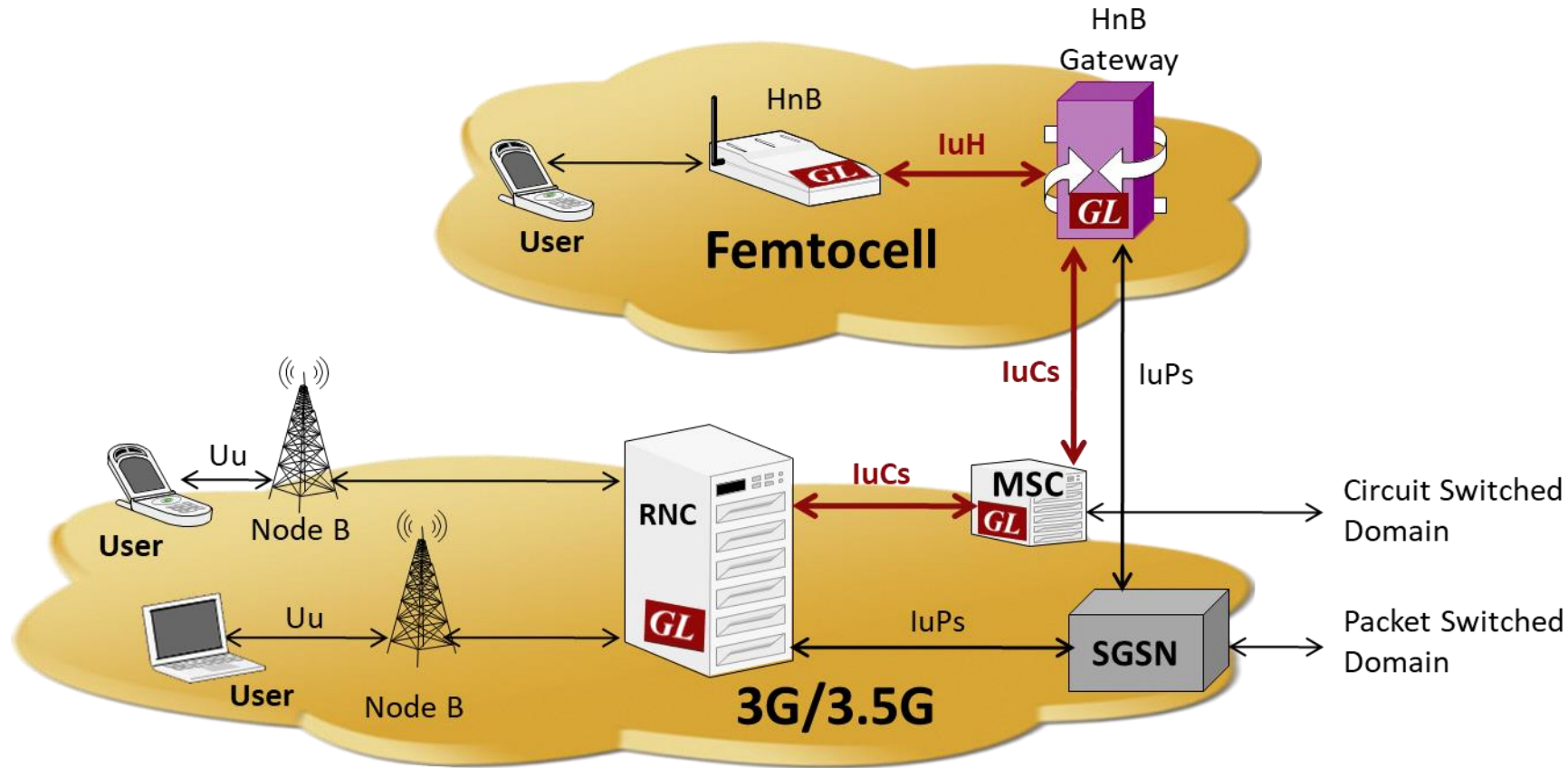

MAPS™ UMTS for IuCS, IuH Interfaces Emulator

(IuCS Emulation over IP and ATM; and IuH Emulation over IP)



818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878
Phone: (301) 670-4784 Fax: (301) 670-9187 Email: info@gl.com
Website: <https://www.gl.com>

MAPS™ UMTS for IuCS Interfaces



MAPS™ UMTS-IuCs and IuH Emulator

(Generate up to 20,000 Subscribers
Up to 2000 Simultaneous Calls)



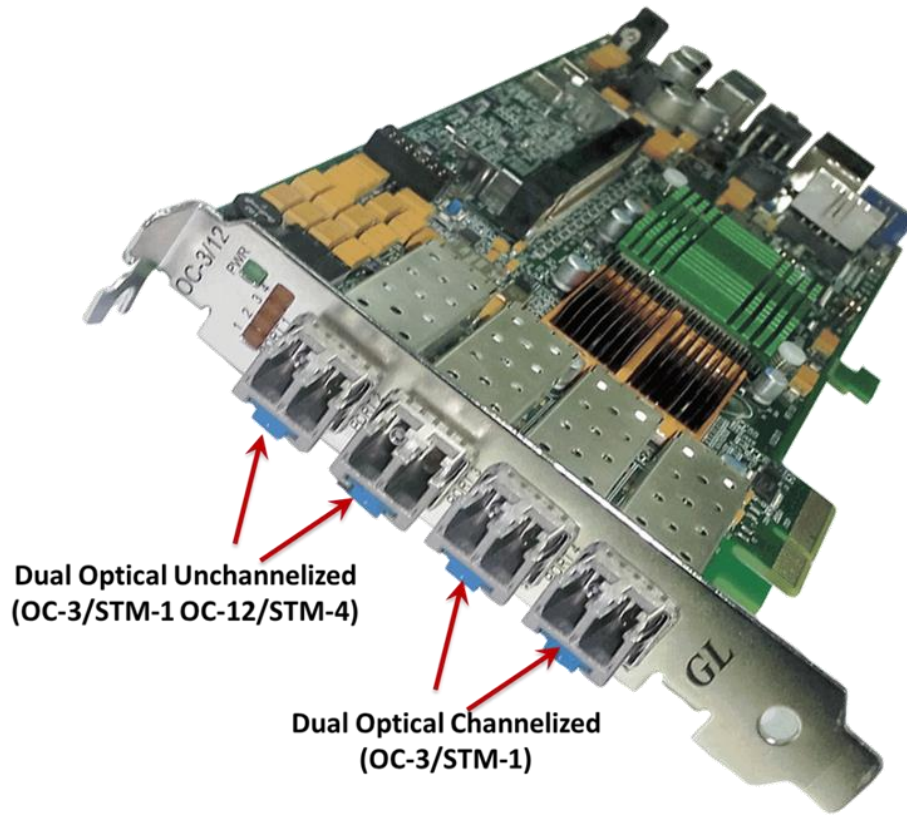
MAPS™ UMTS-IuCS and IuH Emulator HD RTP Generator Hardware

(w/ 2 x 10G cards; w/ 4 x 1G cards)
(Generate up to 20,000 Subscribers
20,000 Simultaneous Calls (with RTP Traffic))

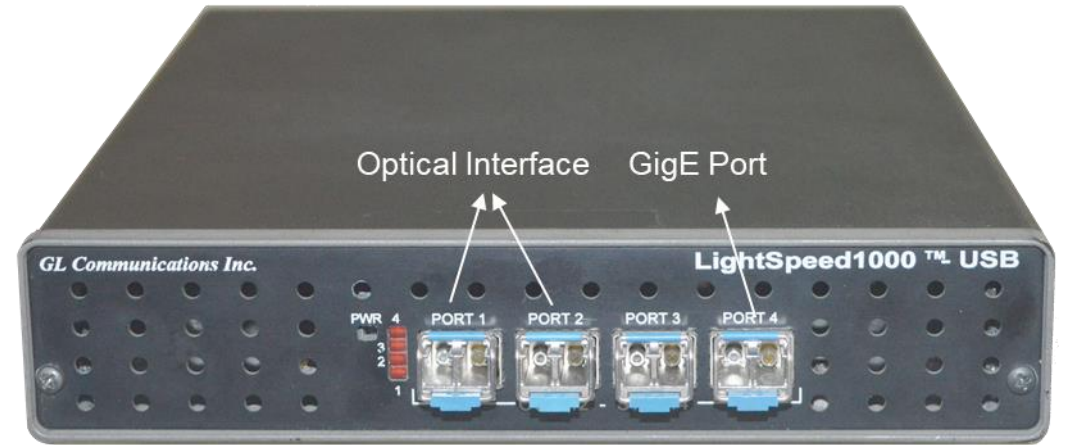
Highlights

- Simulates RNC, MSC, Home NodeB (HnB) and Home NodeB Gateway (HN GW) entities
- Generates and process all Mobility Management, Session Management, RANAP, ALCAP, and DTAP messages over SSCOP
- User controlled access to RANAP, and DTAP signaling messages over SCTP
- Ready scripts for Mobile Originating, Mobile Terminating, Location Updating procedures for quick testing
- Supports RAB Assignment, Authentication, TMSI Reallocation, Encryption, and other optional procedures
- SSCOP links over which RANAP and ALCAP signaling will be carried further for making calls
- SSCOP Server (GL's WCS based server module) provides SSCOP, AAL5 and AAL2 layer services
- Supports various traffic types including Tone, Digits and File playback over AAL2
- Supports traffic over Iu UP protocol layer and also over normal RTP sessions (requires additional licenses)
- All Codec supported including - G.711, G.711 App II with VAD, G.729, G.726, G.726 with VAD, GSM, AMR NB and WB, EVRC, SMV, iLBC, SPEEX NB and WB, G722, and G722.1. Visit [Voice Codecs](#) webpage for more comprehensive information

Hardware Platforms



OC3/OC12 PCIe Card LightSpeed1000™

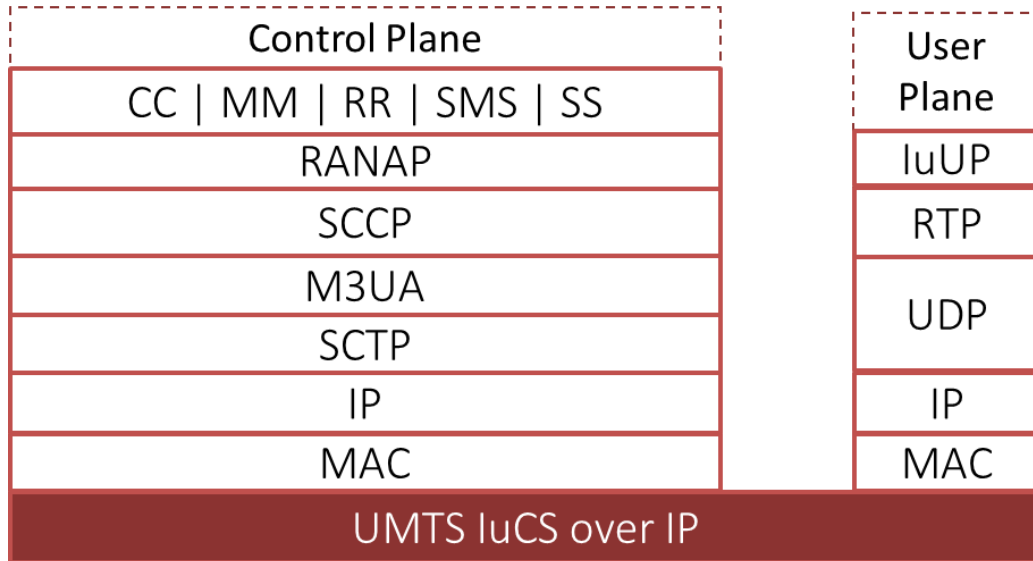


OC3/OC12 Portable USB LightSpeed1000™



HD RTP Generator Hardware
(w/ 2 x 10G cards; w/ 4 x 1G cards)

UMTS IuCS IP Protocol Stack



Supported Protocols	Specification Used
IuCS IP Interface	
SCCP	Q.713, CCITT (ITU-T) Blue Book
MTP3	Q.703, ITU-T Blue Book
RANAP	3GPP TS 25.413 V9.1.0
MM / CC	3GPP TS 24.008 V5.16.0 (2006-06)
RR	3GPP TS 04.18 V8.13.0
SMS	3GPP TS 03.40 V7.5.0 & 3GPP TS 04.11 V7.1.0 GSM 03.38 version 7.2.0 Release 1998
Iu-UP (User Plane)	3GPP TS 25.415
SCTP	RFC4960

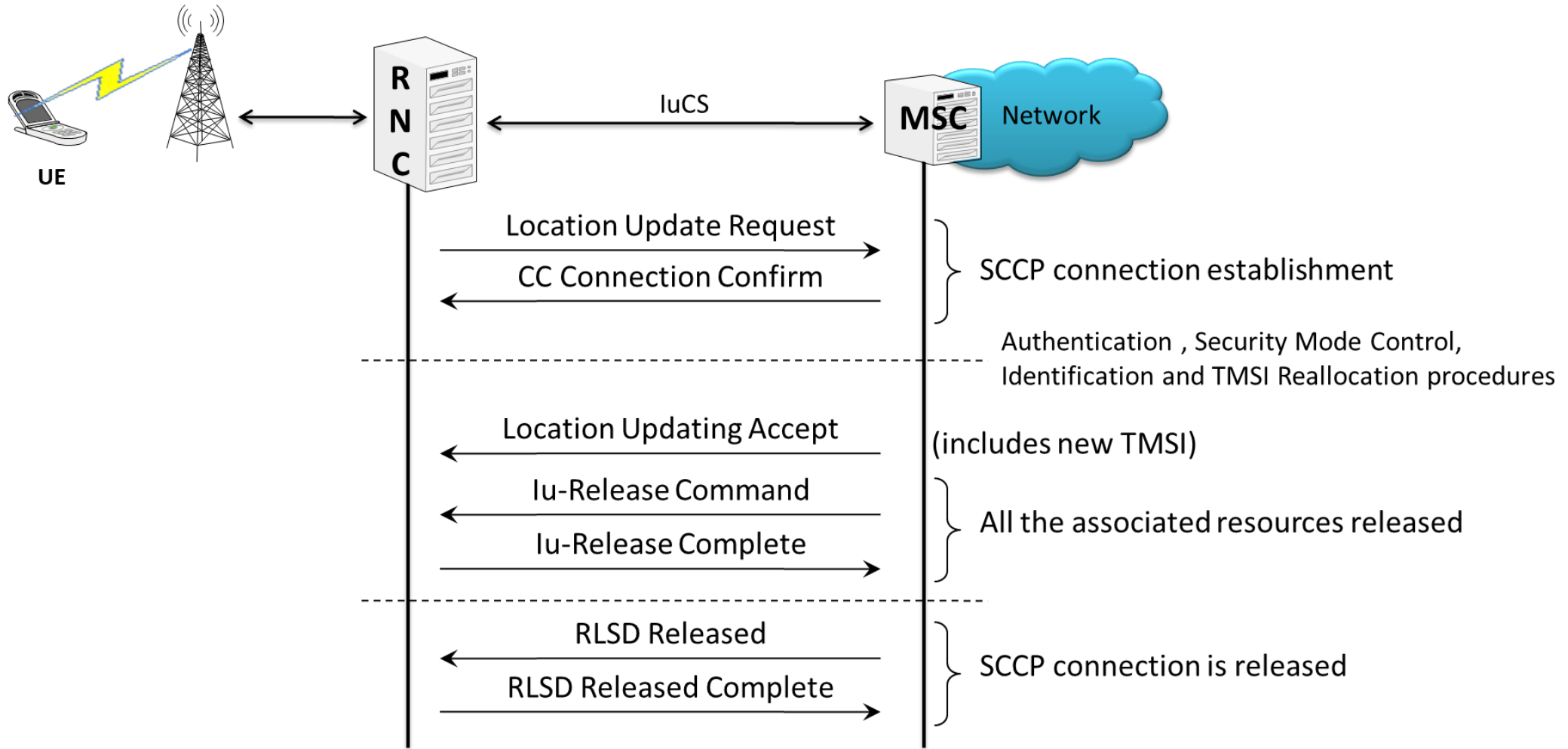
UMTS IuCS ATM Protocol Stack

CC MM RR	
ALCAP	
MTP3B	
SSCF-NNI	Codec
SSCOP	Iu UP
AAL5	AAL2
ATM	ATM
IuCS ATM	

Supported Protocols	Specification Used
IuCS ATM Interface	
SSCOP	ITU-T Q.2110
MTP3b	ITU-T Recommendation Q.2210
AAL Type 2 (ALCAP)	ITU-T Recommendation Q.2630.1
RANAP	3GPP TS 25.413 V9.1.0
MM / CC	3GPP TS 24.008 V5.16.0 (2006-06)
RR	3GPP TS 04.18 V8.13.0
SMS	3GPP TS 03.40 V7.5.0 & 3GPP TS 04.11 V7.1.0 GSM 03.38 version 7.2.0 Release 1998
Iu-UP Iu User Plane Interface	3GPP TS 25.415

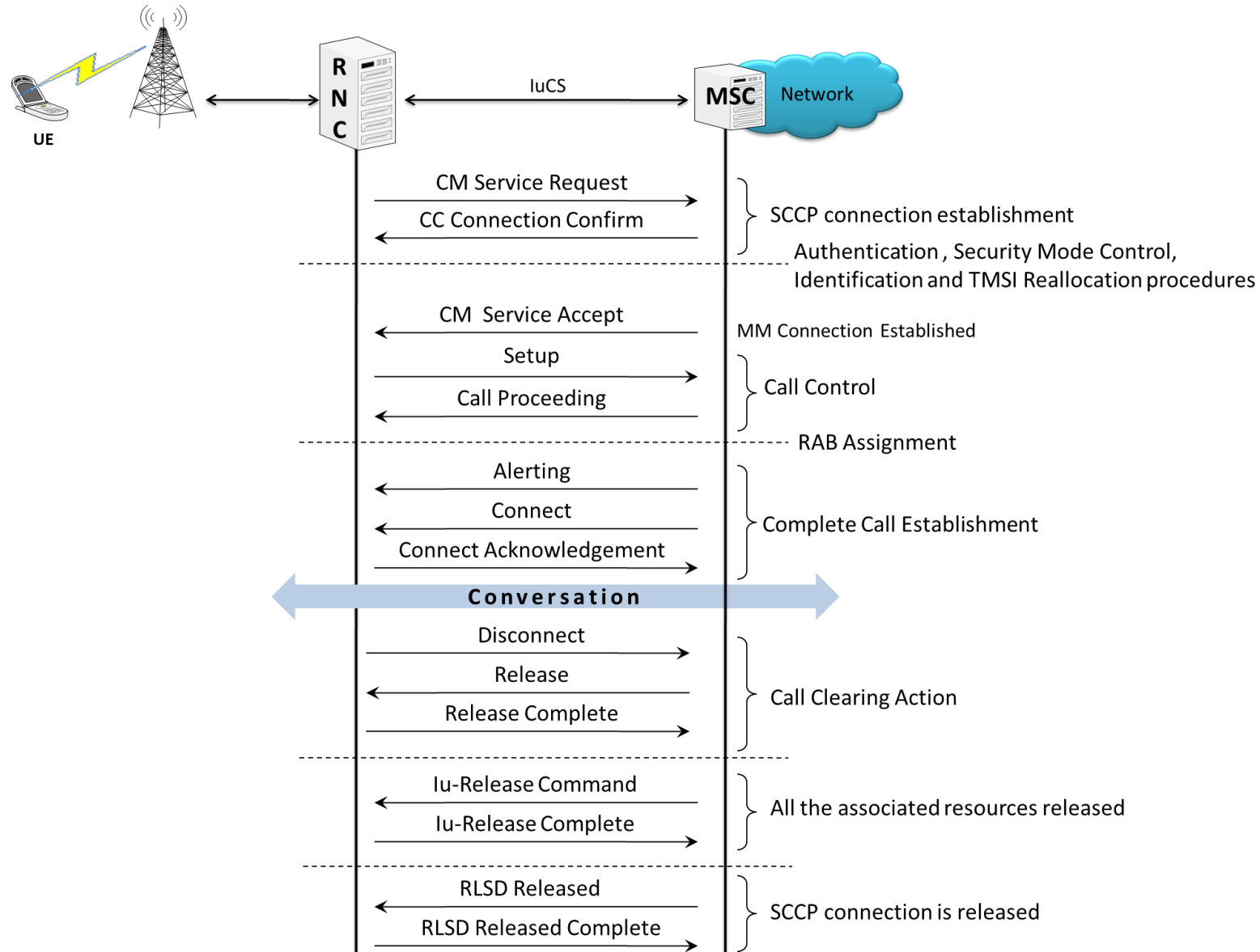
Location Updating (LU) Call Flow

Call Simulation over IP



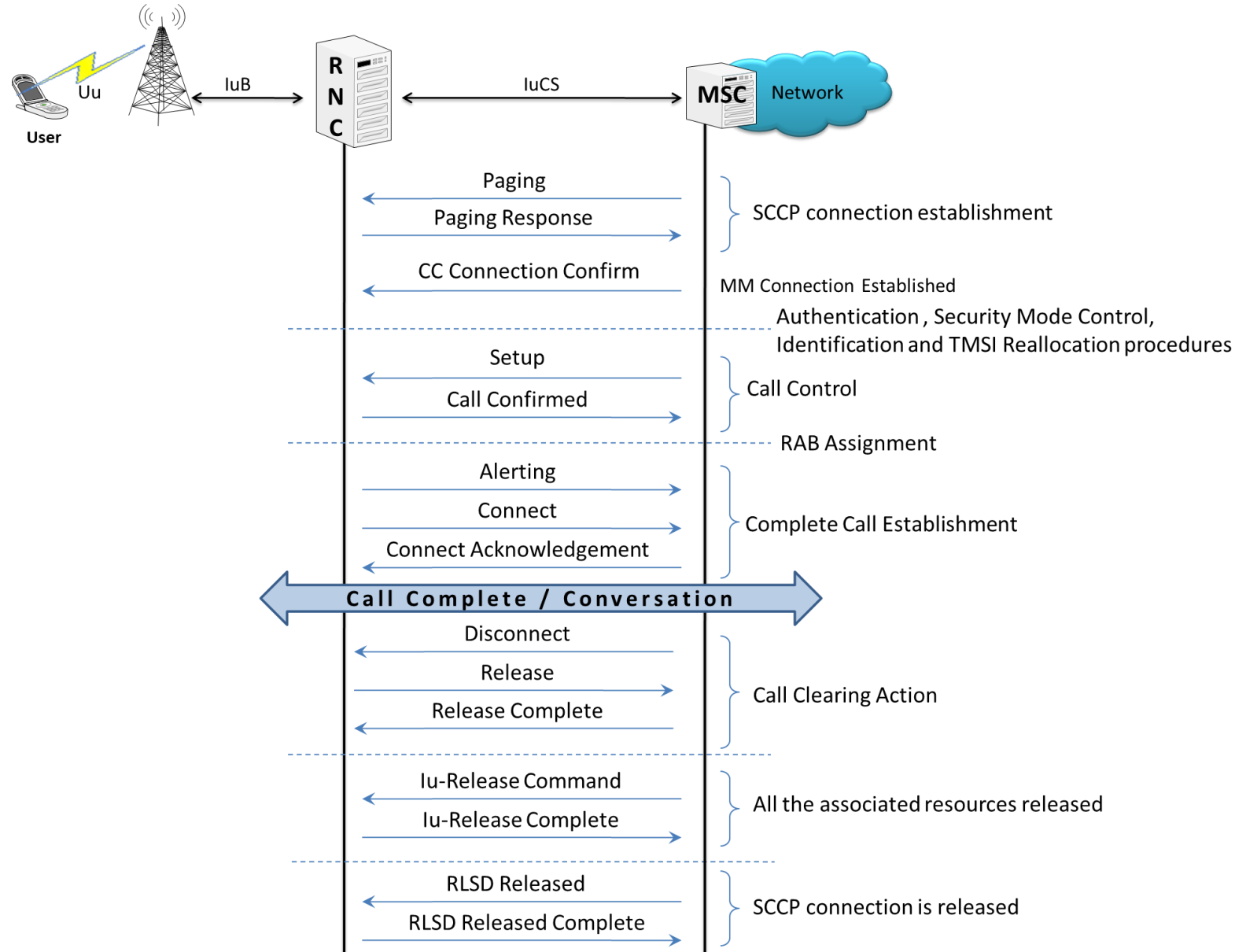
Mobile Originating Call Procedure

Call Simulation over IP



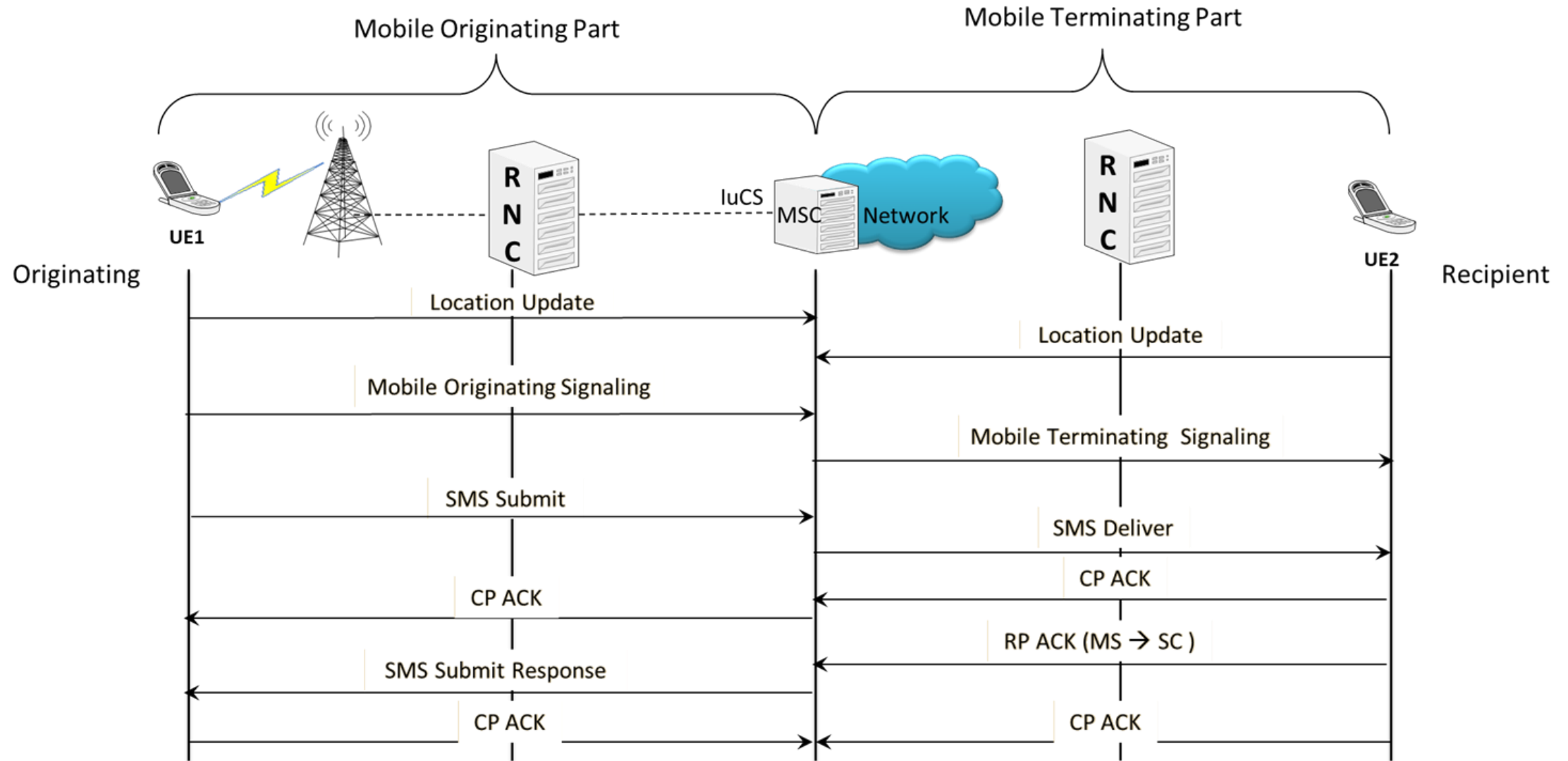
Mobile Terminating Call Procedure

Call Simulation over IP



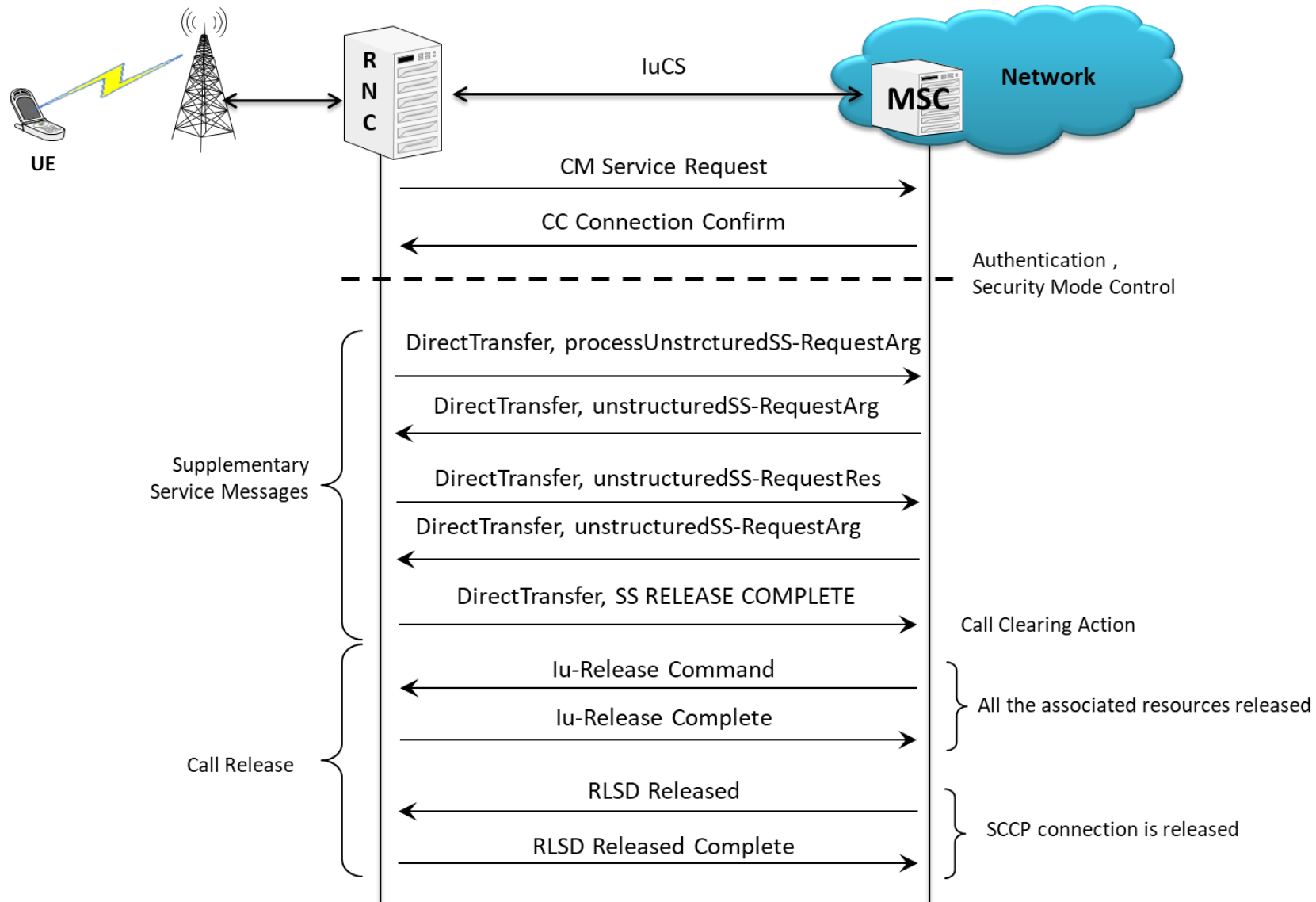
Mobile to Mobile SMS Call Procedure

Call Simulation over IP



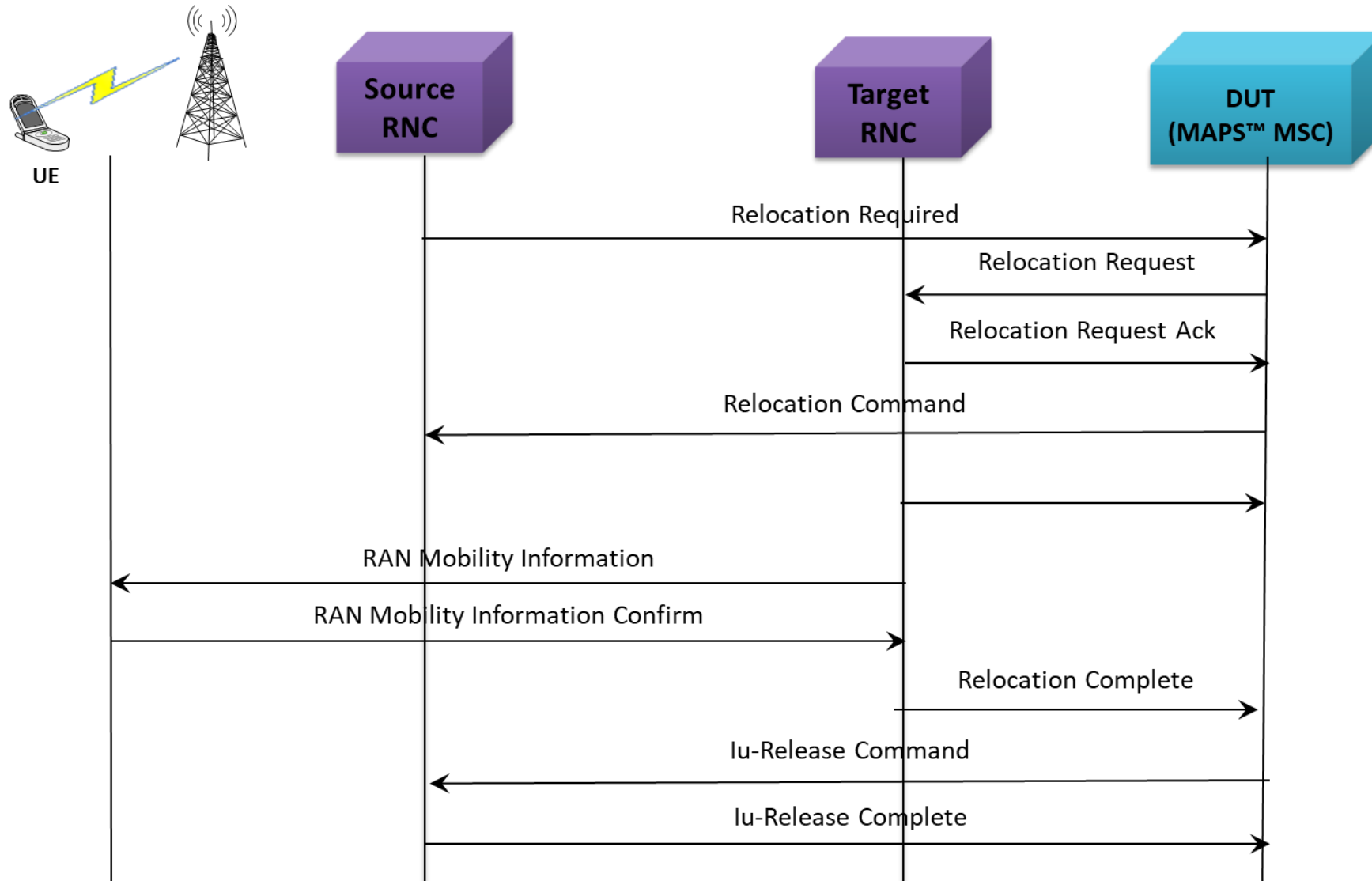
Supplementary Service Call Flow

Call Simulation over IP



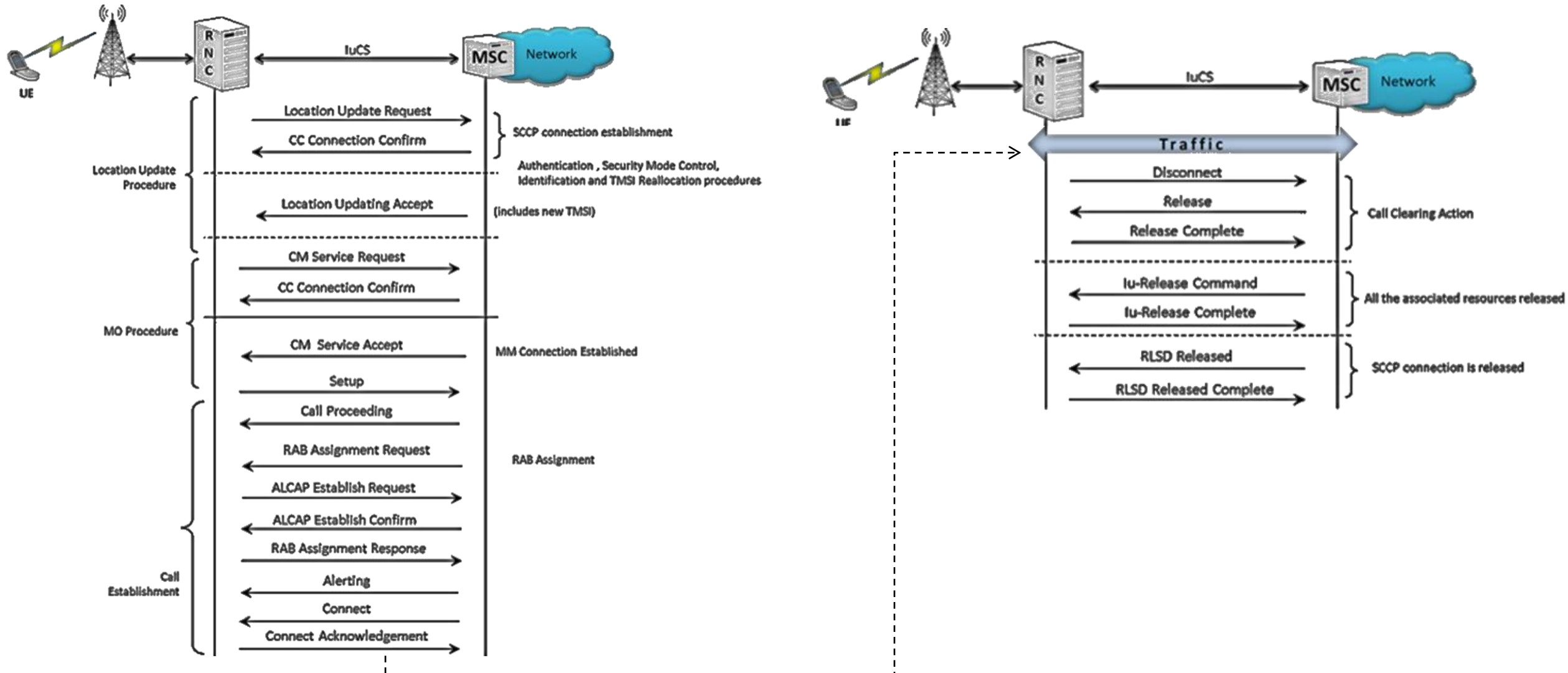
Relocation Call Procedure

Call Simulation over IP



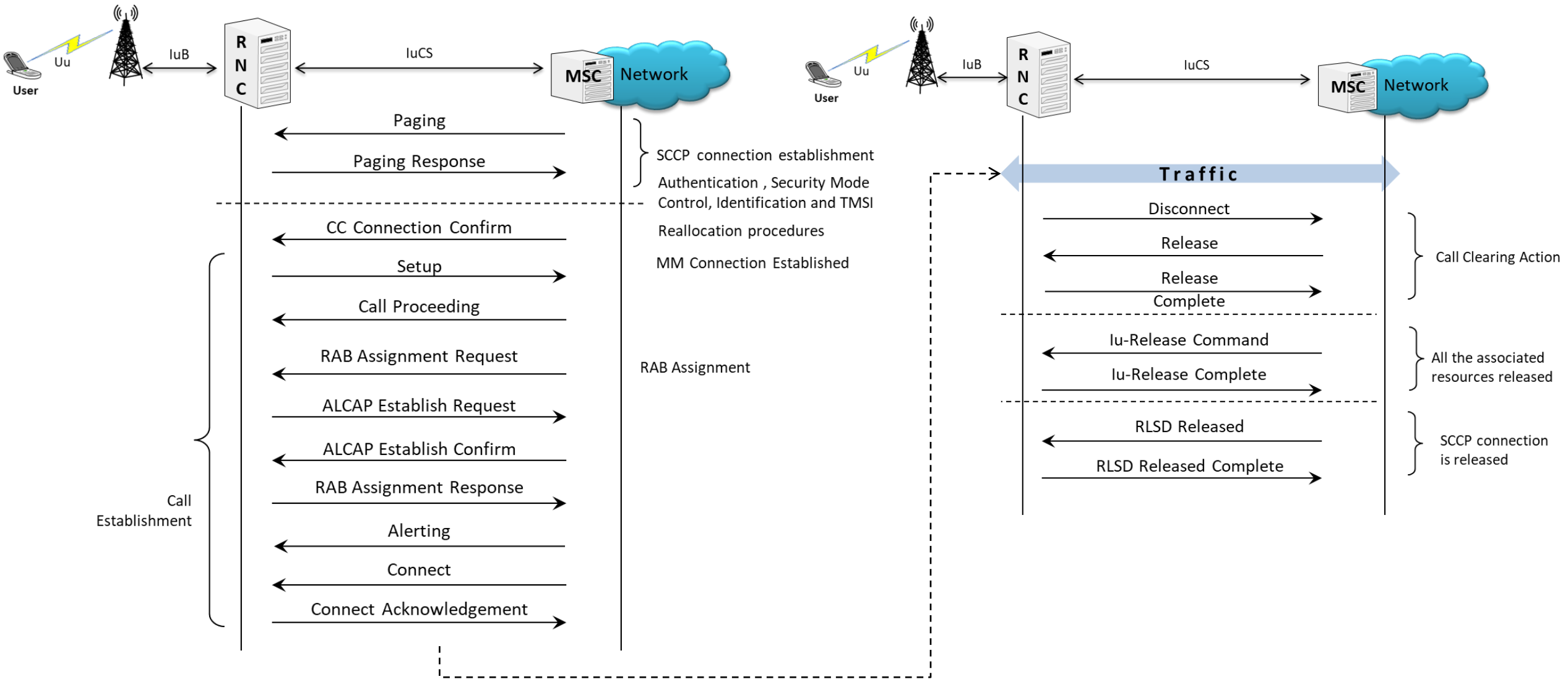
MO Call Procedure

Call Simulation over ATM



MT Call Procedure

Call Simulation over ATM



Testbed Configuration

MAPS (Message Automation Protocol Simulation) RNC (UMTS IU-CS 3GPP SCTP) - [Testbed Setup - TestBedDefault]

Configurations Emulator Reports Editor Debug Tools Windows Help

Config	Value
RNC Configurations	
M3UA Termination Type	IPSP
Enable RTP Simulation	Enable
RTP Hardware Interface Type	PC NIC
SCTP Mode	client
RNC	1
RNC 1	
RNC IP Address	192.168.13.34
MGW IP Address	192.168.13.34
RNC Port	2905
PLMN Identifiers	
M3UA Parameters	
RNC Point Code	1.1.2
Signaling Link Selection	1
Network Indicator	National
RNC Address Indicator	National
M3UA Routing Context Indicator	Absent
M3UA Routing Context	1
M3UA Network Appearance Indicator	Absent
M3UA Network Appearance	12
MSC Parameters	
MSC IP Address	192.168.13.28
MSC Port	2905
MSC Point Code	2.2.2
MSC Address Indicator	International
HD RTP Media Configuration	
End User Configurations	MS_Profiles.xml
CSV File Name	MS_Profiles_IMSLCSV
Enable SMS Ratio For CSV	False
Ratio of SMS Calls	30 %

_M3UATerminationType

Select Option

IPSP

Start Edit

Profile Configuration

MAPS (Message Automation Protocol Simulation) MSC (UMTS IU-CS 3GPP SCTP) - [Profile Editor - MS_Profiles]

Configurations Emulator Reports Editor Debug Tools Windows Help

#	Profiles (Edit-F2)	Config	Value
1	MSProfile0001	MSProfile0001	
2	MSProfile0002	Type Of Call	Terminate MO Call
3	MSProfile0003	Service Type For MT Call	Speech Call
4	MSProfile0004	Enable Paging On TMSI	Disable
5	MSProfile0005	SStype	USSD Notify
6	MSProfile0006	Mobile ID	
7	MSProfile0007	IMEI	353887067326268
8	MSProfile0008	TMSI	01110001
9	MSProfile0009	IMSI	001013014041741
10	MSProfile0010	MSISDN	
11	MSProfile0011	Calling Number Parameters	
12	MSProfile0012	Numbering plan ident...	ISDN/Telphony nu...
13	MSProfile0013	Type of number	Unknown
14	MSProfile0014	Calling Number	3014041741
15	MSProfile0015	Called Number Parameters	
16	MSProfile0016	Numbering Plan Ident...	ISDN/Telphony nu...
17	MSProfile0017	Type of Number	Unknown
18	MSProfile0018	Called Number	3014041791
19	MSProfile0019	Presentation Indicator	Disable
20	MSProfile0020	Location Area Identifiers for Paging	
21	MSProfile0021	LAC	0001
22	MSProfile0022	SAC	0001
23	MSProfile0023	RAC	01
24	MSProfile0024	RNCID	2
25	MSProfile0025	RAB Parameters	
26	MSProfile0026	Authentication Procedures	Disable
27	MSProfile0027	Ciphering Procedures	Disable
28	MSProfile0028	Authentication Parameters	
29	MSProfile0029	USSD Configuration	
30	MSProfile0030	SMS Call Parameters	
31	MSProfile0031	Codec Options and Traffic Config...	
		Codec Options	AMR-OA-Mode7
		Packetization Time in msec	20
		Traffic Config	
		Traffic Type	Auto Traffic File
		Traffic Direction	TxOnly
		Impairment Type	None
		Traffic Profile Name	Profile0001
		Enable Real Media Gateway	False
		Real Media Gateway Destinati...	192.168.12.204

EnableAutoMT
Select Option
Terminate MO Call

Add Insert Delete
Properties

● Initialisation Errors ● Error Events ● Captured Errors ● Link Status Up=0 Dow

Call Simulation over luCS IP

SMS over Voice Call Simulation

Sr.	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Pr.	Result	Total Iteratio.	Completed Iterations
1	IuCS_Call.gls	MSProfile0001	IMSI: 001013014041741.TMSI: 0x7E91E7F	Start	SCCP Connection Released	None		Pass	1	1
2	IuCS_Call.gls	MSProfile0002		Start		None		Unknown	1	0
3	IuCS_Call.gls	MSProfile0003		Start		None		Unknown	1	0
4	IuCS_Call.gls	MSProfile0004		Start		None		Unknown	1	0
5	IuCS_Call.gls	MSProfile0005		Start		None		Unknown	1	0

Message Sequence Diagram (SMS-SUBMIT):

- SecurityModeComplete, 18:37:41.260.7459
- DirectTransfer, SETUP, 18:37:41.261.4517
- DirectTransfer, CALL PROCEEDING, 18:37:41.266.5943
- RAB AssignmentRequest, 18:37:41.267.1647
- RAB AssignmentResponse, 18:37:41.267.9568
- DirectTransfer, ALERTING, 18:37:41.0.3145
- DirectTransfer, CONNECT, 18:37:42.0.7723
- DirectTransfer, CONNECT ACKNOWLEDGE, 18:37:42.1.2053
- DirectTransfer, CM SERVICE REQUEST, 18:37:49.223.124
- DirectTransfer, CM SERVICE ACCEPT, 18:37:50.229.2497
- DirectTransfer, SMS-SUBMIT, 18:37:50.231.4914**
- DirectTransfer, CP-ACK, 18:37:50.239.6154
- DirectTransfer, RP-ACK (SC+MS), 18:37:50.240.1394
- DirectTransfer, CP-ACK, 18:37:50.241.2518
- DirectTransfer, DISCONNECT, 18:38:42.4.7633
- DirectTransfer, RELEASE, 18:38:42.10.3413
- DirectTransfer, RELEASE COMPLETE, 18:38:42.10.8145
- IuReleaseCommand, 18:38:42.16.314
- IuReleaseComplete, 18:38:42.16.4178

Relocation Procedure Simulation

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events...	Results
4	SCMG.gls		1005	Stop	Subsystem-Allowed	Initiate SST		Pass
5	IuCS_Call.gls	MSProfile0001	IMSI: 001013014041741.TMSI: 0x9789BE1F	Completed	Call Released	None		Pass
6	IuCS_Call.gls	MSProfile0001	IMSI: 001013014041741.CalledNumber: 3014041742	Completed	Call Released	None		Pass
7	IuCS_Call.gls	MSProfile0001	IMSI: 001013014041741.CalledNumber: 3014041742	Completed	Call Released	None		Pass

Message Sequence Diagram (Relocation Procedure):

- SecurityModeCommand, 16:55:37.921000
- SecurityModeComplete, 16:55:37.930000
- DirectTransfer, SETUP, 16:55:37.969000
- DirectTransfer, CALL PROCEEDING, 16:55:37.992000
- RAB AssignmentRequest, 16:55:38.061000
- RAB AssignmentResponse, 16:55:38.118000
- DirectTransfer, ALERTING, 16:55:38.178000
- DirectTransfer, CONNECT, 16:55:39.238000
- DirectTransfer, CONNECT ACKNOWLEDGE, 16:55:39.286000
- RelocationRequired, 16:55:54.467000**
- RelocationRequest, 16:55:54.467000
- CC connection confirm, 16:55:54.467000
- RelocationRequestAcknowledge, 16:55:54.467000

Call Simulation over luCS ATM

Call Control MO Procedure

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

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Profile	Result	Total Iterations	Completed Iterations
1	CallControl_MO.gls	Profile0001	IMS: 30170000	Start	Call Released	None	...	Pass	1	1
2	CallControl_MO.gls	Profile0002		Start		None	...	Unknown	1	0
3	CallControl_MO.gls	Profile0003		Start		None	...	Unknown	1	0

Save Column Width

MAPS DUT

```

InitialUE-Message, CM SERVICE REQUEST 17:09:00.007000
CC connection confirm 17:09:00.051000
DirectTransfer, AUTHENTICATION REQUEST 17:09:00.051000
DirectTransfer, AUTHENTICATION RESPONSE 17:09:00.051000
DirectTransfer, TMSI REALLOCATION COMMAND 17:09:00.101000
DirectTransfer, TMSI REALLOCATION COMPLETE 17:09:00.101000
DirectTransfer, CM SERVICE ACCEPT 17:09:00.150000
DirectTransfer, SETUP 17:09:00.151000
DirectTransfer, CALL PROCEEDING 17:09:00.201000
RAB-AssignmentRequest, 17:09:00.201000
Establish Request 17:09:00.203000
Establish Confirm 17:09:00.251000
RAB-AssignmentResponse, 17:09:00.252000
DirectTransfer, ALERTING 17:09:00.302000
DirectTransfer, CONNECT 17:09:00.316000
DirectTransfer, CONNECT ACKNOWLEDGE 17:09:00.376000
DirectTransfer, DISCONNECT 17:11:00.395000
DirectTransfer, RELEASE 17:11:00.447000
DirectTransfer, RELEASE COMPLETE 17:11:00.448000
lu-ReleaseCommand, 17:11:00.498000
lu-ReleaseComplete, 17:11:00.498000
RLSD released 17:11:00.548000
RLC release complete 17:11:00.548000
    
```

```

===== MTP3b Layer =====
0000 Service Indicator = ...0011 SCCP
0000 Sub-service field = 0000... Internati
0001 DPC = 1.1.1(00001001 ..0
0002 OPC = 2.2.2(10..... 000
0004 Signaling Link Code = 0001.... (1)
Pdu = x01000009020205034:
===== SCCP Layer =====
0005 Message Type = 00000001 CR connect
Mandatory Fixed Parameters
Source Local Reference Parameter = 9 (x000009)
Source Local Reference
Protocol Class Parameter = ...0010 Class 2
Class = 0000... No Special:
0009 Message Handling (Class 0 and 1 only) = Param offset x02
000A Pointer to Mandatory Parameter = x05 (5)
000B Pointer to optional parameters
Mandatory Variable Length Parameters
Called Party Address
Parameter length = mandatory paramete
Address Indicators = 3
000D Point Code Indicators = .....1 Address co
000D SSN Indicators = .....0. Address di
000D Global Title Indicators = ..0000.. No global
000D Routing Indicators = ..1..... Route on f
000D Nat1/Int1 Indicators = 0..... Address is
Optional Variable Length Parameters
Calling Party Address
Parameter name = optional parameter
Parameter length = 04
0011 Parameter length = 3
Address Indicators = .....1 Address co
0012 SSN Indicators = .....0. Address di
0012 Global Title Indicators = ..0000.. No global
0012 Routing Indicators = ..1..... Route on f
0012 Nat1/Int1 Indicators = ..1..... Address is
0013 Signalling Point Code = 2.2.2(00010010 ..0:
Data
Parameter name = optional parameter
Parameter length = 0F
0016 Parameter length = 72
SCCP user data = x00134044000006000:
x00
===== RANAP Layer =====
RANAP PDU = CHOICE
Extensibility Marker = 0
Choice Index = 0
ProcedureCode = INTEGER
Contents = 19 id-InitialUE-Me:
Criticality = ENUMERATOR
Contents = 1 ignore(1)
Value = Open Type
Length = 68
Extensibility Marker = 0
    
```

Scripts Message Sequence Event Config Script Flow

Call Control MT Procedure

MAPS (Message Automation Protocol Simulation) MSC (UMTS IUCS 3GPP ATM) - [Call Generation - Untitled]

Configurations Emulator Reports Editor Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Profile	Result	Total Iterations	Completed Iterations
1	Call Control MT.gls	Profile0001	IMS: 301700000000624...	Abort	RAB Assignment Completed	Terminate	...	Pass	1	0
2	Call Control MT.gls	Profile0002		Start		None	...	Unknown	1	0
3	Call Control MT.gls	Profile0003		Start		None	...	Unknown	1	0
4	Call Control MT.gls	Profile0004		Start		None	...	Unknown	1	0

Save Column Width

MAPS DUT

```

Paging, 15:15:36.361000
InitialUE-Message, PAGING RESPONSE 15:15:36.459000
CC connection confirm 15:15:36.464000
DirectTransfer, AUTHENTICATION REQUEST 15:15:36.465000
DirectTransfer, AUTHENTICATION RESPONSE 15:15:36.509000
DirectTransfer, TMSI REALLOCATION COMMAND 15:15:36.509000
DirectTransfer, TMSI REALLOCATION COMPLETE 15:15:36.535000
DirectTransfer, SETUP 15:15:36.535000
DirectTransfer, CALL CONFIRMED 15:15:36.559000
RAB-AssignmentRequest, 15:15:36.559000
Establish Request 15:15:36.585000
    
```

```

===== MTP3b Layer =====
0000 Service Indicator = ...0011 SCCP
0000 Sub-service field = 0000... International network
0001 DPC = 2.2.2(00010010 ..010000)
0002 OPC = 1.1.1(01..... 00000010 ....0010)
0004 Signaling Link Code = 0001.... (1)
Pdu = x090003070B044312108E04C309088E23000E401F000C
===== SCCP Layer =====
0005 Message Type = 00001001 UDT unidata
Mandatory Fixed Parameters
Protocol Class Parameter =
0006 Class = ...0000 Class 0
0006 Message Handling (Class 0 and 1 only) = 0000... No Special Options
0007 Pointer to Mandatory Parameter = Param offset x03 (3)
0008 Pointer to Mandatory Parameter = Param offset x07 (7)
0009 Pointer to Mandatory Parameter = Param2 offset x0B (11)
Mandatory Variable Length Parameters
Called Party Address = mandatory parameter
Parameter length = 4
Address Indicators = .....1 Address contains signalling point cc
000B SSN Indicators = .....1. Address contains subsystem number
000B Global Title Indicators = ..0000.. No global title included
000B Routing Indicators = ..1..... Route on SSN
000B Nat1/Int1 Indicators = 0..... Address is international
000C Signalling Point Code = 2.2.2(00010010 ..010000)
000E Subsystem number = 10001110 RANAP (National Network SSN)
    
```

Scripts Message Sequence Event Config Script Flow

Events Log

MAPS (Message Automation Protocol Simulation) MSC (UMTS IUCS 3GPP SCTP) - [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
2018-12-28 12:26:36.863000	SCTP Up On ConnectionId = 1005		Check_SCTP_Status.gls	ProtScriptId-40-7481902-689...
2018-12-28 12:26:36.863000	ASP UP Sent	1005	M3UA.gls	ProtScriptId-42-7483736-689...
2018-12-28 12:26:36.883000	ASP Acknowledged	1005	M3UA.gls	ProtScriptId-42-7483736-689...
2018-12-28 12:26:36.883000	AS Status Notified	1005	M3UA.gls	ProtScriptId-42-7483736-689...
2018-12-28 12:26:36.889000	ASP Active Ack Received	1005	M3UA.gls	ProtScriptId-42-7483736-689...
2018-12-28 12:26:36.899000	AS Status Notified	1005	M3UA.gls	ProtScriptId-42-7483736-689...
2018-12-28 12:26:36.899000	M3UA Up On ConnectionId = 1005		Check_SCTP_Status.gls	ProtScriptId-40-7481902-689...
2018-12-28 12:26:36.901000	Subsystem-Status-Test	1005	SCMG.gls	ProtScriptId-43-7483772-689...
2018-12-28 12:26:36.902000	Subsystem-Allowed	1005	SCMG.gls	ProtScriptId-43-7483772-689...
2018-12-28 12:26:36.916000	Subsystem-Allowed	1005	SCMG.gls	ProtScriptId-43-7483772-689...
2018-12-28 12:26:54.500000	Location Update Requested		IuCS.gls	ProtScriptId-44-7501373-689...
2018-12-28 12:26:54.500000	CC Connection Confirmed		IuCS.gls	ProtScriptId-44-7501373-689...
2018-12-28 12:26:54.501000	MM Connection Requested	IMSI:,001013014041741,T...	IuCS_Call.gls	ProtScriptId-44-7501373-689...
2018-12-28 12:26:54.501000	Authentication Requested	IMSI:,001013014041741,T...	IuCS_Call.gls	ProtScriptId-44-7501373-689...
2018-12-28 12:26:54.521000	Authentication is Successful	IMSI:,001013014041741,T...	IuCS_Call.gls	ProtScriptId-44-7501373-689...
2018-12-28 12:26:54.521000	Ciphering Requested	IMSI:,001013014041741,T...	IuCS_Call.gls	ProtScriptId-44-7501373-689...
2018-12-28 12:26:54.544000	Ciphering Complete	IMSI:,001013014041741,T...	IuCS_Call.gls	ProtScriptId-44-7501373-689...
2018-12-28 12:26:54.547000	Location Update Completed	IMSI:,001013014041741,T...	IuCS_Call.gls	ProtScriptId-44-7501373-689...
2018-12-28 12:26:54.591000	SCCP Release Initiated		IuCS.gls	ProtScriptId-44-7501373-689...
2018-12-28 12:26:57.059000	RTP Stats Query Script started		RTP Stats Display.gls	ProtScriptId-41-7483513-689...

Save Events

Clear Capture Events to file

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

Bulk Call Generation using CSV Profiles

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

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr...	Script Name	Profile	Call Info	Script Execution	Status	Events	Eve...	Result	Total Iterat...	Completed Iter...
1	IuCS_Call.gls	MSPProfile0001	IMSI: 45080301404316	Start	SCCP Connection Released	None		Fal	10	10
2	IuCS_Call.gls	MSPProfile0002	IMSI: 45080301404316	Start	SCCP Connection Released	None		Fal	10	10
3	IuCS_Call.gls	MSPProfile0003	IMSI: 45080301404317	Start	SCCP Connection Released	None		Fal	10	10
4	IuCS_Call.gls	MSPProfile0004	IMSI: 45080301404318	Start	SCCP Connection Released	None		Fal	10	10
5	IuCS_Call.gls	MSPProfile0005	IMSI: 45080301404318	Start	SCCP Connection Released	None		Fal	10	10
6	IuCS_Call.gls	MSPProfile0006	IMSI: 45080301404318	Start	SCCP Connection Released	None		Fal	10	10
7	IuCS_Call.gls	MSPProfile0007	IMSI: 45080301404318	Start	SCCP Connection Released	None		Fal	10	10
8	IuCS_Call.gls	MSPProfile0008	IMSI: 45080301404319	Stop	SCCP Connection Released			Fal	10	9
9	IuCS_Call.gls	MSPProfile0009	IMSI: 45080301404319	Start	SCCP Connection Released	None		Fal	10	10

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

Save Column Width Show Latest

RNC MSC

```

InitialUE Message, CM SERVICE REQUEST 12:11:58.066000
CC connection confirm 12:11:58.084000
DirectTransfer, CM SERVICE REJECT 12:11:58.084000
Iu-ReleaseCommand 12:11:58.084000
Iu-ReleaseComplete 12:11:58.085000
RLSD released 12:11:58.103000
RLC release complete 12:11:58.104000
                    
```

Find

```

***** MTP3 User Adaptation Layer *****
0000 Version = 00000001 Release
0002 Message Class = 00000001 Transfer
0003 Transfer Message Type = 00000001 Payload
0004 Message Length = 116 (x00000074)
Protocol Data =
0008 Tag = x0210 Transfer Pr
000A Length = 108 (x006C)
Originating Point Code =
000E Point Code = 1.1.2(..001000 00
Destination Point Code =
0012 Point Code = 2.2.2(..010000 00
0014 Service Indicator = ....0011 SCCP
0015 Network Indicator = .....10 National
0016 Message Priority = .....01 Priority
0017 Signalling Link Selection = 1 (x01)
                    
```

Scripts Message Sequence Event Config Script Flow Capture Events

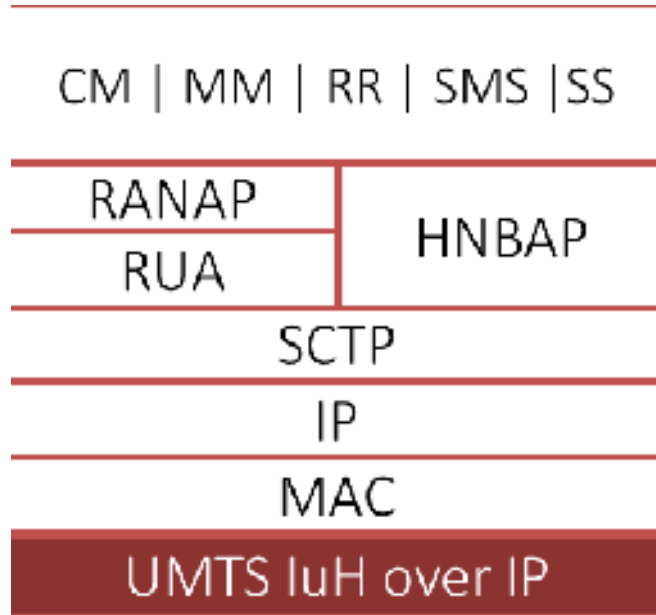
● Initialisation Errors ● Error Events ● Captured Errors ● Link Status Up=1 Down:

MAPS™ UMTS for IuH Interfaces

Key Features of IuH Network

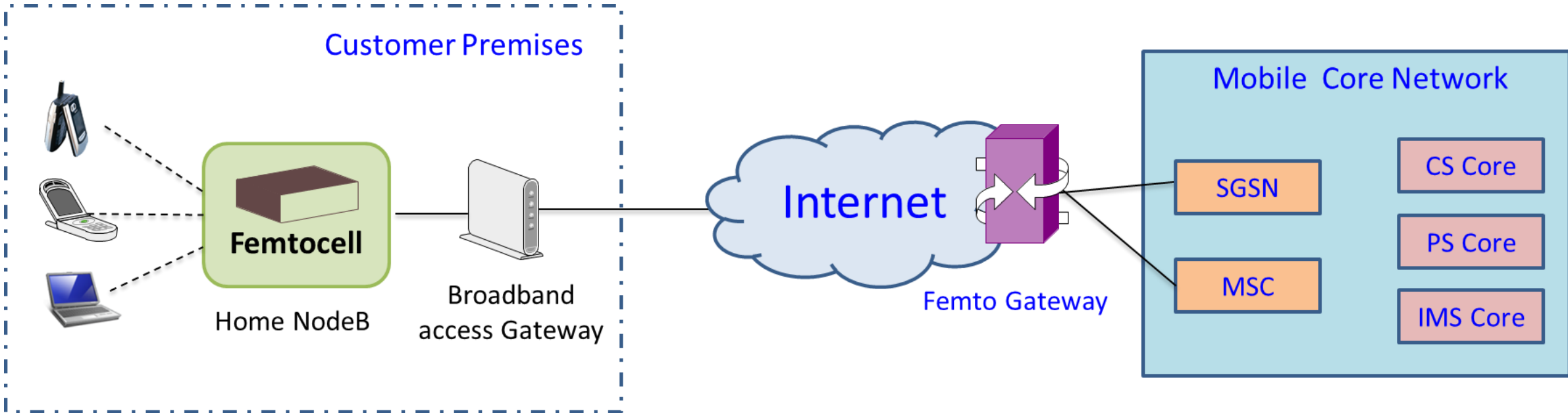
- Simulates RNC, MSC, Home NodeB (HnB) and Home NodeB Gateway (HN GW) entities
- Transmitting Voice Files
- Transmitting DTMF, MF Digits and other Tones and Dual Tones
- Recording Voice Files
- Monitoring Single and Dual Tones, DTMF, and MF digits
- Loopback, Talk using Microphone, Play to Speaker

UMTS IuH Protocol Stack

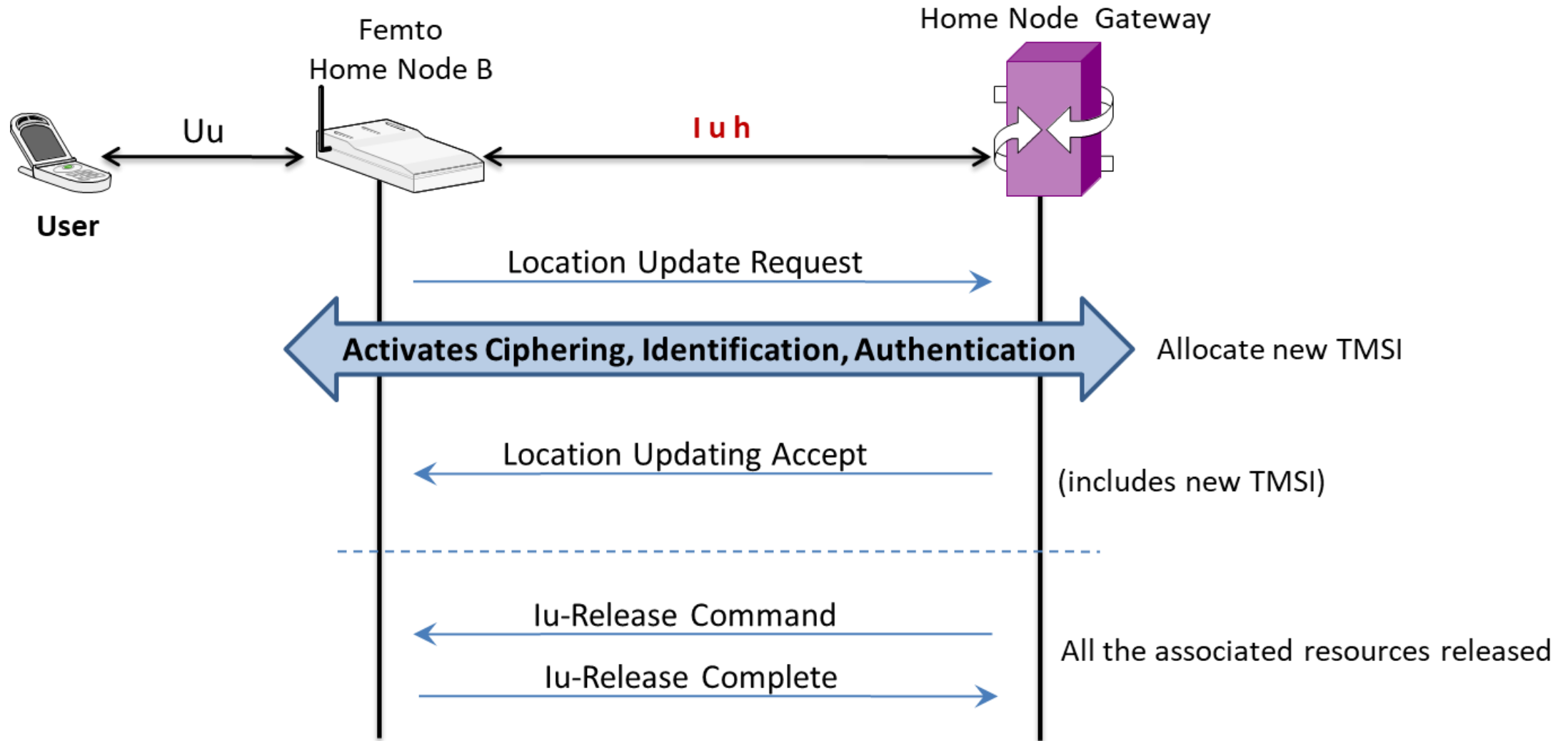


Supported Protocols	Specification Used
IuH Interface	
RUA	3GPP TS 25468 V9.1.0
RANAP	3GPP TS 25.413 V9.1.0
MM / CC	3GPP TS 04.08 V7.17.0
RR	3GPP TS 04.18 V8.13.0
SMS	3GPP TS 03.40 V7.5.0 & 3GPP TS 04.11 V7.1.0 GSM 03.38 version 7.2.0 Release 1998
SCTP	RFC 4960
HNBAP Home Node B (HNB) Application Part	Release 9 - 3GPP TS 25.469 V9.1.0 (2010-03) Release 12 - 3GPP TS 25.469 V12.2.0 (2014-09) (Release 12)

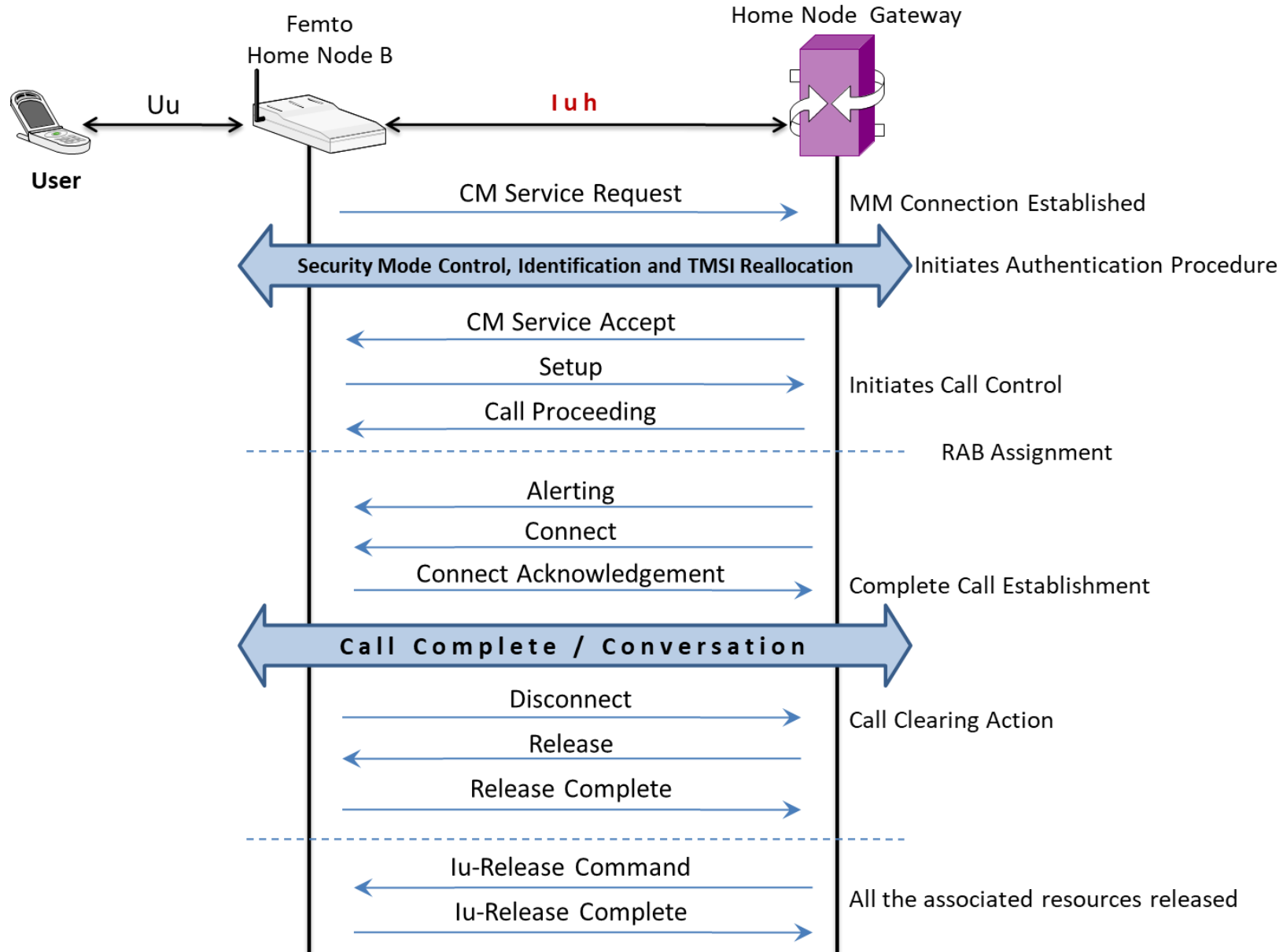
Femtocells Overview



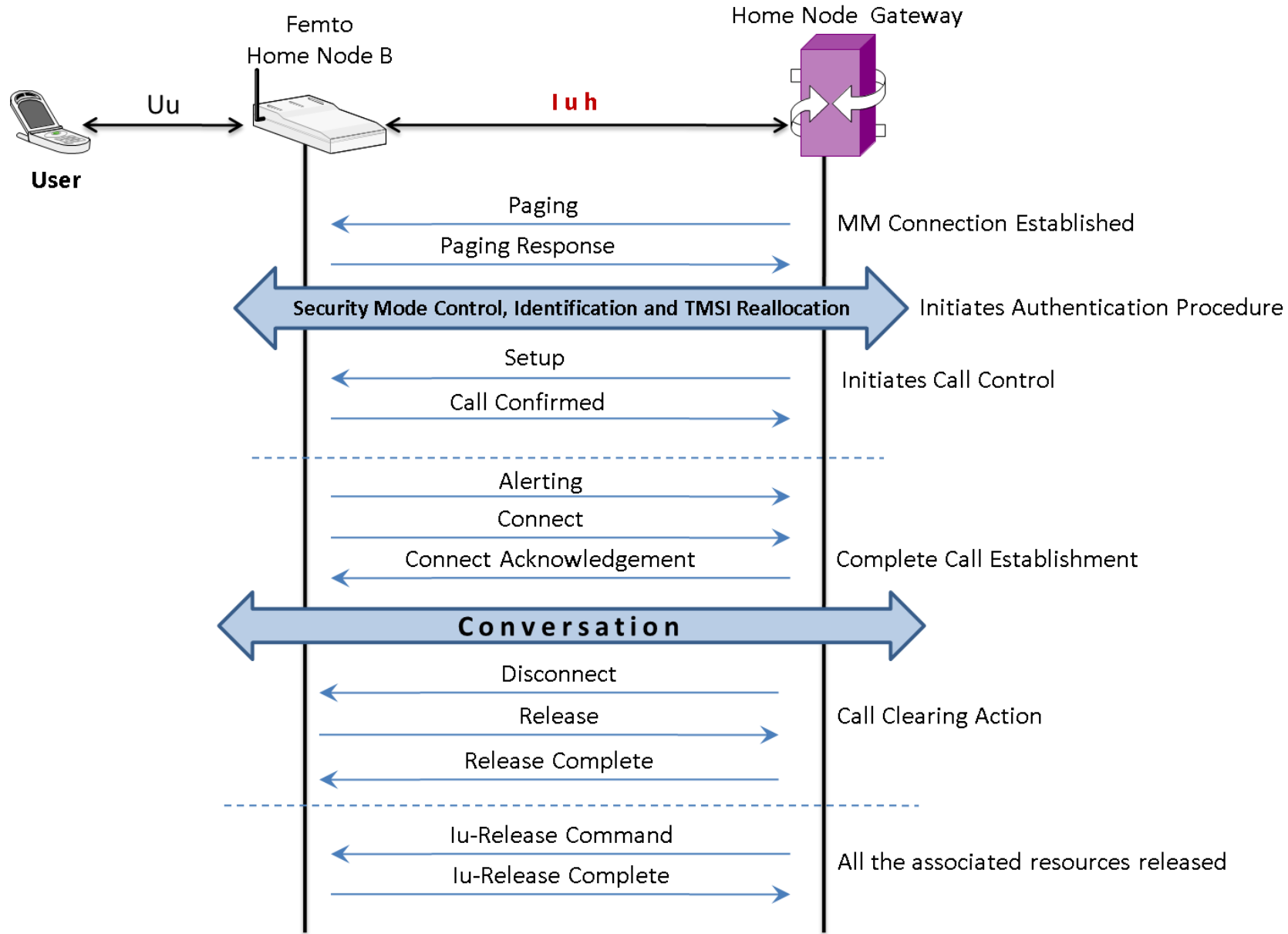
Location Update Call over IuH IP



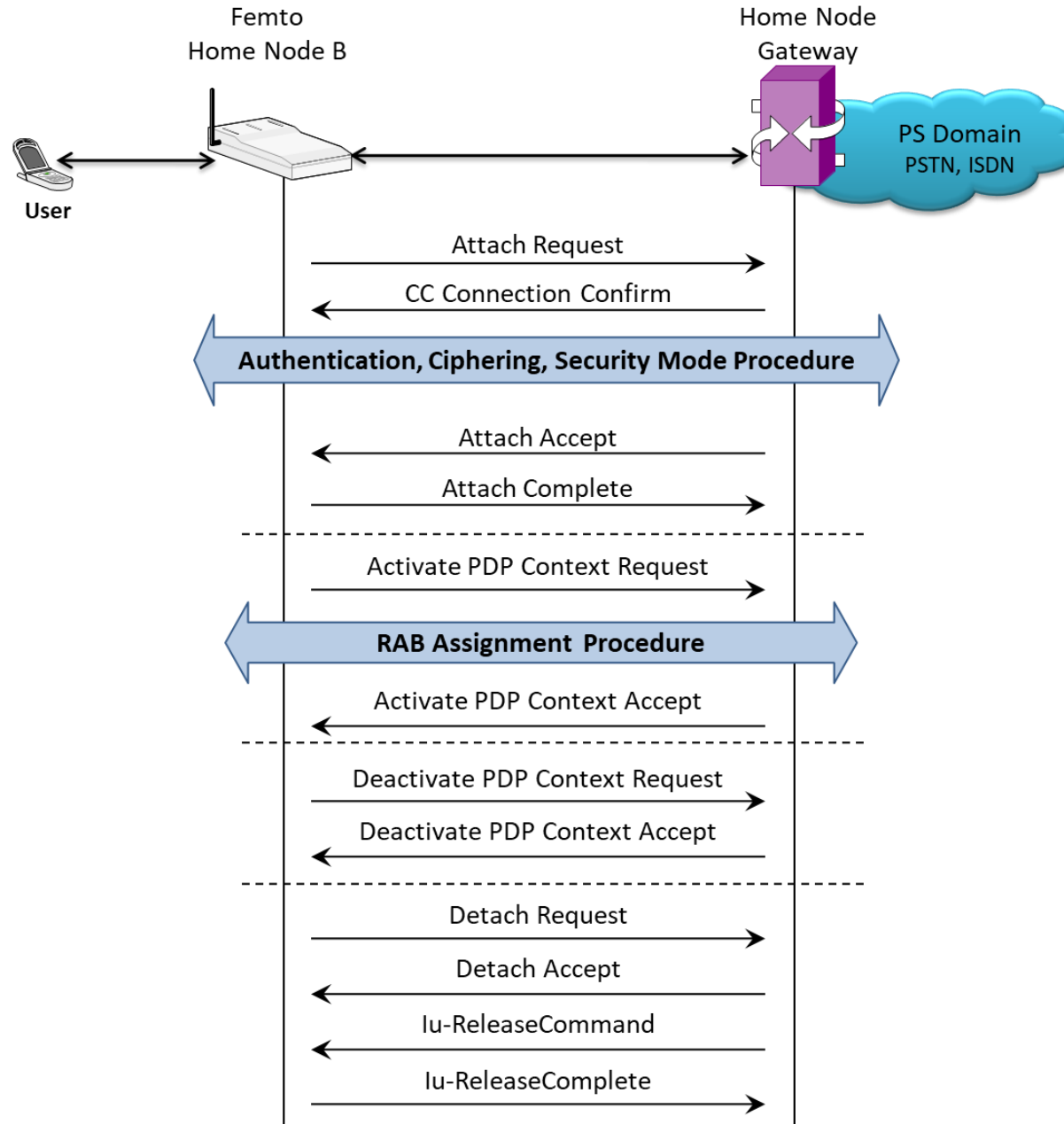
Mobile Originating Call over IuH IP



Mobile Terminating Call over IuH IP



PS Domain IuH Call Procedure



IuH over IP Testbed Configuration

Config

Config	Value
Enable RTP Simulation	Enable
RTP Hardware Interface Type	PC NIC
SCTP Mode	client
HNB	1
HNB 1	
HNB IP Address	192.168.31.46
MGW IP Address	192.168.31.46
HNB GTP IP Address	192.168.31.48
GTP Port For Traffic	2152
HNB Port	29169
HNB Identity	90170886740421@GLHNB.com
HNB ID	00000001
PLMN Identifiers	
Mobile Country Code	001
Mobile Network Code	01
Location Area Identifiers	
Location Area Code	0001
Service Area Code	0001
Routing Area Code	0001
RNCID	1
Cell Identity	00000010
HNBGW Parameters	
HNBGW IP Address	192.168.31.47
HNBGW Port	29169
Packet Switched Userplane Configuration	
Adapter Index	3
Enable or Disable GTP Traffic	Enabled
GTP TrafficType	MobileTraffic
HD RTP Media Configuration	
RTP Cores	2
RTP Cores 1	
RTP Port Index	Port_0::4x1G Adapter
RTP Media IP Address	192.168.12.243
Default Gateway Configuration	
RTP Cores 2	
RTP Port Index	Port_1::4x1G Adapter
RTP Media IP Address	192.168.12.244
Default Gateway Configuration	
Subnet Mask	255.255.255.0
Gateway IP Address	192.168.12.1
End User Configurations	MS_Profiles.xml
CSV File Name	MS_Profiles_IMSI.CSV
Enable SMS Ratio For CSV	False
Ratio of SMS Calls	50

_EnableRTP
Select Option
Enable

Start Edit

Initialisation Errors Error Events Captured Errors

IuH over IP Profile Configuration

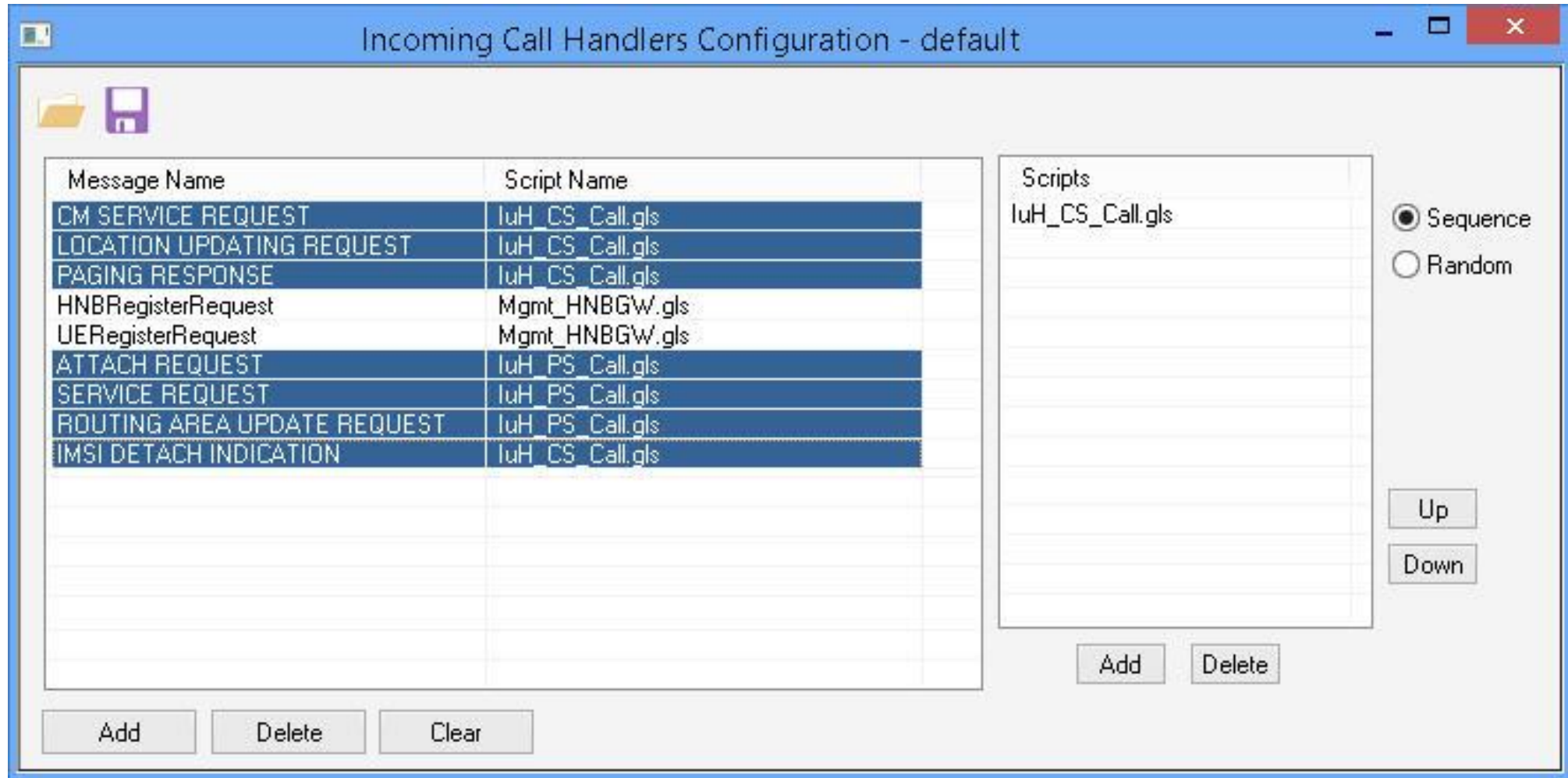
MAPS (Message Automation Protocol Simulation) HNB (UMTS IuH 3GPP) - [Profile Editor - MS_Profiles]

Config

#	Profiles (Edk-F2)	Config	Value	Enable
1	MSProfile0001	MSProfile0001		<input checked="" type="checkbox"/>
2	MSProfile0002	CM Service Type	Mobile Originating Call Establishment	
3	MSProfile0003	Location Update Type	Normal location updating	
4	MSProfile0004	Mobile ID		
5	MSProfile0005	Type Of Identity	IMSI	
6	MSProfile0006	IMEI	867802029630010	
7	MSProfile0007	IMEISV	3500775232370011	
8	MSProfile0008	IMSI	001013014041741	
9	MSProfile0009	TMSI	11111001	
10	MSProfile0010	MSISDN		
11	MSProfile0011	Called Number	3014041791	
12	MSProfile0012	Calling Number	3014041741	
13	MSProfile0013	Location Area Identifiers		
14	MSProfile0014	Location Area Code	0001	
15	MSProfile0015	Service Area Code	0001	
16	MSProfile0016	RAC	0001	
17	MSProfile0017	RNC ID	1	
18	MSProfile0018	Authentication Parameters		
19	MSProfile0019	Key	0123456789abcdef0123456789abcdef	
20	MSProfile0020	Operator Variant Parameter Type	OP	
21	MSProfile0021	OP	01020304050607080910111213141516	
22	MSProfile0022	OPc	01020304050607080910111213141516	
23	MSProfile0023	Authentication Algorithm Type	Xor	
24	MSProfile0024	Authentication Failure Parameters		
25	MSProfile0025	False Key	44444444444444444444444444444444	
26	MSProfile0026	PDP Context Parameters		
27	MSProfile0027	NSAPI	9	
28	MSProfile0028	Access Point Name	apnbasic.epg	
29	MSProfile0029	SMS Call Parameters		
30	MSProfile0030	SMS Character Set	UCS2(16 bit)	
31	MSProfile0031	SMS Data for Default and 8 Bit Data	Test SMS @0001	
32	MSProfile0032	SMS Data for UCS2	0054006500730074002000530040053002000...	
33	MSProfile0033	Destination SC	885643722311	
34	MSProfile0034	Codec Options and Traffic Configuration		
35	MSProfile0035	Codec Options	PCMU	
36	MSProfile0036	Packetization Time in msec	20	
37	MSProfile0037	Traffic Config		
38	MSProfile0038	Traffic Type	Auto Traffic File	
39	MSProfile0039	Traffic Direction	TxRx	
40	MSProfile0040	Traffic Profile Name	Profile0001	
41	MSProfile0041	Impairment Type	None	
42	MSProfile0042	DTMF Parameters		
43	MSProfile0043	Send Digits on Call Connect	Enable	
44	MSProfile0044	Digits	5	
45	MSProfile0045	Digits 1		
46	MSProfile0046	Digit	0	
47	MSProfile0047	On Duration in msec	100	
48	MSProfile0048	Digits 2		
49	MSProfile0049	Digit	#	
50	MSProfile0050	On Duration in msec	100	
51	MSProfile0051	Digits 3		
52	MSProfile0052	Digit	1	
53	MSProfile0053	On Duration in msec	100	
54	MSProfile0054	Digits 4		
		Digit	A	
		On Duration in msec	100	
		Digits 5		
		Digit	*	
		On Duration in msec	100	
		PS Domain Traffic Configurations		
		Mobile Traffic Parameters		
		Udp Src Port	2152	
		Udp Dst Port	2152	
		HTTP Server IP Address	192.168.12.233	
		TCP port for HTTP	80	
		TCP Connection Identifier	1	
		Transmission Type	Once	
		Start File Count	1	
		Traffic File Name	img5a.flixcart.com	
		File Count For Concurrent Or Sequen...	3	
		TxFile For Once Transmission From L...	1	
		Iteration Count	1	

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

luH over IP Incoming Call Handler Configuration



The screenshot shows a window titled "Incoming Call Handlers Configuration - default". It contains a table with two columns: "Message Name" and "Script Name". The table lists various messages and their corresponding scripts. To the right of the table is a "Scripts" list containing "luH_CS_Call.gls". Below the "Scripts" list are radio buttons for "Sequence" (selected) and "Random". There are also "Up" and "Down" buttons for reordering. At the bottom of the window are "Add", "Delete", and "Clear" buttons.

Message Name	Script Name
CM SERVICE REQUEST	luH_CS_Call.gls
LOCATION UPDATING REQUEST	luH_CS_Call.gls
PAGING RESPONSE	luH_CS_Call.gls
HNBRegisterRequest	Mgmt_HNBGW.gls
UERRegisterRequest	Mgmt_HNBGW.gls
ATTACH REQUEST	luH_PS_Call.gls
SERVICE REQUEST	luH_PS_Call.gls
ROUTING AREA UPDATE REQUEST	luH_PS_Call.gls
IMSI DETACH INDICATION	luH_CS_Call.gls

Scripts

- luH_CS_Call.gls

Sequence
 Random

Up
Down

Add Delete

Add Delete Clear

LuH over IP Call Generation

Active Calls **Call Status** **Call Events**

Loading Scripts and Profiles

Sr ...	Script Name	Profile	Call Info	Script Execution	Status	Events	Even...	Result	Total Iterations	Completer
1	IuH_CS_Call.gls	MSPProfile0001	IMSI;.00101301...	Stop	Send_File-Started	Hold		Pass	1	
2	IuH_CS_Call.gls	MSPProfile0002		Start		None		Unknown	1	
3	IuH_CS_Call.gls	MSPProfile0003		Start		None		Unknown	1	
4	IuH_CS_Call.gls	MSPProfile0004		Start		None		Unknown	1	
5	IuH_CS_Call.gls	MSPProfile0005		Start		None		Unknown	1	
6	IuH_CS_Call.gls	MSPProfile0006		Start		None		Unknown	1	
7	IuH_CS_Call.gls	MSPProfile0007		Start		None		Unknown	1	
8	IuH_CS_Call.gls	MSPProfile0008		Start		None		Unknown	1	
9	IuH_CS_Call.gls	MSPProfile0009		Start		None		Unknown	1	
10	IuH_CS_Call.gls	MSPProfile0010		Start		None		Unknown	1	
11	IuH_PS_Call.gls	MSPProfile0011	TMSI;.0x00000004	Stop	GTP-U Mobile-Traffic Started	SMSCall		Pass	1	

Message Sequence

HNB HNBGW

ATTACH REQUEST → 15:52:42.287.1144

AUTHENTICATION AND CIPHERING REQ ← 15:52:42.293.5421

GMM AUTHENTICATION AND CIPHERING RESP → 15:52:42.293.7720

Scripts **Message Sequence** Event Config Script Flow

IuH over IP Call Reception

The screenshot displays the 'Call Reception' window with a table of call records and a detailed message sequence view.

Sr...	Script Name	Profile	Call Info	Script Execution	Status	Events
1	Mgmt_HNBGW.gls		HNBD,0x00000001	Stop	HNB Register Accepted	HNBDeRegistrati...
2	GTPSessionInit.gls		0	Stop	GTP User Session Started	StopGTP Session
3	IuH_CS_Call.gls	MSPProfile0001	IMSI:,001013014041741,CalledNumber:,3014041791	Stop	Send_File-Started	Terminate
4	IuH_PS_Call.gls	MSPProfile0011	TMSI,0x00000006	Stop	GTP-U Mobile-Traffic Started	DeactivatePDPC...

Below the table, there are control buttons: Stop, Stop All, Abort, Abort All, Show Records (checked), Select Active Call, Auto Trash, and Trash.

The 'Message Sequence' view shows the following sequence of messages:

- RAB-AssignmentResponse (15:54:42.134.8667)
- ALERTING (15:54:42.135.2843)
- CONNECT (15:54:43.135.5663)
- CONNECT ACKNOWLEDGE (15:54:43.142.667)

At the bottom, there are tabs for Scripts, Message Sequence (selected), Event Config, and Script Flow.

Call Status

Message Sequence

LuH over IP Event and Traffic Log

Server Traffic Log

```
Untitled - BasicServer
File Edit View Setup Help
Connected: client #644 at 127.0.0.1
644(1): end tasks on disconnect;
644(2): run task "MobilelpCoreSrv:StartServer ";
644(3): inform task "CONFIGURE Client HTTP 0 GTP 192.168.44.50 2152 192.168.44.214 2152 ";
644(4): inform task "ADDGTPSTREAM 192.168.12.1 3 ";
644(5): inform task "ADDCONNECTION 3 1 192.168.2.160 80 192.168.12.1 img5a.flixcart.com ";
644(6): inform task "DELETEDGTPSTREAM 192.168.12.1 3 ";
Ready
```

Events Log

Date/Time	Captured Events	Call Trace Id	Script Name	Script Id
2015-7-3 10:41:46.400000	AUTN= 0xE368C71B412A80002800FBE3688E9B41	IMSI:001010123456219,TMSI:0x11111001,CalledNumber:90658	luH_CS_Call.gls	CGProtScriptId_Z_1183925924-898-5772
2015-7-3 10:41:46.400000	Authentication Parameters are...	IMSI:001010123456219,TMSI:0x11111001,CalledNumber:90658	luH_CS_Call.gls	CGProtScriptId_Z_1183925924-898-5772
2015-7-3 10:41:46.400000	RESEConst = 0x2800FBE3	IMSI:001010123456219,TMSI:0x11111001,CalledNumber:90658	luH_CS_Call.gls	CGProtScriptId_Z_1183925924-898-5772
2015-7-3 10:41:46.400000	RESExtension 0x68C71B4153830C9678102404	IMSI:001010123456219,TMSI:0x11111001,CalledNumber:90658	luH_CS_Call.gls	CGProtScriptId_Z_1183925924-898-5772
2015-7-3 10:41:46.436000	Authentication Response sent	IMSI:001010123456219,TMSI:0x00000002,CalledNumber:90658	luH_CS_Call.gls	CGProtScriptId_Z_1183925924-898-5772
2015-7-3 10:41:46.455000	TMSI Reallocated	IMSI:001010123456219,TMSI:0x00000002,CalledNumber:90658	luH_CS_Call.gls	CGProtScriptId_Z_1183925924-898-5772
2015-7-3 10:41:46.455000	MM Connection Established	IMSI:001010123456219,TMSI:0x00000002,CalledNumber:90658	luH_CS_Call.gls	CGProtScriptId_Z_1183925924-898-5772
2015-7-3 10:41:46.455000	CM service Accepted	IMSI:001010123456219,TMSI:0x00000002,CalledNumber:90658	luH_CS_Call.gls	CGProtScriptId_Z_1183925924-898-5772
2015-7-3 10:41:46.456000	Call Initiated	IMSI:001010123456219,TMSI:0x00000002,CalledNumber:90658	luH_CS_Call.gls	CGProtScriptId_Z_1183925924-898-5772
2015-7-3 10:41:46.479000	RAB Assignment Requested	IMSI:001010123456219,TMSI:0x00000002,CalledNumber:90658	luH_CS_Call.gls	CGProtScriptId_Z_1183925924-898-5772
2015-7-3 10:41:46.480000	RAB Assignment Complete	IMSI:001010123456219,TMSI:0x00000002,CalledNumber:90658	luH_CS_Call.gls	CGProtScriptId_Z_1183925924-898-5772
2015-7-3 10:41:46.494000	Alerting Sent	IMSI:001010123456219,TMSI:0x00000002,CalledNumber:90658	luH_CS_Call.gls	CGProtScriptId_Z_1183925924-898-5772
2015-7-3 10:41:47.516000	Call Connected	IMSI:001010123456219,TMSI:0x00000002,CalledNumber:90658	luH_CS_Call.gls	CGProtScriptId_Z_1183925924-898-5772
2015-7-3 10:42:27.555000	Call Terminated	IMSI:001010123456219,TMSI:0x00000002,CalledNumber:90658	luH_CS_Call.gls	CGProtScriptId_Z_1183925924-898-5772
2015-7-3 10:42:27.572000	lu Connection Released	IMSI:001010123456219,TMSI:0x00000002,CalledNumber:90658	luH_CS_Call.gls	CGProtScriptId_Z_1183925924-898-5772
2015-7-3 10:53:04.559000	ContextID=50001		luH_PS.gls	CGProtScriptId_8_1184606042-900-5772
2015-7-3 10:53:04.858000	Identification Completed	TMSI:0x00000002	luH_PS_Call.gls	CGProtScriptId_8_1184606042-900-5772
2015-7-3 10:53:04.908000	Attach Accepted, GMM Registered	TMSI:0x00000002	luH_PS_Call.gls	CGProtScriptId_8_1184606042-900-5772
2015-7-3 10:53:04.924000	TMSI Reallocation Completed	TMSI:0x00000002	luH_PS_Call.gls	CGProtScriptId_8_1184606042-900-5772
2015-7-3 10:53:05.042000	RAB Assignment Complete	TMSI:0x00000002	luH_PS_Call.gls	CGProtScriptId_8_1184606042-900-5772
2015-7-3 10:53:05.065000	PDP Context Accepted	TMSI:0x00000002	luH_PS_Call.gls	CGProtScriptId_8_1184606042-900-5772
2015-7-3 10:53:05.067000	FileName = img5a.flixcart.com	TMSI:0x00000002	luH_PS_Call.gls	CGProtScriptId_8_1184606042-900-5772
2015-7-3 10:53:05.068000	Activate PDP Context Accepted	TMSI:0x00000002	luH_PS_Call.gls	CGProtScriptId_8_1184606042-900-5772
2015-7-3 10:53:23.910000	GTPTEID 3 MICConnectionID 1 EventType TrafficStarted=	TMSI:0x00000002	luH_PS_Call.gls	CGProtScriptId_8_1184606042-900-5772
2015-7-3 10:54:05.081000	Deactivate PDP Context Requested	TMSI:0x00000002	luH_PS_Call.gls	CGProtScriptId_8_1184606042-900-5772
2015-7-3 10:54:05.097000	RAB Released	TMSI:0x00000002	luH_PS_Call.gls	CGProtScriptId_8_1184606042-900-5772
2015-7-3 10:54:05.118000	Deactivate PDP Context Accepted	001010123456219	luH_PS.gls	CGProtScriptId_8_1184606042-900-5772
2015-7-3 10:54:05.240000	Detach Initiated	TMSI:0x00000002	luH_PS_Call.gls	CGProtScriptId_8_1184606042-900-5772
2015-7-3 10:54:05.256000	Detach Completed, GMM Context Released	TMSI:0x00000002	luH_PS_Call.gls	CGProtScriptId_8_1184606042-900-5772
2015-7-3 10:54:05.257000	lu Release Complete	TMSI:0x00000002	luH_PS_Call.gls	CGProtScriptId_8_1184606042-900-5772

High Density (HD) RTP Traffic Simulation



- Rackmount network appliance with 4x1GigE NIC
- Transport over UDP and TCP, IPv4 and IPv6, and TLS for secure transport
- Easily achieve up to 20,000 endpoints per appliance (5000 per port)
- Up to 350 calls per second (with RTP traffic)
- Scales to around 100,000 to 200,000 endpoints with use of Master Controller for single point of control
- Manage 10+ MAPS™ systems with single point of control from Master Controller

Bulk Call Generation using XML profiles

The screenshot displays the MAPS (Message Automation Protocol Simulation) HNB (UMTS IuH 3GPP) interface. The main window shows a table of call generation profiles with columns for Sr No, Script Name, Profile, Call Info, Script Execution, Status, Events, Ev..., Result, Total Iterations, and Completed Iterations. Below the table are control buttons for Add, Delete, Insert, Refresh, Start, Start All, Stop, Stop All, Abort, and Abort All. A checkbox for 'View Executing Line' is present. The 'Script Contents' section shows the following code:

```
//Initialize Variables
ReportEvent (Script = "Started");
CallDurationTimeOut=$_CallDuration;
InterCallDurationTimeOut=$_InterCallDuration;
AnswerCallTimeOut=$_CallAnswerTime;
IuHScriptId="IuH";
ScriptIdCounter = 0;
RtpSessionState = "Null";
AppendInAscii (IuHScriptId,ScriptIdCounter);
ProtocolStandard="IuH";
IuHMMState = "IDLE";
RUADisconnectSent = 0;

IMSIStr="IMSI:";
TMSIStr="TMSI:";
```

The bottom status bar shows 'Error Events', 'Captured Errors', and 'Link Status Up=1 Down=0'.

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Ev...	Result	Total Iterations	Completed Iterations
1	IuH_CS_Call.gls	MSPProfile0001		Start		None		Unknown	10	0
2	IuH_CS_Call.gls	MSPProfile0002		Start		None		Unknown	10	0
3	IuH_CS_Call.gls	MSPProfile0003		Start		None		Unknown	10	0
4	IuH_CS_Call.gls	MSPProfile0004		Start		None		Unknown	10	0
5	IuH_CS_Call.gls	MSPProfile0005		Start		None		Unknown	10	0
6	IuH_CS_Call.gls	MSPProfile0006		Start		None		Unknown	10	0
7	IuH_CS_Call.gls	MSPProfile0007		Start		None		Unknown	10	0
8	IuH_CS_Call.gls	MSPProfile0008		Start		None		Unknown	10	0
9	IuH_CS_Call.gls	MSPProfile0009		Start		None		Unknown	10	0
10	IuH_CS_Call.gls	MSPProfile0010		Start		None		Unknown	10	0

Bulk Call Generation using CSV Profiles

MAPS (Message Automation Protocol Simulation) HNB (UMTS IuH 3GPP) - [Call Generation - CSV_config]

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Even...	Result	Total Iterations	Completed Iterations
1	IuH_CS_Call.gls		IMSI:,1013014041801,TMSI:,0x11110061,CalledNumber:,3...	Stop	Send_File-Started	Hold		Pass	1	0
2	IuH_CS_Call.gls		IMSI:,1013014041802,TMSI:,0x11110062,CalledNumber:,3...	Stop	Send_File-Started	Hold		Pass	1	0
3	IuH_CS_Call.gls		IMSI:,1013014041803,TMSI:,0x11110063,CalledNumber:,3...	Stop	Send_File-Started	Hold		Pass	1	0
4	IuH_CS_Call.gls		IMSI:,1013014041804,TMSI:,0x11110064,CalledNumber:,3...	Stop	Send_File-Started	Hold		Pass	1	0
5	IuH_CS_Call.gls		IMSI:,1013014041805,TMSI:,0x11110065,CalledNumber:,3...	Stop	Send_File-Started	Hold		Pass	1	0
6	IuH_CS_Call.gls		IMSI:,1013014041806,TMSI:,0x11110066,CalledNumber:,3...	Stop	Send_File-Started	Hold		Pass	1	0
7	IuH_CS_Call.gls		IMSI:,1013014041807,TMSI:,0x11110067,CalledNumber:,3...	Stop	Send_File-Started	Hold		Pass	1	0
8	IuH_CS_Call.gls		IMSI:,1013014041808,TMSI:,0x11110068,CalledNumber:,3...	Stop	Send_File-Started	Hold		Pass	1	0
9	IuH_CS_Call.gls		IMSI:,1013014041809,TMSI:,0x11110069,CalledNumber:,3...	Stop	Send_File-Started	Hold		Pass	1	0
10	IuH_CS_Call.gls		IMSI:,1013014041810,TMSI:,0x11110070,CalledNumber:,3...	Stop	Send_File-Started	Hold		Pass	1	0

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

Save Column Width Show Latest

HNB HNBGW

CM SERVICE REQUEST 15:17:37.228000

AUTHENTICATION REQUEST 15:17:37.263000

AUTHENTICATION RESPONSE 15:17:37.263000

SecurityModeCommand 15:17:37.285000

SecurityModeComplete 15:17:37.285000

CM SERVICE ACCEPT 15:17:37.301000

SETUP 15:17:37.301000

Find

```

===== RUA Layer =====
RUA PDU = CHOICE
Extensibility Marker = 0
Procedure Code = INTEGER
Contents = 1 id-Connect
Criticality = ENUMERATOR
Contents = 0 reject(0)
Value = Open Type
Length = 101
Extensibility Marker = 0
Preamble = 0
ProtocolIE-Container = SEQUENCE OF
Iteration Count = 5
ProtocolIE-Container = Instance 0
ProtocolIE-ID = INTEGER
Contents = 7 id-CN-DomainIndicator
                    
```

Scripts Message Sequence Event Config Script Flow

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

Bulk Call Reception using CSV Profiles

MAPS (Message Automation Protocol Simulation) HNB GateWay (UMTS IuH 3GPP) - [Call Reception]

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events ...	Results
1	Mgmt_HNBGW.gls		HNBID:0x00000001	Stop		HNBDeregistration		Pass
2	IuH_CS_Call.gls		IMSI:,1013014041786,CalledNumber:,3014051786	Stop	Send_File-Started	Terminate		Pass
3	IuH_CS_Call.gls		IMSI:,1013014041787,CalledNumber:,3014051787	Stop	Send_File-Started	Terminate		Pass
4	IuH_CS_Call.gls		IMSI:,1013014041788,CalledNumber:,3014051788	Stop	Send_File-Started	Terminate		Pass
5	IuH_CS_Call.gls		IMSI:,1013014041789,CalledNumber:,3014051789	Stop	Send_File-Started	Terminate		Pass
6	IuH_CS_Call.gls		IMSI:,1013014041790,CalledNumber:,3014051790	Stop	Send_File-Started	Terminate		Pass
7	IuH_CS_Call.gls		IMSI:,1013014041791,CalledNumber:,3014051791	Stop	Send_File-Started	Terminate		Pass
8	IuH_CS_Call.gls		IMSI:,1013014041792,CalledNumber:,3014051792	Stop	Send_File-Started	Terminate		Pass
9	IuH_CS_Call.gls		IMSI:,1013014041793,CalledNumber:,3014051793	Stop	Send_File-Started	Terminate		Pass
10	IuH_CS_Call.gls		IMSI:,1013014041794,CalledNumber:,3014051794	Stop	Send_File-Started	Terminate		Pass

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

Save Column Width Show Latest

HNB HNBGW

```

CM SERVICE REQUEST → 15:16:34.096000
AUTHENTICATION REQUEST ← 15:16:34.097000
AUTHENTICATION RESPONSE → 15:16:34.114000
SecurityModeCommand ← 15:16:34.114000
SecurityModeComplete → 15:16:34.128000
CM SERVICE ACCEPT ← 15:16:34.128000
SETUP → 15:16:34.142000
CALL PROCEEDING ← 15:16:34.142000
        
```

Find

```

===== RUA Layer =====
RUA PDU = CHOICE
Extensibility Marker = 0
Procedure Code = INTEGER
Contents = 1 id-Connect
Criticality = ENUMERATOR
Contents = 0 reject(0)
Value = Open Type
Length = 101
Extensibility Marker = 0
Preamble = 0
ProtocolIE-Container = SEQUENCE OF
Iteration Count = 5
ProtocolIE-Container = Instance 0
ProtocolIE-ID = INTEGER
Contents = 7 id-CN-DomainIndicator
Criticality = ENUMERATOR
Contents = 0 reject(0)
Value = Open Type
        
```

Scripts Message Sequence Event Config Script Flow

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

Message Statistics

GL MAPS (Message Automation Protocol Simulation) MSC (UMTS IUCS 3GPP SCTP) - [Statistics]

Configurations Emulator Reports Editor Debug Tools Windows Help

Call Stats Message Stats

Message Type	Tx Count	Rx Count	Retransmit Count
ALERTING	10003	0	0
ASP Active	0	1	0
ASP Active Acknowledgement	1	0	0
ASP Up	0	1	0
ASP Up Acknowledgement	1	0	0
AUTHENTICATION REQUEST	10006	0	0
AUTHENTICATION RESPONSE	0	10006	0
CALL PROCEEDING	10003	0	0
CC connection confirm	10006	0	0
CM SERVICE REQUEST	0	10003	0
CONNECT	10003	0	0
CONNECT ACKNOWLEDGE	0	10003	0
DISCONNECT	2	8001	0
IDENTITY REQUEST	3	0	0
IDENTITY RESPONSE	0	3	0
IT Inactivity test	9998	9998	0
Iu-ReleaseCommand	8006	0	0
Iu-ReleaseComplete	0	8006	0
LOCATION UPDATING ACCEPT	3	0	0
LOCATION UPDATING REQUEST	0	3	0
Notify	2	0	0
RAB-AssignmentRequest	10003	0	0
RAB-AssignmentResponse	0	10003	0
RELEASE	8001	2	0
RELEASE COMPLETE	2	8001	0
RLC release complete	0	8006	0
RLSD released	8006	0	0
SETUP	0	10003	0
SSA subsystem-allowed	1	0	0
SST subsystem-status-test	0	1	0
SecurityModeCommand	10006	0	0
SecurityModeComplete	0	10006	0
TMSI REALLOCATION COMPLETE	0	3	0

Customizations - Statistics and Reports

MOS, R-Factor

Packet Loss

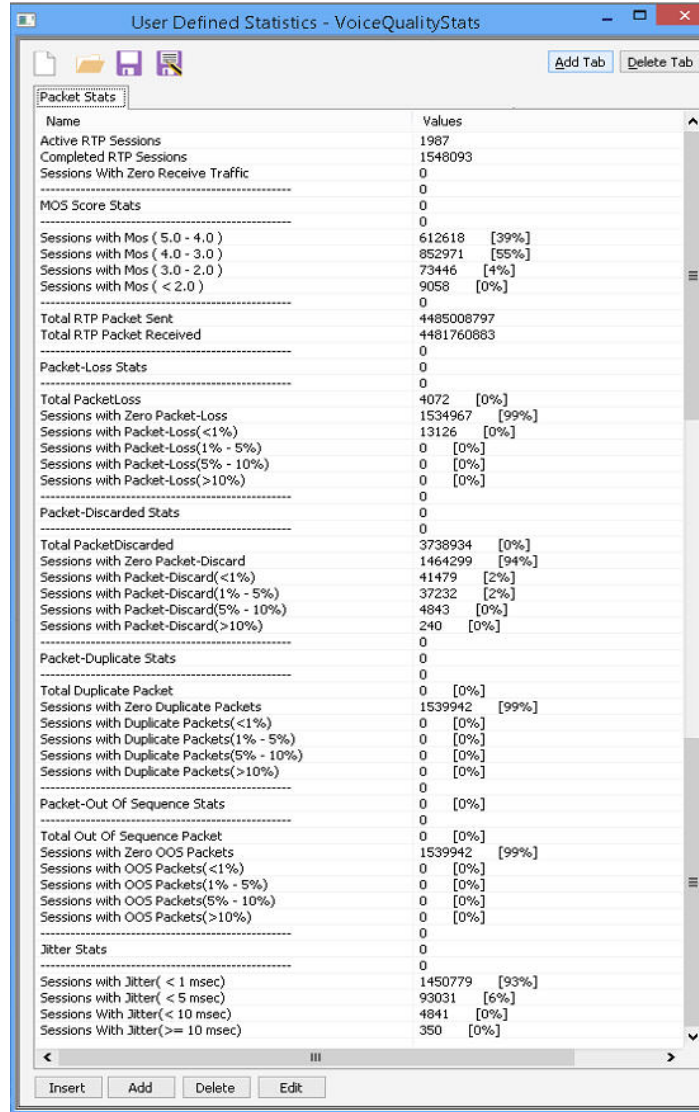
Packets Discarded

Duplicate Packets

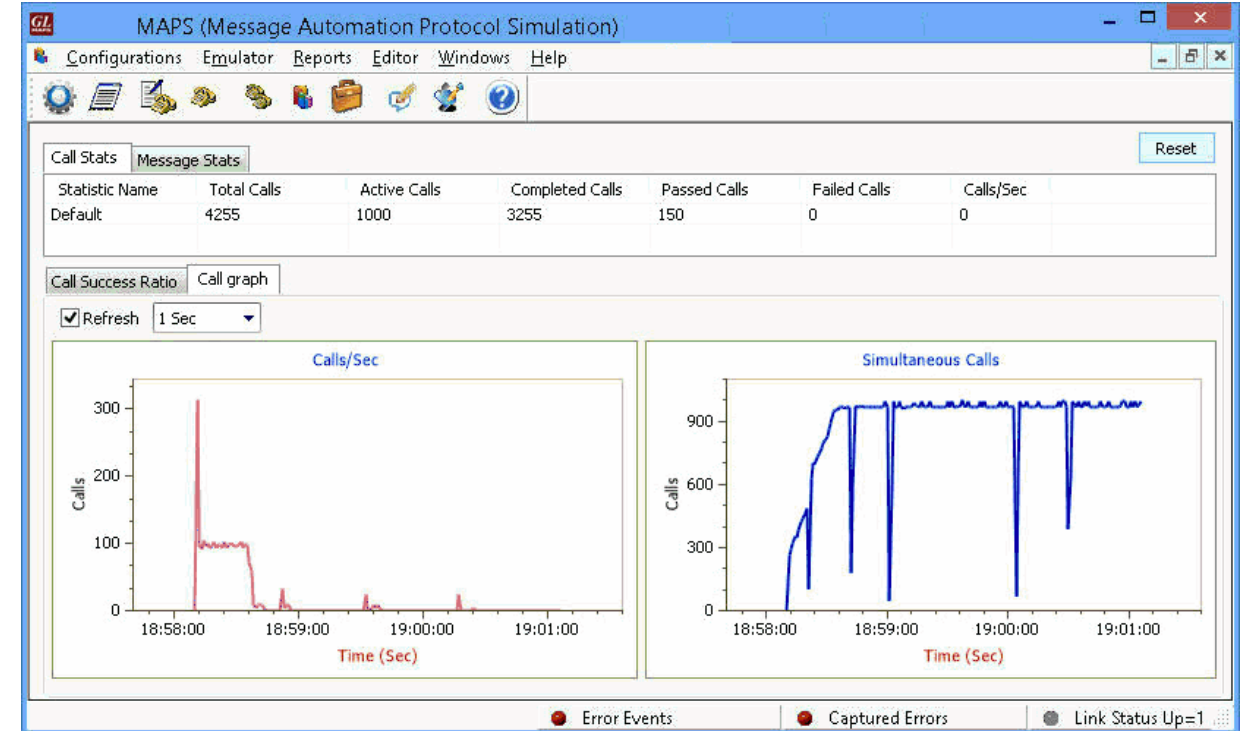
Out-Of-Sequence

Packets

Jitter Statistics

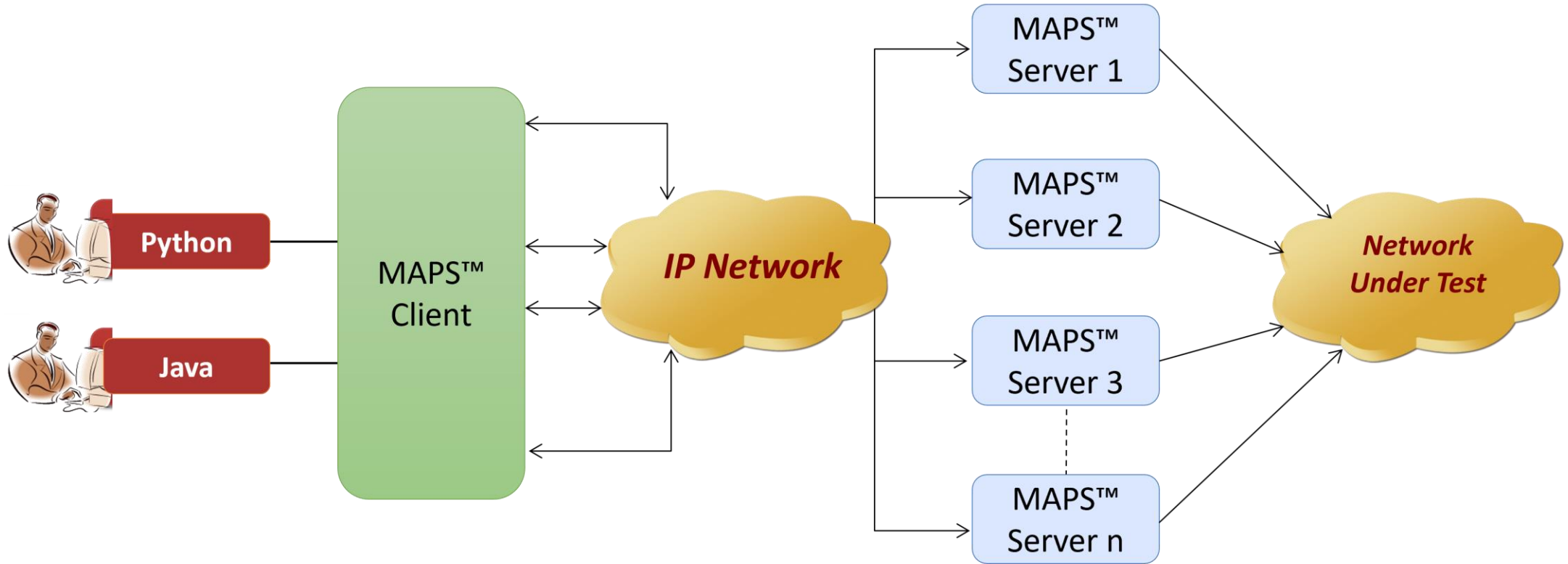


Name	Values
Active RTP Sessions	1987
Completed RTP Sessions	1548093
Sessions With Zero Receive Traffic	0
MOS Score Stats	0
Sessions with Mos (5.0 - 4.0)	612618 [39%]
Sessions with Mos (4.0 - 3.0)	952971 [55%]
Sessions with Mos (3.0 - 2.0)	73446 [4%]
Sessions with Mos (< 2.0)	9058 [0%]
Total RTP Packet Sent	4485008797
Total RTP Packet Received	4481760883
Packet-Loss Stats	0
Total PacketLoss	4072 [0%]
Sessions with Zero Packet-Loss	1534967 [99%]
Sessions with Packet-Loss(<1%)	13126 [0%]
Sessions with Packet-Loss(1% - 5%)	0 [0%]
Sessions with Packet-Loss(5% - 10%)	0 [0%]
Sessions with Packet-Loss(>10%)	0 [0%]
Packet-Discarded Stats	0
Total PacketDiscarded	3738934 [0%]
Sessions with Zero Packet-Discard	1464299 [94%]
Sessions with Packet-Discard(<1%)	41479 [2%]
Sessions with Packet-Discard(1% - 5%)	37232 [2%]
Sessions with Packet-Discard(5% - 10%)	4843 [0%]
Sessions with Packet-Discard(>10%)	240 [0%]
Packet-Duplicate Stats	0
Total Duplicate Packet	0 [0%]
Sessions with Zero Duplicate Packets	1539942 [99%]
Sessions with Duplicate Packets(<1%)	0 [0%]
Sessions with Duplicate Packets(1% - 5%)	0 [0%]
Sessions with Duplicate Packets(5% - 10%)	0 [0%]
Sessions with Duplicate Packets(>10%)	0 [0%]
Packet-Out Of Sequence Stats	0
Total Out Of Sequence Packet	0 [0%]
Sessions with Zero OOS Packets	1539942 [99%]
Sessions with OOS Packets(<1%)	0 [0%]
Sessions with OOS Packets(1% - 5%)	0 [0%]
Sessions with OOS Packets(5% - 10%)	0 [0%]
Sessions with OOS Packets(>10%)	0 [0%]
Jitter Stats	0
Sessions with Jitter(< 1 msec.)	1450779 [93%]
Sessions with Jitter(< 5 msec.)	93031 [6%]
Sessions With Jitter(< 10 msec.)	4841 [0%]
Sessions With Jitter(>= 10 msec.)	350 [0%]



Call Stats provide a running tabular log of system level stats, tracked stats include: Total Calls, Active Calls, Completed Calls, Passed Calls, Failed Calls, Instantaneous Calls/Sec

MAPS™ API Architecture



- API wraps our proprietary scripting language in standard languages familiar to the user:
 - Python
 - Java
- Clients and Servers support a “Many-to-Many” relationship, making it very easy for users to develop complex test cases involving multiple signaling protocols

APIs High Level vs Low Level

- The API is broken into High and Low level function calls / scripts
- For High Level scripts, all the fine-grained protocol control happen in the script running on the MAPS server, hidden from the API user
- Low Level scripts put the API user in complete control of the protocol stack. This makes Low Level scripts more flexible and powerful, but also correspondingly more complex

```
my_call = local_server.start_call_script("HIGH", "PLACE_CALL")
if my_call.handle != 0:
    my_call.set_local_variable("Contact", "(s)", local_contact)
    my_call.set_local_variable("AddressOfRecord", "(s)", local_aor)
    my_call.set_local_variable("To", "(s)", remote_uri)
    my_call.place_call()
```

```
if local_server.status == "STARTED":
    my_call = local_server.start_call_script("LOW", "PLACE_CALL")
    if my_call.handle != 0:
        my_call.set_local_variable("Contact", "(s)", local_contact)
        my_call.set_local_variable("AddressOfRecord", "(s)", local_aor)
        my_call.set_local_variable("To", "(s)", remote_uri)
        if my_call.rtp_action.create_session(rtp_address, rtp_port) == SUCCESS:
            my_call.send_message("Invite", "InviteImport")
            recvd_msg = my_call.receive_message(timeout)
            if recvd_msg == "100 TRYING" or recvd_msg == "180 RINGING":
```

CLI Support

Python 3.7.5 Shell

File Edit Shell Debug Options Window Help

Python 3.7.5 (tags/v3.7.5:5c02a39a0b, Oct 15 2019, 00:11:34) [MSC v.1916 64 bit (AMD64)] on win32

Type "help", "copyright", "credits" or "license()" for more information.

>>>

= RESTART: C:\Program Files\GL Communications Inc\MAPS-IuCS\MAPSCLI\PythonClient\examples\IuCS\RNC\IuCS_PlaceCall.py

IuCS Server Connection... True

IuCS Testbed Starting ... True

IuCS Profile Loading... True

Check M3UA Health Status... True

IuCS Call Initiated... True

Call Connecting...

Call Answered...

Send File started

IuCS Call Status...CALL ACTIVE

IuCS Call Terminating... True

CMOS = 4.15625

LMOS = 4.15625

CR_FACTOR = 91

LR_FACTOR = 91

TX_PACKETS = 502

RX_PACKETS = 1604

LOST_PACKETS = 0

DISCARDED_PACKETS = 0

OUT_OF_SEQ_PACKETS = 0

DUPLICATE_PACKETS = 0

AVG_JITTER = 0.6875

IuCS Script Stopping... True

IuCS Server Disconnecting... True

>>> |

MapsCLI RNC (UMTS IUCS 3GPP SCTP)

File Edit View



View Latest Command

```
1 :: 2019-1-11 12:08:13.519000 : UserEvent 1 "GetMessageInfo"# "Index"=12;
1 :: 2019-1-11 12:08:13.619000 : UserEvent 1 "GetMessageInfo"# "Index"=13;
1 :: 2019-1-11 12:08:13.717000 : UserEvent 1 "GetMessageInfo"# "Index"=14;
1 :: 2019-1-11 12:08:13.826000 : UserEvent 1 "GetMessageInfo"# "Index"=15;
1 :: 2019-1-11 12:08:13.926000 : UserEvent 1 "GetMessageInfo"# "Index"=16;
1 :: 2019-1-11 12:08:14.024000 : UserEvent 1 "GetMessageInfo"# "Index"=17;
1 :: 2019-1-11 12:08:14.123000 : UserEvent 1 "GetMessageInfo"# "Index"=18;
1 :: 2019-1-11 12:08:14.222000 : UserEvent 1 "GetMessageInfo"# "Index"=19;
1 :: 2019-1-11 12:08:15.288000 : StopScript 1;
```

Thank You