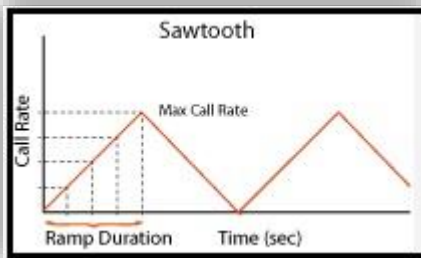
**Uniform**



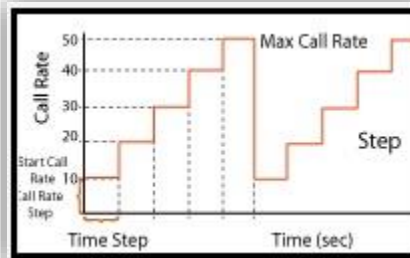
**Normal**



**Saw-tooth**



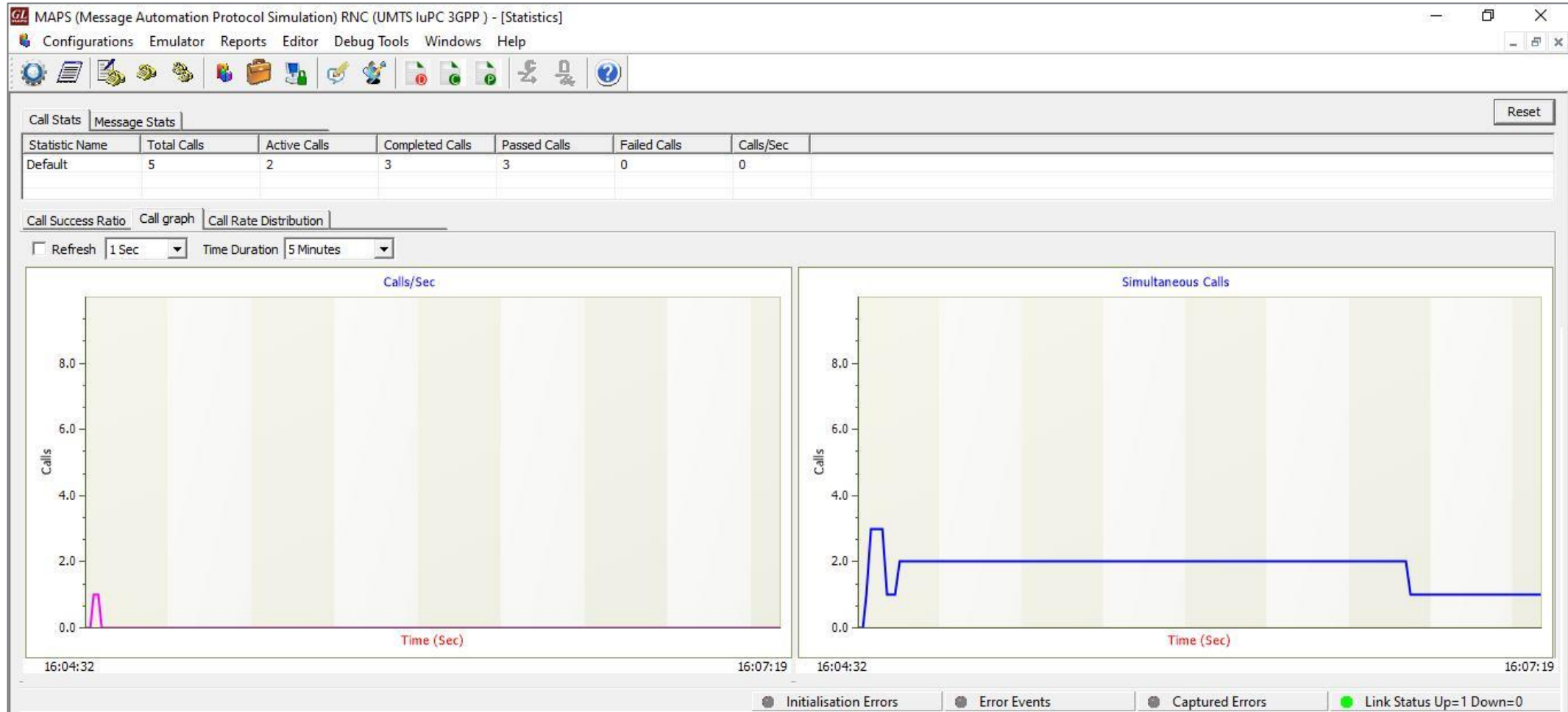
**Step**



The screenshot shows the MAPS (Message Automation Protocol Simulation) RNC (UMTS luPC 3GPP) - [Load Generation - LoadGendefault] software interface. The window title is "GL MAPS (Message Automation Protocol Simulation) RNC (UMTS luPC 3GPP) - [Load Generation - LoadGendefault]". The interface includes a menu bar (Configurations, Emulator, Reports, Editor, Debug Tools, Windows, Help) and a toolbar. The main configuration area includes fields for "Total Calls To Generate" (with a note "\* indicates no limit"), "Max Active Calls" (2000), and a checked "Unique Distributions Per Script" option. Below these are options for "Multi Distributions" (unchecked) and "Max Active Calls Per Script" (0). A "Statistical Distribution" dropdown is set to "Fixed", and a "Call Rate" field is set to "200". The "Scripts" section contains a table with "Tx\_PositionCalculation" and "LCS\_Controller" listed. To the right, a "Profile" section lists "RNCProfile0001" through "RNCProfile0005". At the bottom, there are "Add" and "Delete" buttons for both scripts and profiles, and a "Stop Time" section with "Days", "Hours", and "Minutes" dropdowns, and "Start Time" and "End Time" fields set to "00:00:00.000".

# Call and Message Statistics

## Call Statistics





# Call and Message Statistics

## Message Statistics

GL MAPS (Message Automation Protocol Simulation) RNC (UMTS luPC 3GPP) - [Statistics]

Configurations Emulator Reports Editor Debug Tools Windows Help

Call Stats Message Stats

Message Type	Tx Count	Rx Count	Retransmit Count
ASP Active	0	1	0
ASP Active Acknowledgement	1	0	0
ASP Up	0	1	0
ASP Up Acknowledgement	1	0	0
CC connection confirm	0	1	0
Notify	2	0	0
PositionActivationRequest	0	1	0
PositionActivationResponse	1	0	0
PositionInitiationRequest	1	0	0
PositionInitiationResponse	0	1	0
PositionPeriodicResult	0	21	0
RLC release complete	0	1	0
RLSD released	1	0	0
SSA subsystem-allowed	1	0	0
SST subsystem-status-test	0	1	0

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

**Thank You**