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# MAPS™ CAP PROTOCOL EMULATOR

CAMEL Application Part Emulation over IP, TDM & ATM

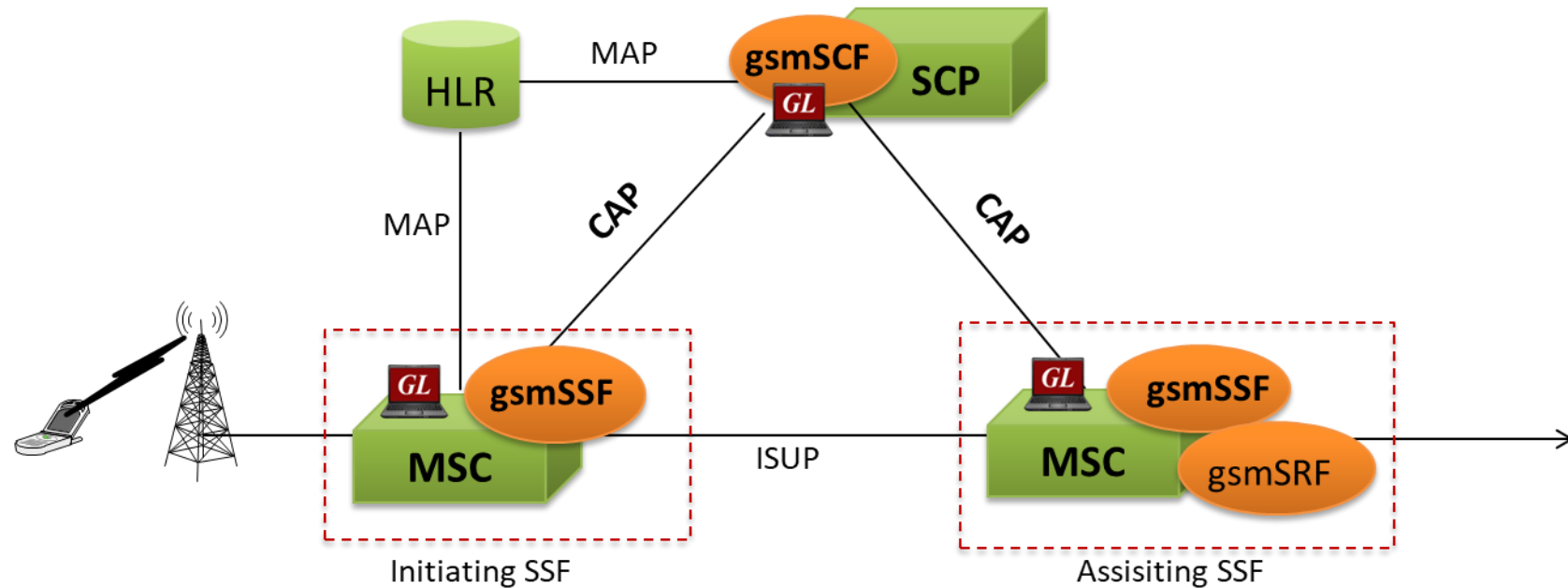
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# MAPS™ CAP (CAMEL Application Part) over IP/TDM/ATM



 **MAPS™ CAP Emulator (over TDM/ATM/IP)**  
in GSM, GPRS, UMTS Networks

- CAP -> CAMEL Application Part
- CAMEL -> Customized Applications for Mobile networks Enhanced Logic
- gsmSCF -> GSM Service Control Function
- gsmSRF -> GSM Specialized Resource Function
- gsmSSF -> GSM Service Switching Function

# Applications

- Multi-protocol, Multi-interface Simulation
- Test Service Usage Charging for Voice, Data, SMS, etc
- Cost-of-call verification through balance check
- Test Premium Calling and Toll-Free Services
- Provides fault insertion, and erroneous call flows testing capability
- Performance testing, Load Testing, Functional testing, Regression testing and Conformance testing of network elements
- Ready scripts make testing procedure simpler, less time consuming and hence time to market products
- Test response of network against protocol message modification, or corruption
- Inter-operability testing of networks

# Supported Protocol Standards

## CAMEL IP Protocol Stack

CAP	
TCAP	
SCCP	
MTP3	M3UA
M2PA	
SCTP	
IP	

Supported Protocols	Standard / Specification Used
C	3GPP TS 29.078 6.3.0 (2004-09)
TCAP	ANSI T1.114-1996
SCCP	Q.713, CCITT (ITU-T) Blue Book
M2PA	RFC 4165
M3UA	RFC 3332
SCTP	RFC 4960

# Supported Protocol Standards (Contd)

## CAMEL TDM and ATM Protocol Stack

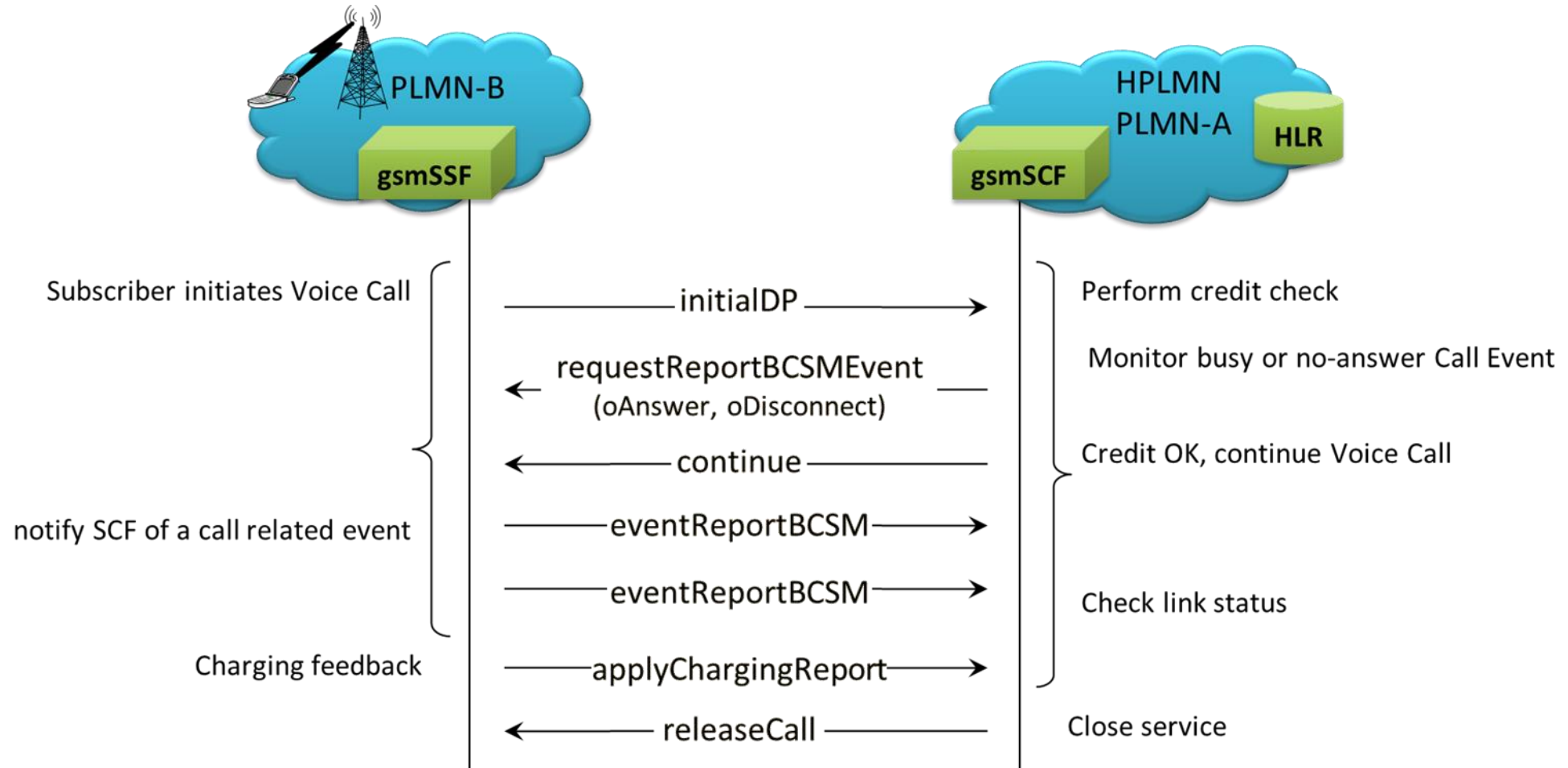
CAP
TCAP
SCCP
MTP3
<b>TDM</b>

CAP
TCAP
SCCP
MTP3b
SSCOP
AAL5
ATM
Physical Layer
CAP over ATM

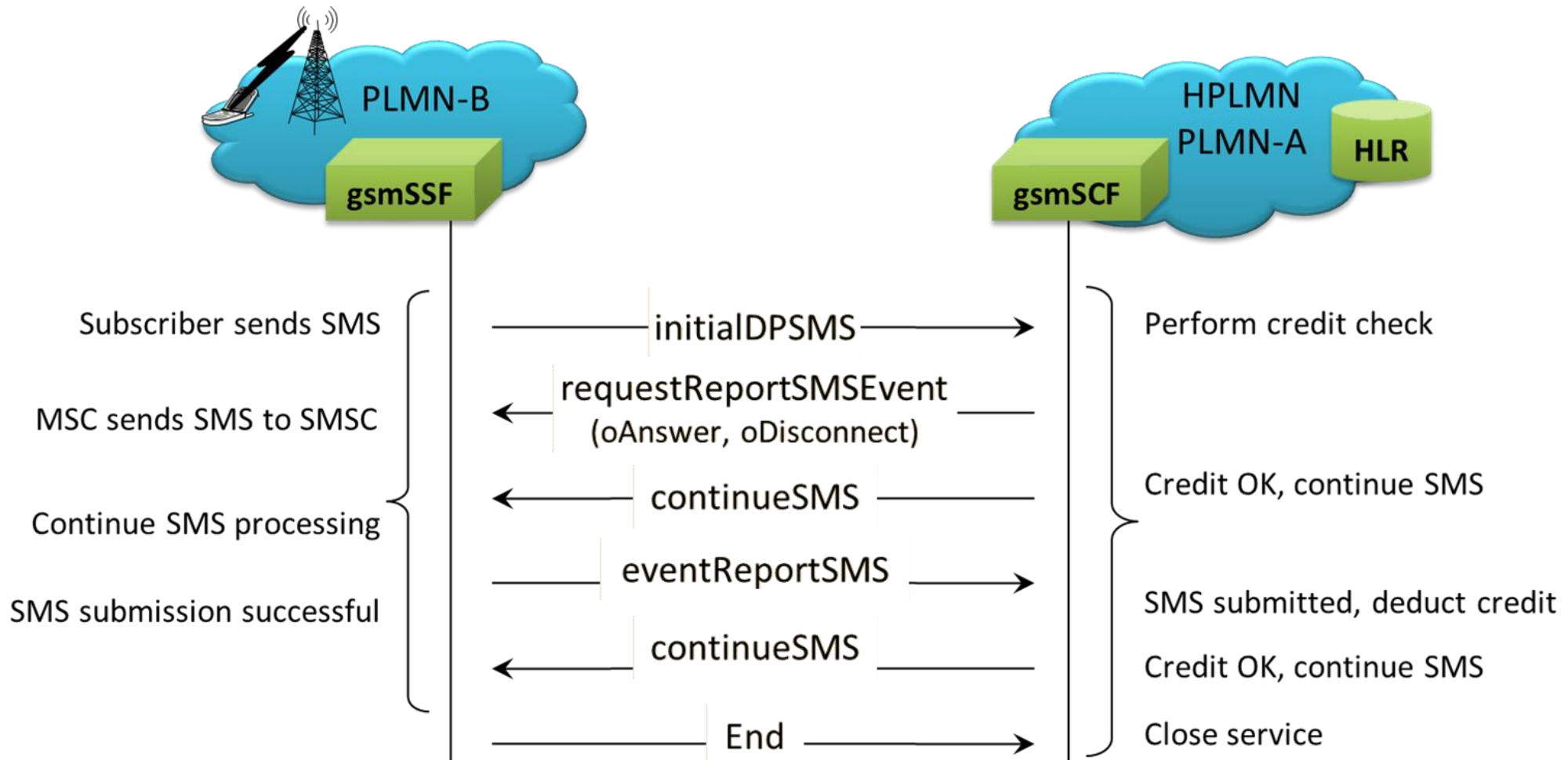
Supported Protocols	Standard / Specification Used
<b>TDM</b>	
CAP	3GPP TS 29.002 V4.18.0 (2007-09)
TCAP	ANSI T1.114-1996
SCCP	Q.713, CCITT (ITU-T) Blue Book
MTP3	Q.703, ITU-T Blue Book
<b>ATM</b>	
CAP	3GPP TS 29.002 V4.18.0 (2007-09)
TCAP	ANSI T1.114-1996
SCCP	Q.713, CCITT (ITU-T) Blue Book
MTP3b	ITU-T Q.2210
SSCOP	ITU-T Q.2110
AAL5	Class C & D (ITU-T I.363.5)
ATM	ITU-T I.361

# Typical Call Procedures

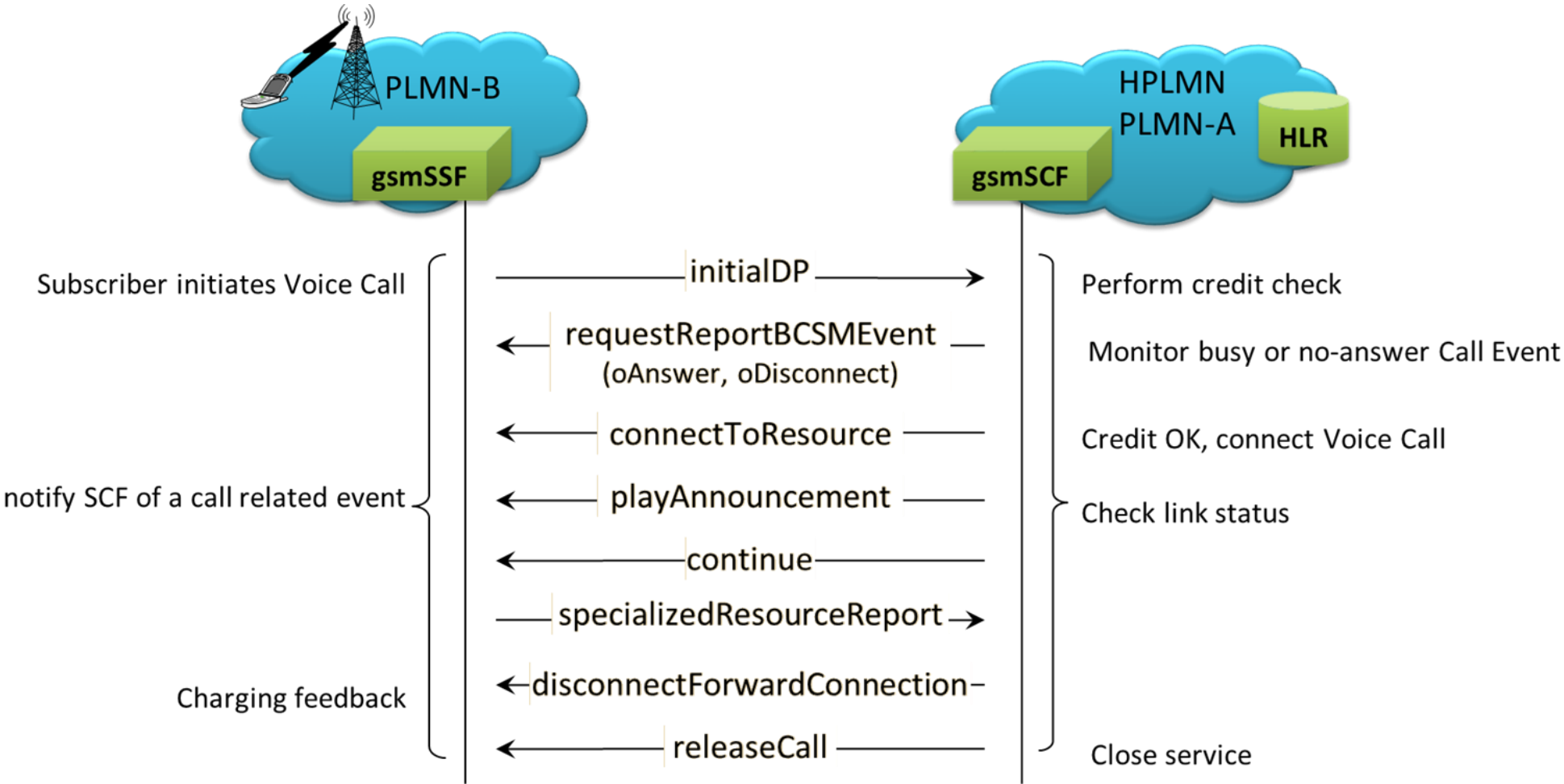
## Prepaid Voice Call Service



# Camel SMS Service

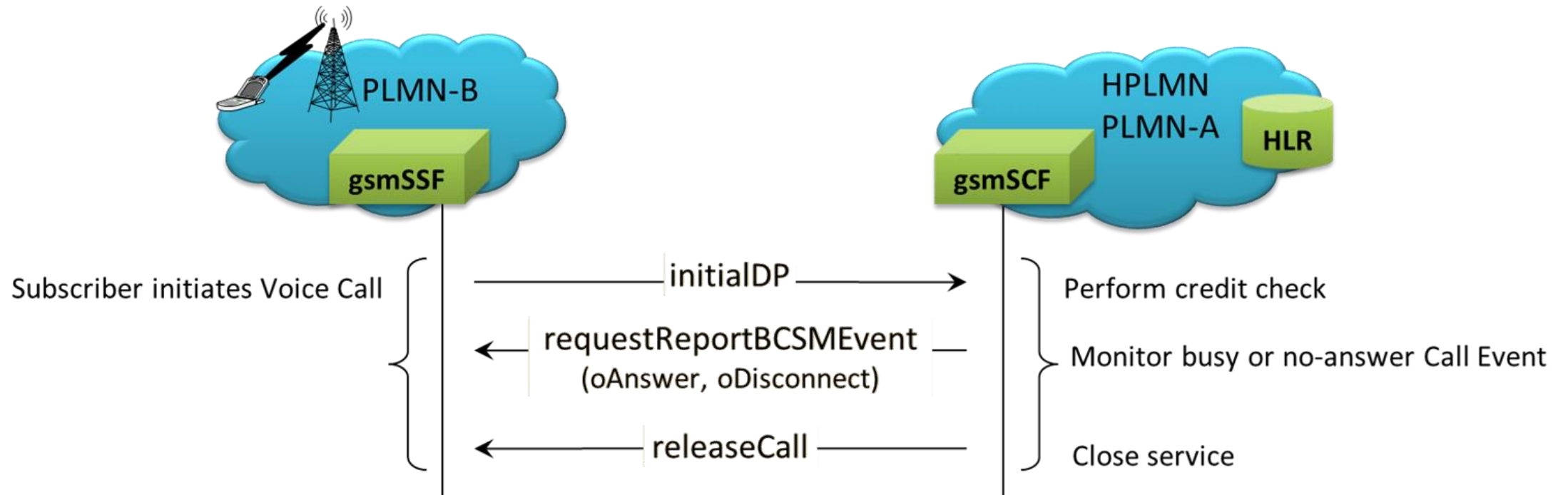


# Low Balance Voice Call Service (Release with Play Announcement)

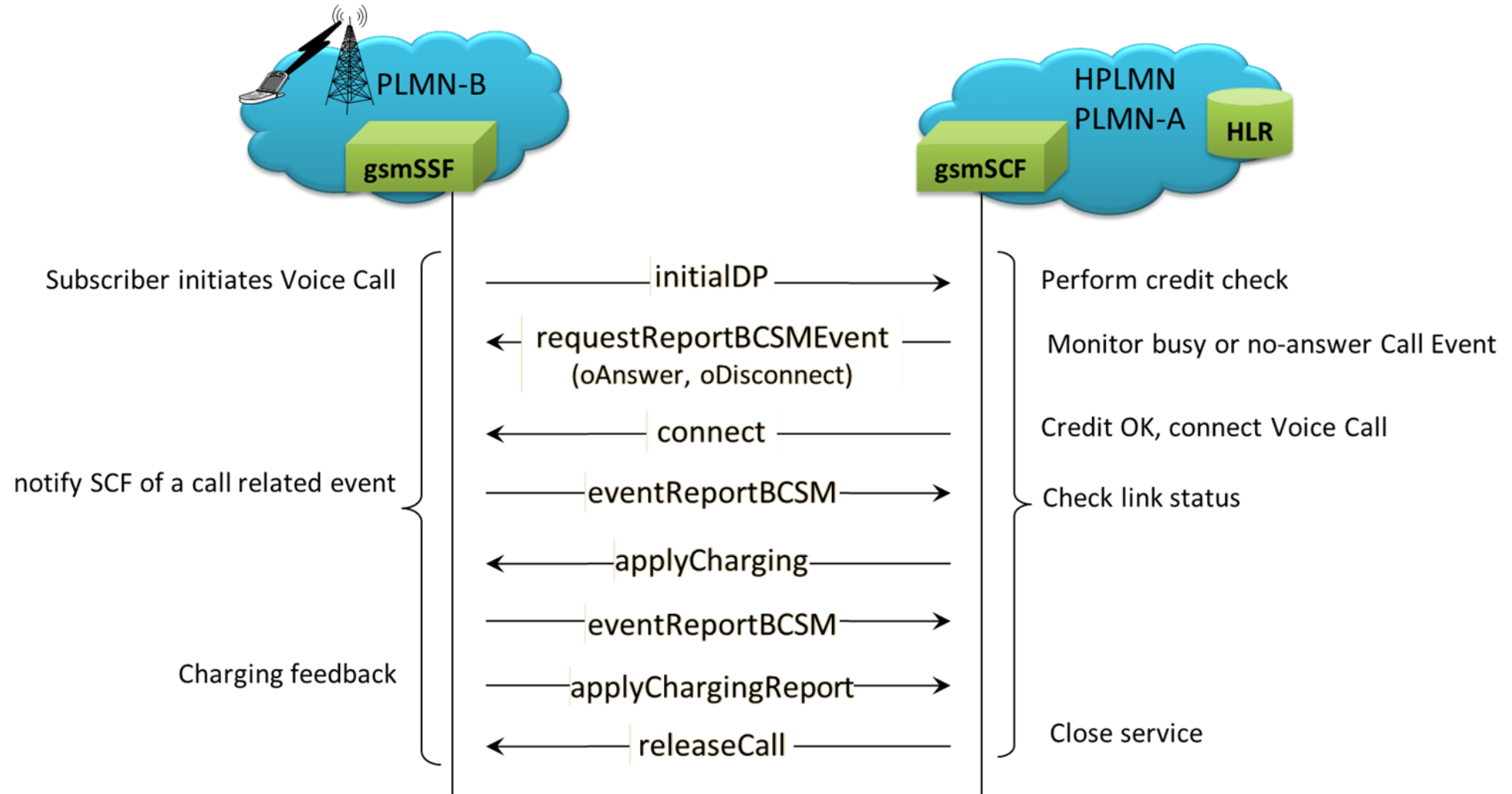




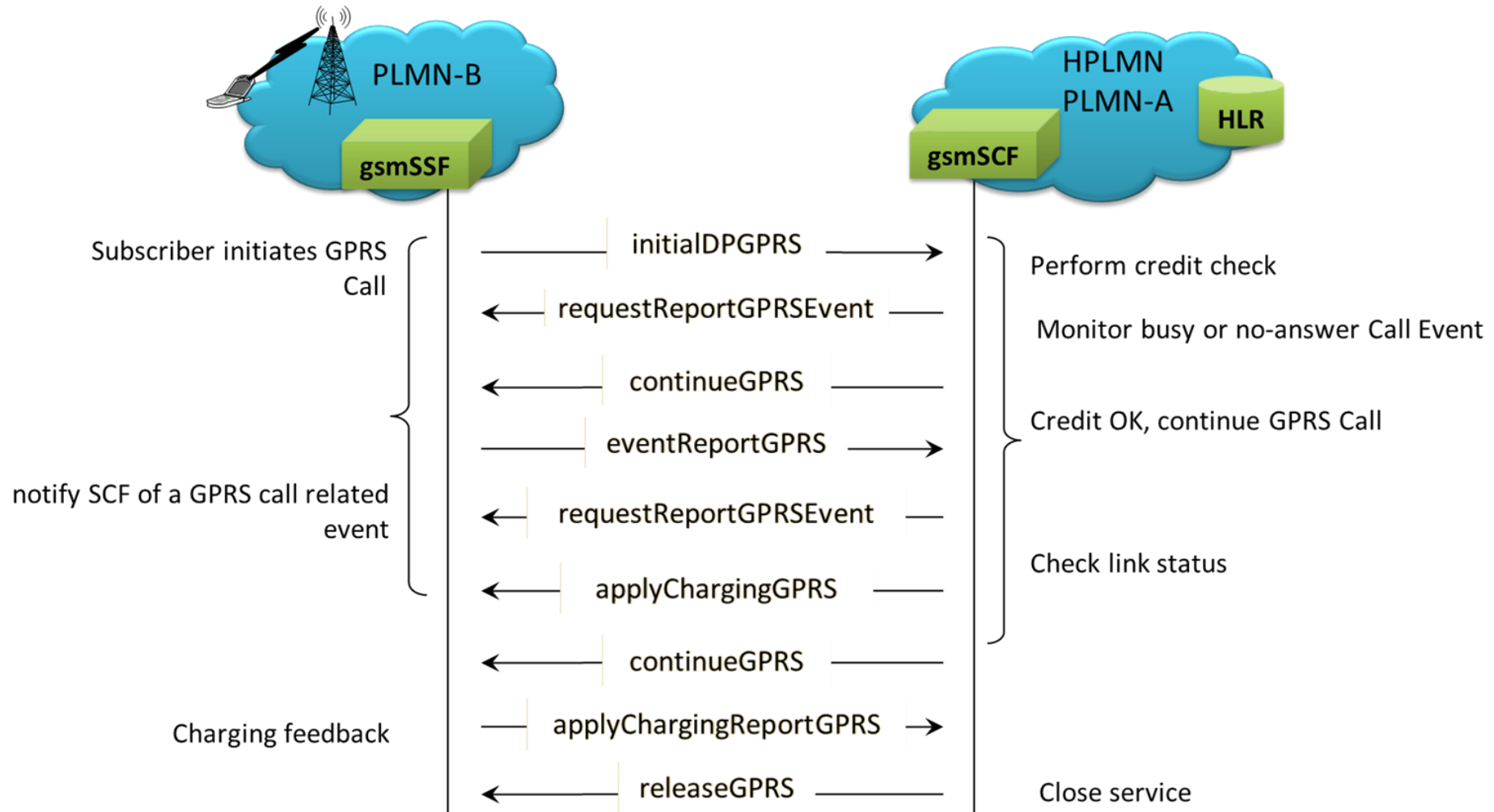
## Low Balance Voice Call Service (Release without Play Announcement)



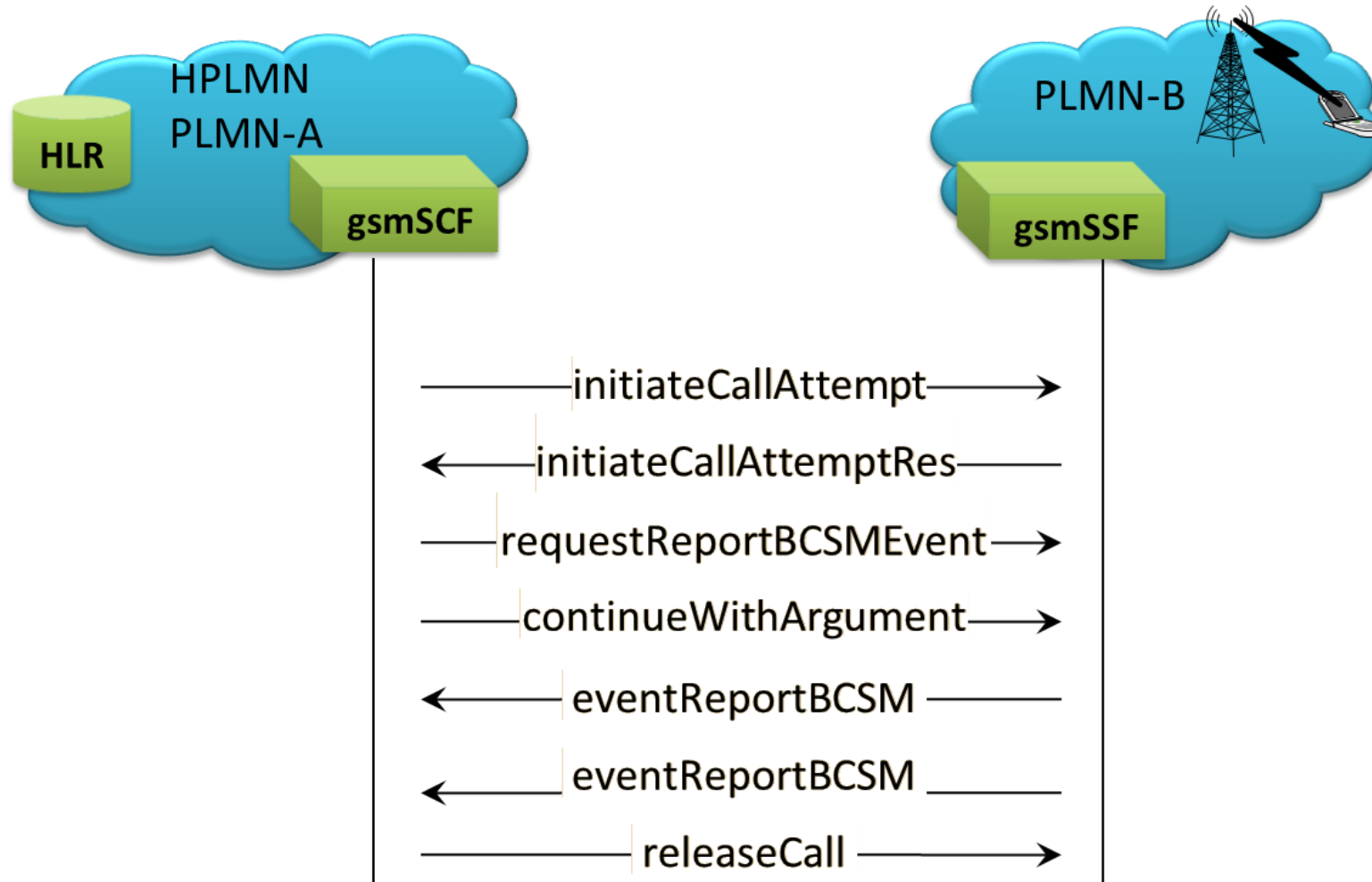
# Toll Free Voice Call Service



# Camel GPRS Service



# Camel ICA (Initiate Call Attempts) Service



# CAP Testbed Configuration (IP/TDM/ATM)

## Testbed Profile (CAP IP)

MAPS (Message Automation Protocol Simulation) gsmSSF (CAMEL IP M3UA) - [Testbed Setup - TestBedDefault]

Config

Config	Value
SSF Interfaces	1
SSF 1	
SSF IP Address	192.168.12.205
SSF Port	2906
SSF Point Code	2.2.2
SCCP Routing Indicator	Route on GT
SCCP Point Code Indicator	Absent
SSF Subsystem Number	CAP - 146
SSF Global Title Address	54321574578
SSF Address Indicator	National
Nature Of SSF Address Indicator	Unknown
Connected Destination Nodes	1
Connected Destination Nodes 1	
Node Type	SCF
Source SCTP Mode	Server
Destination IP Address	192.168.12.205
Destination Port	2905
Destination Point Code	3.3.3
Source M3UA Termination Type	IPSP
Network Indicator	National
Signaling Link Selection	1
M3UA Routing Context Indicator	Absent
M3UA Routing Context	1
Destination SCCP Routing Indicator	Route on GT
Destination SCCP Point Code Indicator	Absent
Destination Subsystem Number	CAP - 146
Destination Global Title Address	12345658578
Destination Address Indicator	National
Nature Of Destination Address Indicator	Unknown
End User Configuration	MS_Profiles.xml

## Testbed Profile (CAP TDM)

MAPS (Message Automation Protocol Simulation) gsmSSF (CAMEL 3GPP) - [Testbed Setup - TestBedDefault]

Config

Config	Value
SSF Interfaces	1
SSF 1	
SSF Point Code	2.2.2
SCCP Routing Indicator	Route on GT
SCCP Point Code Indicator	Absent
SSF Subsystem Number	CAP - 146
SSF Global Title Address	54321574578
SSF Address Indicator	National
Nature Of SSF Address Indicator	Unknown
Connected Destination Nodes	1
Connected Destination Nodes 1	
Node Type	SCF
MTP Signalling Configuration	
T1 Port Number	2
Timeslot	23
SignalingSubchannel	1..8
Network Indicator	National
Signaling Link Selection	1
Destination Point Code	3.3.3
Destination SCCP Routing Indicator	Route on GT
Destination SCCP Point Code Indicator	Absent
Destination Subsystem Number	CAP - 146
Destination Global Title Address	12345658578
Destination Address Indicator	National
Nature Of Destination Address Indicator	Unknown
Adjacent Point Code	3.3.3
End User Configuration	MS_Profiles.xml

## Testbed Profile (CAP ATM)

MAPS (Message Automation Protocol Simulation) gsmSCF (CAMEL 3GPP ATM) - [Testbed Setup - TestBedDefault]

Config

Config	Value
SCF Interfaces	1
SCF 1	
SCF Point Code	3.3.3
SCCP Routing Indicator	Route on GT
SCCP Point Code Indicator	Absent
SCF Subsystem Number	CAP - 146
SCF Global Title Address	12345658578
SCF Address Indicator	National
Nature Of SCF Address Indicator	Unknown
Connected Destination Nodes	1
Connected Destination Nodes 1	
Node Type	SSF
MTP Links	2
MTP Links 1	
T1 E1 Port Number	1
Signaling VPI	105
Signalling VCI	106
Network Indicator	National
Signaling Link Selection	0
MTP Links 2	
T1 E1 Port Number	3
Signaling VPI	105
Signalling VCI	106
Network Indicator	National
Signaling Link Selection	1
Destination Point Code	2.2.2
Destination SCCP Routing Indicator	Route on GT
Destination SCCP Point Code Indicator	Absent
Destination Subsystem Number	CAP - 146
Destination Global Title Address	54321574578
Destination Address Indicator	National
Nature Of Destination Address Indicator	Unknown
Adjacent Point Code	2.2.2
End User Configuration	MS_Profiles.xml

# Profile Configuration IP/TDM/ATM

## Profile Editor (CAP IP)

#	Profiles (Edit-F2)	Config	Value
1	MSProfile001	Connection Identifier	1
2	MSProfile002	Service Key	36421
3	MSProfile003	Triggered Event Type for Voice Calls	Mobile Originating Call
4	MSProfile004	Triggered Event Type for SMS Calls	Mobile Originated SMS
5	MSProfile005	Subscriber Information	
6	MSProfile006	IMSI	404068976453423
7	MSProfile007	IMEI	3456787564534500
8	MSProfile008	Calling Party Number	9017000638
9	MSProfile009	Subscriber Number	Subscriber Number
10	MSProfile010	Called Party Number	9156553424
11	MSProfile011	Called Party NAI	Subscriber Number
12	MSProfile012	Type Of Called Party Number	National Number
13	MSProfile013	Additional Numbers	
14	MSProfile014	Redirecting Number	474678468468
15	MSProfile015	Redirecting Number NAI	Subscriber Number
16	MSProfile016	Location Information	
17	MSProfile017	MCC	404
18	MSProfile018	MNC	006
19	MSProfile019	LAC	1
20	MSProfile020	RAC	1
21	MSProfile021	Cell Identity	1
22	MSProfile022	Digits Collected	43547
23	MSProfile023	MSC GT Address	46756748845
24	MSProfile024	VLR GT Address	57645743675
25	MSProfile025	SMSC GT Address	8967897897
26	MSProfile026	Location Number	214315456
27	MSProfile027	GPRS Related Parameters	
28	MSProfile028	PDP Context Specific Information	
29	MSProfile029	APN Name	www.gl.com
30	MSProfile030	End User IP Address	192.168.1.13
31	MSProfile031	GGSN IP Address	192.168.3.78
32	MSProfile032	SGSN GT Address	91876534524

## Profile Editor (TDM)

#	Profiles (Edit-F2)	Config	Value
1	MSProfile001	Connection Identifier	1
2	MSProfile002	Service Key	36421
3	MSProfile003	Triggered Event Type for Voice Calls	Mobile Originating Call
4	MSProfile004	Triggered Event Type for SMS Calls	Mobile Originated SMS
5	MSProfile005	Subscriber Information	
6	MSProfile006	IMSI	404068976453423
7	MSProfile007	IMEI	3456787564534500
8	MSProfile008	Calling Party Number	9017000638
9	MSProfile009	Subscriber Number	Subscriber Number
10	MSProfile010	Called Party Number	9156553424
11	MSProfile011	Called Party NAI	Subscriber Number
12	MSProfile012	Type Of Called Party Number	National Number
13	MSProfile013	Additional Numbers	
14	MSProfile014	Redirecting Number	474678468468
15	MSProfile015	Redirecting Number NAI	Subscriber Number
16	MSProfile016	Location Information	
17	MSProfile017	MCC	404
18	MSProfile018	MNC	006
19	MSProfile019	LAC	1
20	MSProfile020	RAC	1
21	MSProfile021	Cell Identity	1
22	MSProfile022	Digits Collected	43547
23	MSProfile023	MSC GT Address	46756748845
24	MSProfile024	VLR GT Address	57645743675
25	MSProfile025	SMSC GT Address	8967897897
26	MSProfile026	Location Number	214315456
27	MSProfile027	GPRS Related Parameters	
28	MSProfile028	PDP Context Specific Information	

## Profile Editor (ATM)

#	Profiles (Edit-F2)	Config	Value
1	MSProfile001	ATM Link Selection	
2	MSProfile002	Originating Global Title Address	54321574578
3	MSProfile003	Destination Global Title Address	12345658578
4	MSProfile004	Service Key	36421
5	MSProfile005	Triggered Event Type for Voice Calls	Mobile Originating Call
6	MSProfile006	Triggered Event Type for SMS Calls	Mobile Originated SMS
7	MSProfile007	Subscriber Information	
8	MSProfile008	IMSI	404068976453423
9	MSProfile009	IMEI	3456787564534500
10	MSProfile010	Calling Party Number	9017000638
11	MSProfile011	Subscriber Number	Subscriber Number
12	MSProfile012	Called Party Number	9156553424
13	MSProfile013	Called Party NAI	Subscriber Number
14	MSProfile014	Type Of Called Party Number	National Number
15	MSProfile015	Additional Numbers	
16	MSProfile016	Redirecting Number	474678468468
17	MSProfile017	Redirecting Number NAI	Subscriber Number
18	MSProfile018	Location Information	
19	MSProfile019	Digits Collected	43547
20	MSProfile020	MSC GT Address	46756748845
21	MSProfile021	VLR GT Address	57645743675
22	MSProfile022	SMSC GT Address	8967897897
23	MSProfile023	Location Number	214315456
24	MSProfile024	GPRS Related Parameters	
25	MSProfile025	PDP Context Specific Information	

# CAP Global Configuration IP/TDM/ATM

## Global Profile (CAP IP)

The screenshot shows the 'Global Configuration - Globalprofile' window. The left pane displays a tree view of configuration categories: Global Configuration, Call Parameters, SCMG Timers, M3UA Parameters, and M3UA Specific Timers. The right pane shows a table of configuration values.

Config	Value
Global Configuration	
Call Parameters	
Balance Timer in msec	8000
Response Timer in msec	10000
Answer Event Timer in msec	5000
Disconnect Event Timer in msec	120000
SMSFailure Event Timer in msec	60000
SCMG Timers	
Trbss in msec	10000
Tstainfo in msec	30000
M3UA Parameters	
Dynamic Registration	Not Required
Destination Audit	Not Required
M3UA Specific Timers	
TackTimer in msec	2000
TbeatTimer in msec	30000
DAUDTimer in msec	5000

## Global Profile (TDM)

The screenshot shows the 'Global Configuration - Globalprofile' window with the TDM profile selected. The left pane shows the configuration tree, and the right pane shows the configuration values. A dialog box for '\_DAUDTimeOut' is open, showing a value of 5000.

Config	Value
Global Configuration	
Call Parameters	
Balance Timer in msec	8000
Response Timer in msec	10000
Answer Event Timer in msec	0
Disconnect Event Timer in msec	60000
SMSFailure Event Timer in msec	60000
SCMG Timers	
Trbss in msec	10000
Tstainfo in msec	30000

## Global Profile (ATM)

The screenshot shows the 'Global Configuration - Globalprofile' window with the ATM profile selected. The left pane shows the configuration tree, and the right pane shows the configuration values. An 'Enable' checkbox is checked.

Config	Value
Global Configuration	
Call Parameters	
Balance Timer in msec	8000
Response Timer in msec	10000
Answer Event Timer in msec	0
Disconnect Event Timer in msec	60000
SMSFailure Event Timer in msec	60000
SCMG Timers	
Trbss in msec	10000
Tstainfo in msec	30000
MTP3b Parameters	
Enable Initial Alignment	True
Proving Selection	Normal
Transmit Buffer Packet Limit	5000

# Customizations - Call Flow (Scripts)

The screenshot displays the ScriptEditor application interface. The main window shows a script titled 'Camel\_GPRS\_Service\_SSF' with the following code:

```
1  /// Initialization ///
2
3
4  if (ProfileLoaded != 1)
5      ErrorLog ("No Subscriber Profile Selected");
6      exit;
7  endif
8  MsgSeqCount = 0;
9  ReportEvent (CamelScript = "Running");
10 gprsSSFOID=$_gsmSSFOID++;
11 AllocUniqueId "gsmSSF" GPRSOrgRef;
12 invokeId = 1;
13 TimeIfNoTariffSwitch=0;
14 ReleaseIfDurationExceeded=0;
15 State = "Null";
16 IsGeneration=1;
17 KeyIdentifier: gprsSSFOID;
18 MsgHandler : "CAMELMsgHandler";
19 InterfaceId=(ConnectionIdentifier-1);
20 goto "Identify Connection";
21 TDPR = 11;
22 GetSystemTimeZone (Timestamp);
23 if( EnableCLI==0)
```

The Command Window on the left lists various actions and utility functions. The Help Window on the right provides details for the 'Send' command:

### Send

#### For Binary based Protocols

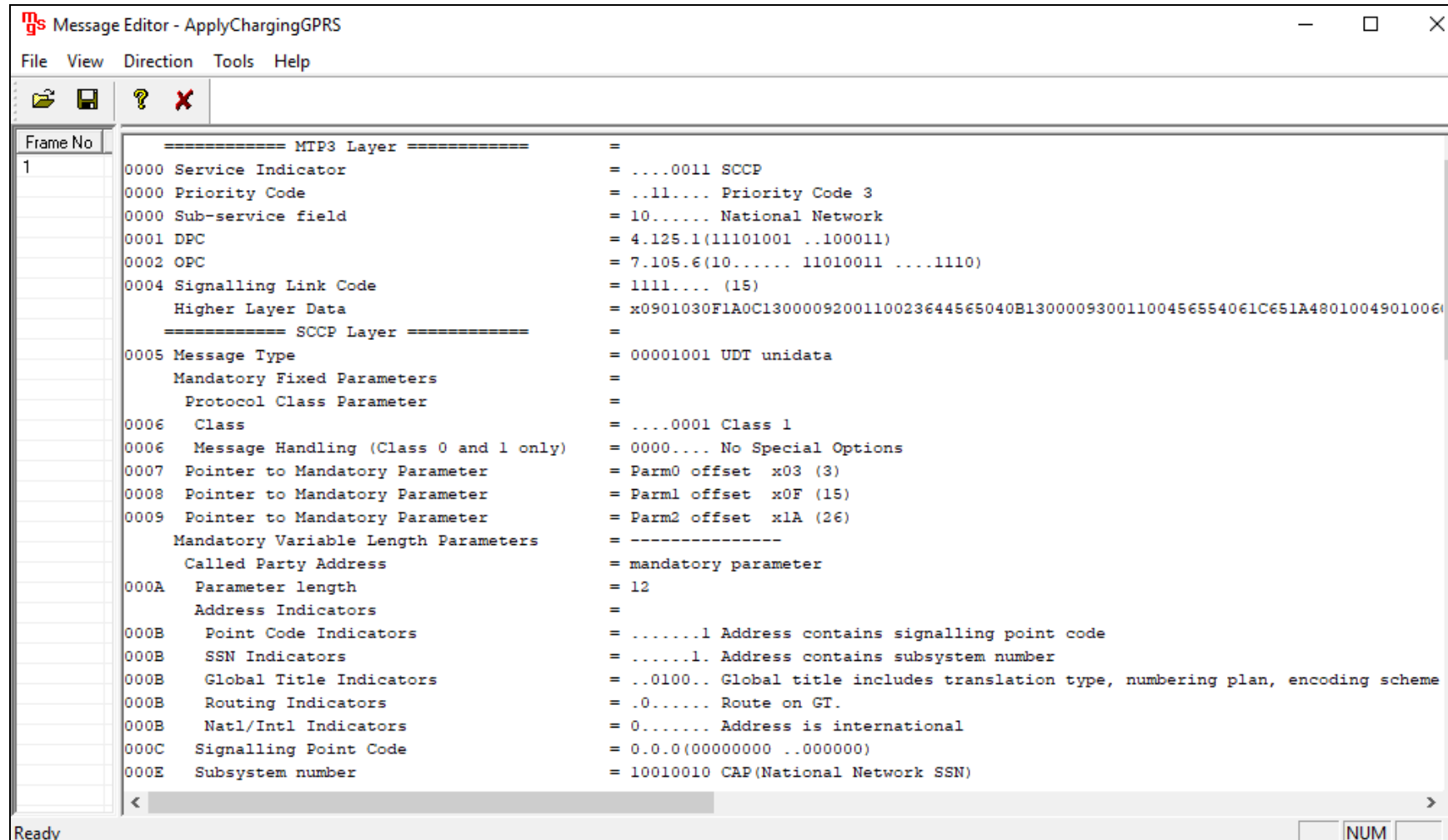
This command sends the valid Protocol signaling message to the DUT. Message templates are binary HDL files. When 'Send' instruction is executed the following actions take place:

- Message template is read and decoded as per the selected protocol standard
- Import file is read and mapping between Variable Names and Information elements absolute names are obtained.
- These variable values are imported into protocol message.
- Protocol message is encoded

The status bar at the bottom indicates 'Line Count - 218 | Line: 5 Col: 49' and 'NUM'.



# Customizations - Protocol Messages



The screenshot shows a window titled "Message Editor - ApplyChargingGPRS" with a menu bar (File, View, Direction, Tools, Help) and a toolbar. The main area displays a list of protocol message fields for "Frame No 1". The fields are organized into layers: MTP3 Layer, SCCP Layer, and various parameters. The status bar at the bottom shows "Ready" and a "NUM" field.

```
=====  
0000 Service Indicator = .....0011 SCCP  
0000 Priority Code = ..11.... Priority Code 3  
0000 Sub-service field = 10..... National Network  
0001 DPC = 4.125.1(11101001 ..100011)  
0002 OPC = 7.105.6(10..... 11010011 ....1110)  
0004 Signalling Link Code = 1111.... (15)  
Higher Layer Data = x0901030F1A0C1300009200110023644565040B13000093001100456554061C651A4801004901006  
=====  
0005 Message Type = 00001001 UDT unidata  
Mandatory Fixed Parameters =  
Protocol Class Parameter =  
0006 Class = ....0001 Class 1  
0006 Message Handling (Class 0 and 1 only) = 0000.... No Special Options  
0007 Pointer to Mandatory Parameter = Parm0 offset x03 (3)  
0008 Pointer to Mandatory Parameter = Parm1 offset x0F (15)  
0009 Pointer to Mandatory Parameter = Parm2 offset x1A (26)  
Mandatory Variable Length Parameters = -----  
Called Party Address = mandatory parameter  
000A Parameter length = 12  
Address Indicators =  
000B Point Code Indicators = .....1 Address contains signalling point code  
000B SSN Indicators = .....1 Address contains subsystem number  
000B Global Title Indicators = ..0100.. Global title includes translation type, numbering plan, encoding scheme  
000B Routing Indicators = .0..... Route on GT.  
000B Natl/Intl Indicators = 0..... Address is international  
000C Signalling Point Code = 0.0.0(00000000 ..000000)  
000E Subsystem number = 10010010 CAP(National Network SSN)
```

# Incoming Call Handler Configuration

MAPS (Message Automation Protocol Simulation) gsmSCF (CAMELIP ITU M3UA) - [Incoming Call Handlers Configuration

Configurations Emulator Reports Editor Debug Tools Windows Help

Message Name	Script Name
initialDP	Camel_VoiceCall_Service_SCF.gls
initialDPGPRS	Camel_GPRS_Service_SCF.gls
ASP Up	M3UA.gls
ASP Down	M3UA.gls
ASP Active	M3UA.gls
ASP Inactive	M3UA.gls
SST subsystem-status-test	SCMG.gls
SOR subsystem-out-of-service-request	SCMG.gls
initialDPSMS	Camel_SMS_Service_SCF.gls

Scripts

Camel\_VoiceCall\_Service\_SCF...  Sequence  Random

Add Delete Apply Scripts Clear Scripts

MAPS (Message Automation Protocol Simulation) gsmSCF (CAMEL 3GPP ATM) - [Incoming Call Handlers Configuration

Configurations Emulator Reports Editor Debug Tools Windows Help

Message Name	Script Name
initialDPGPRS	Camel_GPRS_Service_SCF.gls
initialDP	Camel_VoiceCall_Service_SCF.gls
Signalling Link Test Message	SLTM.gls
SSA subsystem-allowed	SCMG.gls
SST subsystem-status-test	SCMG.gls
SOR subsystem-out-of-service-request	SCMG.gls
initialDPSMS	Camel_SMS_Service_SCF.gls

Scripts

Add Delete

Add Delete Apply Scripts Clear Scripts

# Call Generation

## GPRS Services

MAPS (Message Automation Protocol Simulation) gsmSSF (CAMELIP ITU M3UA) - [Call Generation - CallGenDefault]

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Ev...	Result	Total Iterations	Completed Iteratio...
1	Camel_VoiceCall_Service_SSF.gls	MSProfile001	0x00000002	Start	Call Released from both side	None		Pass	1	1
2	Camel_SMS_Service_SSF.gls	MSProfile001	0x00000004	Start	Event Report for oSmsSubmission is sent	None		Unknown	1	1
3	Camel_GPRS_Service_SSF.gls	MSProfile001	0x00000003	Start	Call Charging Report Sent	None		Pass	1	1

gsmSSF      gsmSCF

```

initiateDPGPRS → 17:35:05.628000
requestReportGPRSEvent ← 17:35:05.692000
continueGPRS ← 17:35:05.692000
eventReportGPRS → 17:35:05.698000
requestReportGPRSEvent ← 17:35:05.720000
applyChargingGPRS ← 17:35:05.720000
continueGPRS ← 17:35:05.721000
applyChargingReportGPRS → 17:35:13.739000
applyChargingGPRS ← 17:35:13.758000
continueGPRS ← 17:35:13.759000
applyChargingReportGPRS → 17:35:21.777000
releaseGPRS ← 17:35:21.795000
    
```

=====  
MTP3 User Adaptation Layer  
0000 Version  
0002 Message Class  
0003 Transfer Message Type  
0004 Message Length  
Protocol Data  
0008 Tag  
000A Length  
000E Originating Point Code  
000E Point Code  
Destination Point Code  
0012 Point Code  
0014 Service Indicator  
0015 Network Indicator  
0016 Message Priority  
0017 Signalling Link Selection  
=====  
SCCP Layer  
0018 Message Type  
Mandatory Fixed Parameters  
Protocol Class Parameter  
0019 Class  
0019 Message Handling (Class 0  
001A Pointer to Mandatory Param  
001B Pointer to Mandatory Param  
001C Pointer to Mandatory Param  
Mandatory Variable Length Pa  
Called Party Address

## ICA Services

MAPS (Message Automation Protocol Simulation) gsmSCF (CAMELIP ITU M3UA) - [Call Generation - CallGenDefault]

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Ev...	Result	Total Iterations	Completed Iteratio...
1	Camel_ICA_Service_SCF.gls	MSProfile001	0x00000005	Start	Call Released	None		Pass	1	1

gsmSCF      gsmSSF

```

initiateCallAttempt → 17:42:31.951000
initiateCallAttemptRes ← 17:42:32.019000
requestReportBCSMEvent → 17:42:32.021000
continueWithArgument ← 17:42:32.022000
eventReportBCSM ← 17:42:32.044000
eventReportBCSM ← 17:43:32.065000
releaseCall → 17:43:32.068000
    
```

=====  
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 = 140 (x0000008C)  
Protocol Data =  
0008 Tag = x0210 Transfer Protocol Data  
000A Length = 130 (x0082)  
000E Originating Point Code =  
000E Point Code = 3.3.3(..011000 00011011)  
Destination Point Code =  
0012 Point Code = 2.2.2(..010000 00010010)  
0014 Service Indicator = ...0011 SCCP  
0015 Network Indicator = .....10 National Network  
0016 Message Priority = .....00 Priority Code 0  
0017 Signalling Link Selection = 1 (x01)  
Pdu = x090103080D059292000200059292000200606  
Parameter Padding = x0000  
=====  
SCCP Layer  
0018 Message Type = 00001001 UDT unidata  
Mandatory Fixed Parameters =  
Protocol Class Parameter =  
0019 Class = ....0001 Class 1

# Call Generation (Contd.)

## SMS Services

MAPS (Message Automation Protocol Simulation) gsmSSF (CAMELIP ITU M3UA) - [Call Generation - CallGenDefault]

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Ev...	Result	Total Iterations	Completed Iteratio...
1	Camel_VoiceCall_Service_SSF.gls	MSPProfile001	0x00000002	Start	Call Released from both side	None		Pass	1	1
2	Camel_SMS_Service_SSF.gls	MSPProfile001	0x00000004	Start	Event Report for oSmsSubmission is sent	None		Unknown	1	1
3	Camel_GPRS_Service_SSF.gls	MSPProfile001	0x00000003	Start	Call Charging Report Sent	None		Pass	1	1

Save Column Width Show Latest

gsmSSF gsmSCF

```

===== MTP3 User Adaptat
0000 Version
0002 Message Class
0003 Transfer Message Type
0004 Message Length
0008 Tag
000A Length
000E Originating Point Code
0010 Point Code
0012 Destination Point Code
0014 Point Code
0016 Service Indicator
0018 Network Indicator
001A Message Priority
001C Signalling Link Selection
===== SCCP Layer =====
0018 Message Type
Mandatory Fixed Parameters
Protocol Class Parameter

```

Scripts Message Sequence Event Config Script Flow

Initialisation Errors Error

## Voice Services

MAPS (Message Automation Protocol Simulation) gsmSSF (CAMELIP ITU M3UA) - [Call Generation - CallGenDefault]

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Ev...	Result	Total Iterations	Completed Iteratio...
1	Camel_VoiceCall_Service_SSF.gls	MSPProfile001	0x00000002	Start	Call Released from both side	None		Pass	1	1
2	Camel_SMS_Service_SSF.gls	MSPProfile001	0x00000004	Start	Event Report for oSmsSubmission is sent	None		Unknown	1	1
3	Camel_GPRS_Service_SSF.gls	MSPProfile001	0x00000003	Start	Call Charging Report Sent	None		Pass	1	1

Save Column Width Show Latest

gsmSSF gsmSCF

```

===== 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 = 232 (x000000E8)
0008 Tag =
000A Length = x0210 Transfer Protocol Data
000E Originating Point Code = 223 (x00DF)
0010 Point Code = 2.2.2(..010000 00010010)
0012 Destination Point Code = 3.3.3(..011000 00011011)
0014 Service Indicator = ...0011 SCCP
0016 Network Indicator = .....10 National Network
0018 Message Priority = .....00 Priority Code 0
001C Signalling Link Selection = 1 (x01)
Pdu = x0901C
Parameter Padding = x00
===== SCCP Layer =====
0018 Message Type = 00001001 UDT undata
Mandatory Fixed Parameters
Protocol Class Parameter
0019 Class = ...0001 Class 1
001A Message Handling (Class 0 and 1 only) = 0000... No Special Options
001B Pointer to Mandatory Parameter = Parm0 offset x03 (3)
001C Pointer to Mandatory Parameter = Parm0 offset x08 (8)

```

Scripts Message Sequence Event Config Script Flow

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

# Call Reception

## GPRS Services

MAPS (Message Automation Protocol Simulation) gsmSCF (CAMELIP ITU M3UA) - [Call Reception]

Sr No	Script Name	Call Info	Script Execution	Status	Events	Even...	Results
1	Check_SCTP_Status.gls		Stop		None		Unknown
2	M3UA.gls	1	Stop	ASP Active	Send-ASPDown		Pass
3	SCMG.gls	1	Stop	Subsystem-Allowed	Initiate SST		Pass
4	Camel_VoiceCall_Service_SCF.gls	0x00000002	Completed	Call Released	None		Pass
5	Camel_GPRS_Service_SCF.gls	0x00000003	Completed	GPRS Call Released	None		Pass
6	Camel_SMS_Service_SCF.gls	0x00000004	Completed	Dialog Ended	None		Pass

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

Save Column Width  Show Latest

```

===== MTP3 User Adaptation Layer =====
0000 Version = 00000001 Rel
0002 Message Class = 00000001 Tra
0003 Transfer Message Type = 00000001 Pay
0004 Message Length = 152 (x000000)
      Protocol Data
0008 Tag = x0210 Transf
000A Length = 144 (x0090)
      Originating Point Code
000E Point Code = 2.2.2(.0100
      Destination Point Code
0012 Point Code = 3.3.3(.0110
0014 Service Indicator = ...0011 SCC
0015 Network Indicator = .....10 Nat
0016 Message Priority = .....00 Pri
0017 Signalling Link Selection = 1 (x01)
      Pdu
===== SCCP Layer =====
0018 Message Type = 00001001 UDT
      Mandatory Fixed Parameters
      Protocol Class Parameter
0019 Class = ...0000 Cla
0019 Message Handling (Class 0 and 1 only) = 0000... No
001A Pointer to Mandatory Parameter = Parm0 offset
001B Pointer to Mandatory Parameter = Parm1 offset
001C Pointer to Mandatory Parameter = Parm2 offset
    
```

Scripts Message Sequence Event Config Script Flow

● Initialisation Errors ● Error Events ● Captured Errors

## SMS Services

MAPS (Message Automation Protocol Simulation) gsmSCF (CAMELIP ITU M3UA) - [Call Reception]

Sr No	Script Name	Call Info	Script Execution	Status	Events	Even...	Results
1	Check_SCTP_Status.gls		Stop		None		Unknown
2	M3UA.gls	1	Stop	ASP Active	Send-ASPDown		Pass
3	SCMG.gls	1	Stop	Subsystem-Allowed	Initiate SST		Pass
4	Camel_VoiceCall_Service_SCF.gls	0x00000002	Completed	Call Released	None		Pass
5	Camel_GPRS_Service_SCF.gls	0x00000003	Completed	GPRS Call Released	None		Pass
6	Camel_SMS_Service_SCF.gls	0x00000004	Completed	Dialog Ended	None		Unknown

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

Save Column Width  Show Latest

```

===== 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 = 224 (x000000E0)
      Protocol Data
0008 Tag = x0210 Transfer Protocol Data
000A Length = 216 (x00D8)
      Originating Point Code
000E Point Code = 2.2.2(.010000 00010010)
      Destination Point Code
0012 Point Code = 3.3.3(.011000 00011011)
0014 Service Indicator = ...0011 SCCP
0015 Network Indicator = .....10 National Network
0016 Message Priority = .....00 Priority Code 0
0017 Signalling Link Selection = 1 (x01)
      Pdu
===== SCCP Layer =====
0018 Message Type = 00001001 UDT unidata
      Mandatory Fixed Parameters
      Protocol Class Parameter
0019 Class = ...0001 Class 1
0019 Message Handling (Class 0 and 1 only) = 0000... No Special Options
001A Pointer to Mandatory Parameter = Parm0 offset x03 (3)
001B Pointer to Mandatory Parameter = Parm1 offset x08 (8)
001C Pointer to Mandatory Parameter = Parm2 offset x0D (13)
    
```

Scripts Message Sequence Event Config Script Flow

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

# Call Reception (Contd.)

## Voice\_Call Services

The screenshot displays the MAPS (Message Automation Protocol Simulation) software interface for gsmSCF (CAMELIP ITU M3UA) - [Call Reception]. The interface includes a menu bar (Configurations, Emulator, Reports, Editor, Debug Tools, Windows, Help) and a toolbar. The main window is divided into several sections:

- Table:** A table showing the execution status of various scripts. A red box highlights the 'Results' column.
- Buttons:** Control buttons such as Stop, Stop All, Abort, Abort All, Show Records, Select Active Call, Auto Trash, and Trash.
- Message Sequence Diagram:** A diagram showing the sequence of messages between gsmSSF and gsmSCF. A bracket on the left labels this as 'Message Sequence'.
- Decode Message:** A detailed view of a message structure, including MTP3 User Adaptation Layer and SCCP Layer parameters. A bracket on the right labels this as 'Decode Message'.

Sr No	Script Name	Call Info	Script Execution	Status	Events	Even...	Results
1	Check_SCTP_Status.gls		Stop		None		Unknown
2	M3UA.gls	1	Stop	ASP Active	Send-ASPDnwn		Pass
3	SCMG.gls	1	Stop	Subsystem-Allowed	Initiate SST		Pass
4	Camel_VoiceCall_Service_SCF.gls	0x00000002	Completed	Call Released	None		Pass
5	Camel_GPRS_Service_SCF.gls	0x00000003	Completed	GPRS Call Released	None		Pass
6	Camel_SMS_Service_SCF.gls	0x00000004	Completed	Dialog Ended	None		Unknown

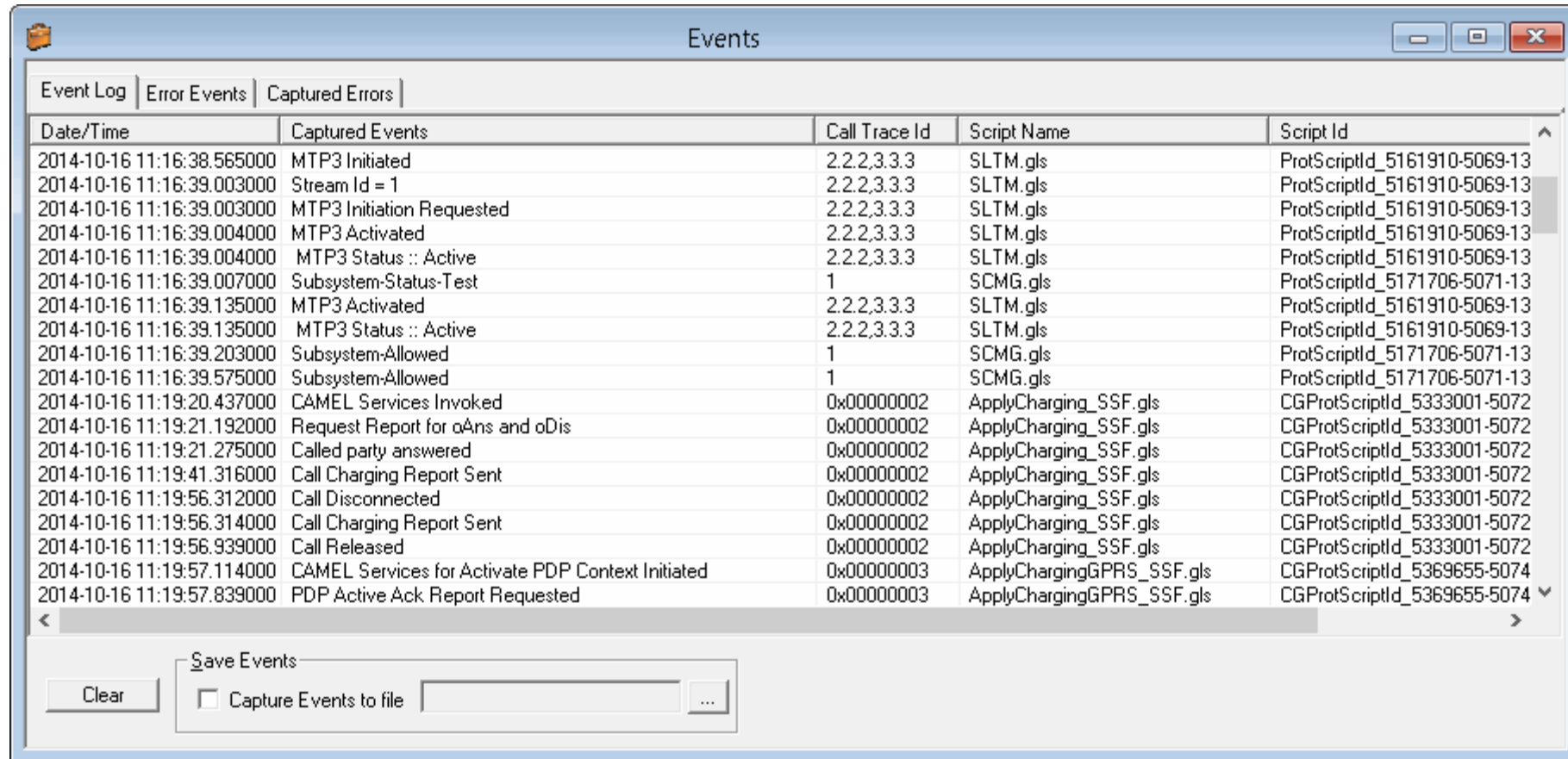
```
==== MTP3 User Adaptation Layer =====  
0000 Version = 00000001 Release 1.0  
0002 Message Class = 00000001 Transfer  
0003 Transfer Message Type = 00000001 Payload Data  
0004 Message Length = 232 (x000000E8)  
Protocol Data  
0008 Tag = x0210 Transfer Protocol Data  
000A Length = 223 (x00DF)  
Originating Point Code =  
000E Point Code = 2.2.2(..010000 00010010)  
Destination Point Code =  
0012 Point Code = 3.3.3(..011000 00011011)  
0014 Service Indicator = ..0011 SCCP  
0015 Network Indicator = .....10 National Network  
0016 Message Priority = .....00 Priority Code 0  
0017 Signalling Link Selection = 1 (x01)  
Pdu = x090103080D05929200020005929200020C  
Parameter Padding = x00  
==== SCCP Layer =====  
0018 Message Type = 00001001 UDT unidata  
Mandatory Fixed Parameters =  
Protocol Class Parameter =  
0019 Class = ....0001 Class 1  
0019 Message Handling (Class 0 and 1 only) = 0000... No Special Options  
001A Pointer to Mandatory Parameter = Parm0 offset x03 (3)  
001B Pointer to Mandatory Parameter = Parm1 offset x08 (8)
```

Call Results

Message Sequence

Decode Message

# Events Log



Date/Time	Captured Events	Call Trace Id	Script Name	Script Id
2014-10-16 11:16:38.565000	MTP3 Initiated	2.2.2.3.3.3	SLTM.gls	ProtScriptId_5161910-5069-13
2014-10-16 11:16:39.003000	Stream Id = 1	2.2.2.3.3.3	SLTM.gls	ProtScriptId_5161910-5069-13
2014-10-16 11:16:39.003000	MTP3 Initiation Requested	2.2.2.3.3.3	SLTM.gls	ProtScriptId_5161910-5069-13
2014-10-16 11:16:39.004000	MTP3 Activated	2.2.2.3.3.3	SLTM.gls	ProtScriptId_5161910-5069-13
2014-10-16 11:16:39.004000	MTP3 Status :: Active	2.2.2.3.3.3	SLTM.gls	ProtScriptId_5161910-5069-13
2014-10-16 11:16:39.007000	Subsystem-Status-Test	1	SCMG.gls	ProtScriptId_5171706-5071-13
2014-10-16 11:16:39.135000	MTP3 Activated	2.2.2.3.3.3	SLTM.gls	ProtScriptId_5161910-5069-13
2014-10-16 11:16:39.135000	MTP3 Status :: Active	2.2.2.3.3.3	SLTM.gls	ProtScriptId_5161910-5069-13
2014-10-16 11:16:39.203000	Subsystem-Allowed	1	SCMG.gls	ProtScriptId_5171706-5071-13
2014-10-16 11:16:39.575000	Subsystem-Allowed	1	SCMG.gls	ProtScriptId_5171706-5071-13
2014-10-16 11:19:20.437000	CAMEL Services Invoked	0x00000002	ApplyCharging_SSF.gls	CGProtScriptId_5333001-5072
2014-10-16 11:19:21.192000	Request Report for oAns and oDis	0x00000002	ApplyCharging_SSF.gls	CGProtScriptId_5333001-5072
2014-10-16 11:19:21.275000	Called party answered	0x00000002	ApplyCharging_SSF.gls	CGProtScriptId_5333001-5072
2014-10-16 11:19:41.316000	Call Charging Report Sent	0x00000002	ApplyCharging_SSF.gls	CGProtScriptId_5333001-5072
2014-10-16 11:19:56.312000	Call Disconnected	0x00000002	ApplyCharging_SSF.gls	CGProtScriptId_5333001-5072
2014-10-16 11:19:56.314000	Call Charging Report Sent	0x00000002	ApplyCharging_SSF.gls	CGProtScriptId_5333001-5072
2014-10-16 11:19:56.939000	Call Released	0x00000002	ApplyCharging_SSF.gls	CGProtScriptId_5333001-5072
2014-10-16 11:19:57.114000	CAMEL Services for Activate PDP Context Initiated	0x00000003	ApplyChargingGPRS_SSF.gls	CGProtScriptId_5369655-5074
2014-10-16 11:19:57.839000	PDP Active Ack Report Requested	0x00000003	ApplyChargingGPRS_SSF.gls	CGProtScriptId_5369655-5074

Clear  Save Events  Capture Events to file

# Bulk Call Generation

GL MAPS (Message Automation Protocol Simulation) MME (LTE SGs 3GPP) - [Call Generation]

Configurations Emulator Reports Editor Debug Tools Windows Help

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

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

View Executing Line

Script Contents

```
KeyIdentifier:IMSI;
starttimer InterCallDurationTimer 10 msec;

wait;

"InterCallDurationTimerExpiry":
  if (ProfileLoaded != 1)
    ErrorLog ("No Subscriber Profile Selected");
    exit;
  endif
IsGeneration=1;
MMEID=(MMEIdentifier-1);
VLRID=(VLRIdentifier-1);
goto "IdentifyMME";
```

Scripts Message Sequence Event Config Script Flow

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



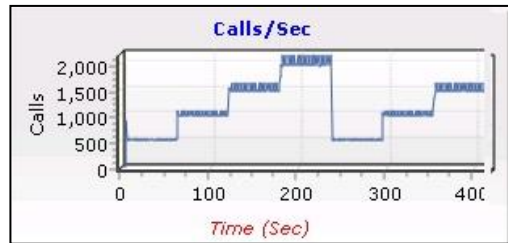
# Load Generation



Saw-tooth Statistical Distribution



Ramp Statistical Distribution



Step Statistical Distribution

- 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.

Load Generation - LoadGendefault

Total Calls To Generate \* (\* indicates no limit)

Max Active Calls 5000  Unique Distributions Per Script

Multi Distributions

Statistical Distribution Fixed

Call Rate 500

Scripts

Scripts	Profile
Camel_VoiceCall_Service_SSF	MSProfile011
	MSProfile012
	MSProfile013
	MSProfile014
	MSProfile015
	MSProfile016
	MSProfile017
	MSProfile018
	MSProfile019
	MSProfile020
	MSProfile021
	MSProfile022
	MSProfile023

Stop Time

Days 0 Hours 0 Minutes 0

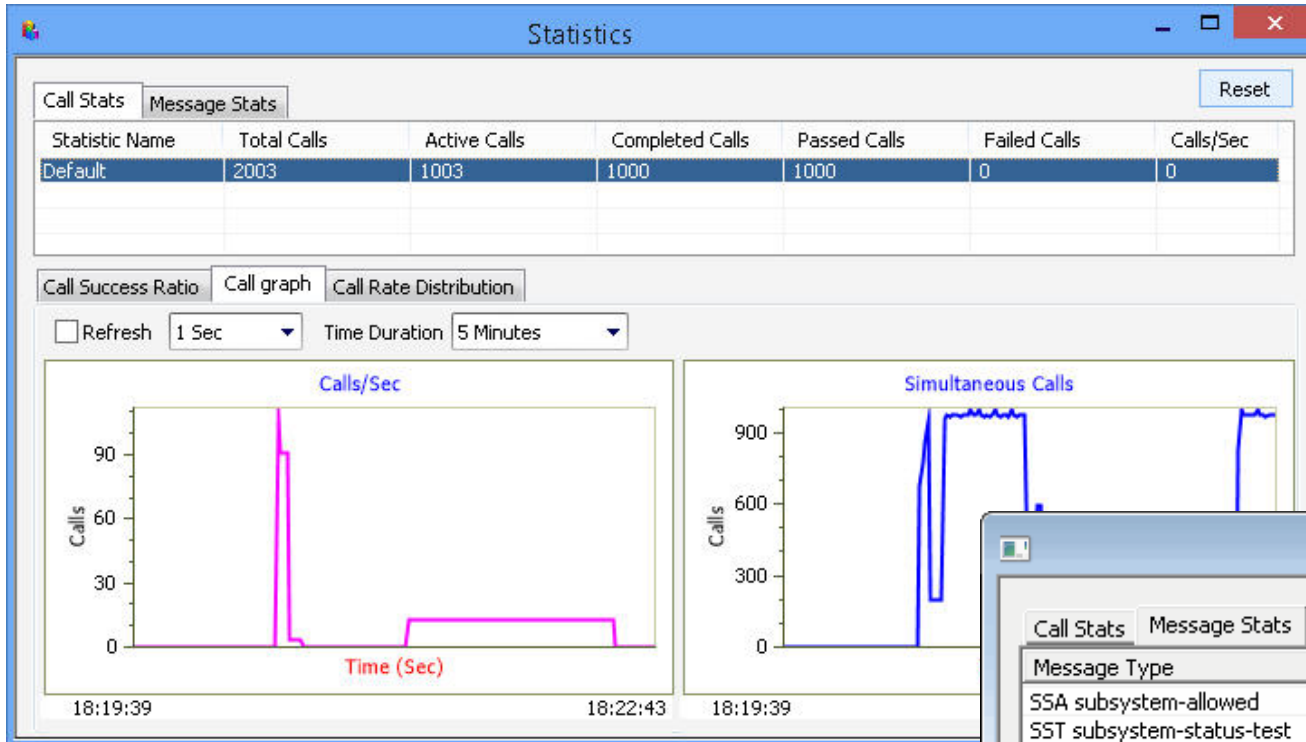
Start Time - 00:00:00.000

End Time - 00:00:00.000

Pause Start

# Bulk Call Statistics and Graph

## Call Statistics with Graph



## Message Statistics

The screenshot shows a software window titled "Statistics" with two tabs: "Call Stats" and "Message Stats". The "Message Stats" tab is active, displaying a table with the following data:

Message Type	Tx Count	Rx Count	Retransmit Count
SSA subsystem-allowed	0	1	0
SST subsystem-status-test	1	0	0
Signalling link test acknowledgement message	1	1	0
Signalling link test message	1	1	0
applyChargingGPRS	392	0	0
continueGPRS	1537	0	0
eventReportGPRS	0	276	0
initialDPGPRS	0	1145	0
requestReportGPRSEvent	1421	0	0
applyChargingReportGPRS	0	116	0
releaseGPRS	551	0	0

# Customizations - Statistics and Reports

MOS, R-Factor

Packet Loss

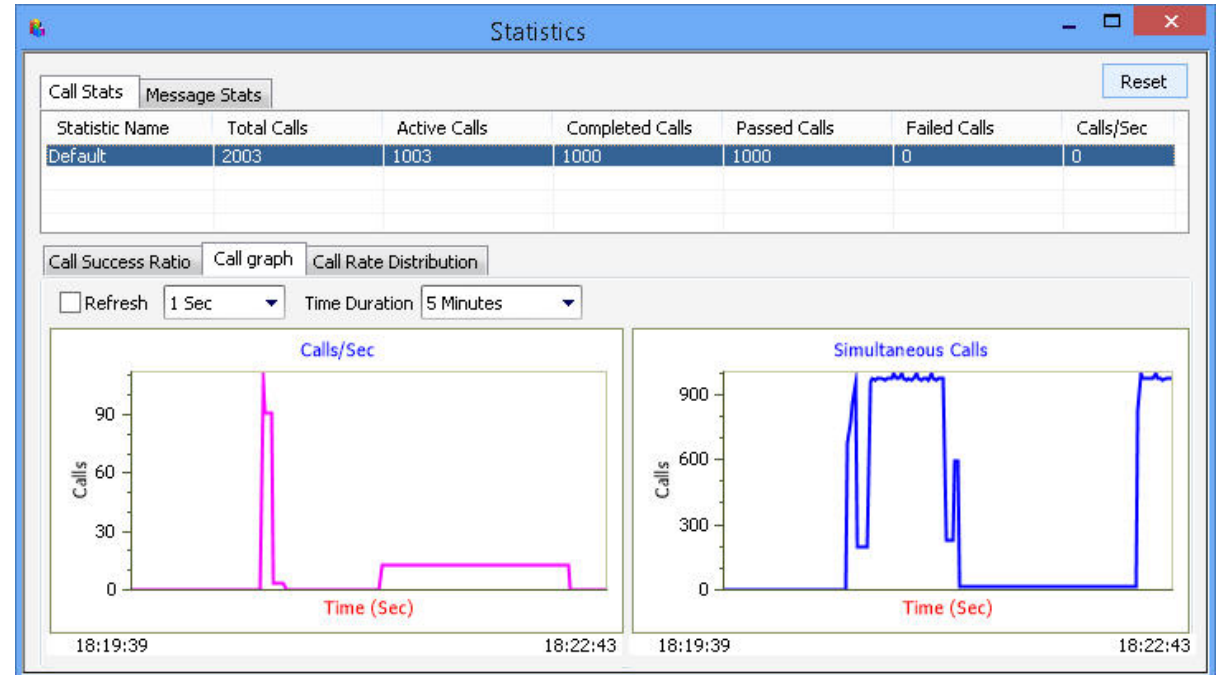
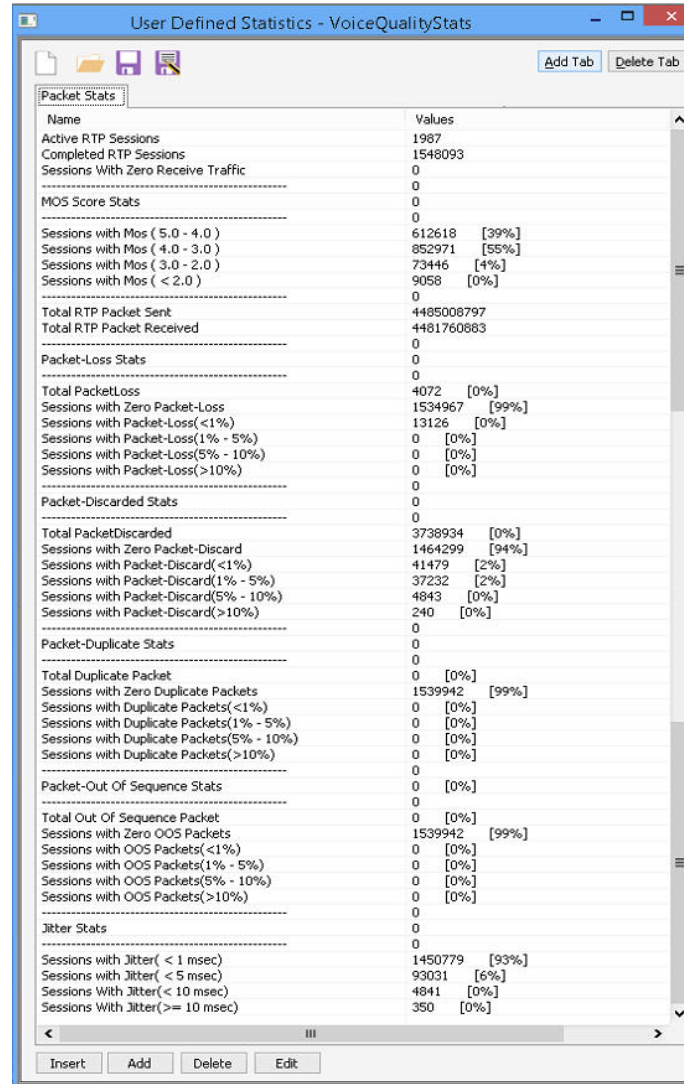
Packets Discarded

Duplicate Packets

Out-Of-Sequence

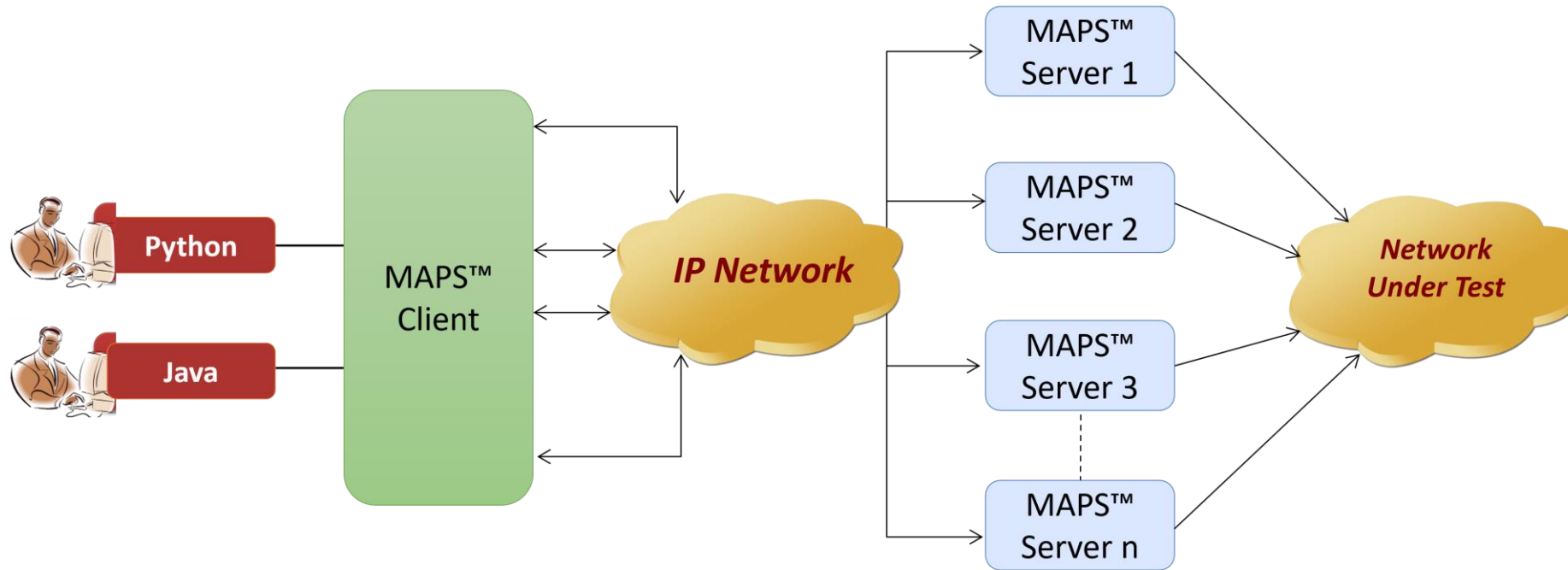
Packets

Jitter Statistics



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

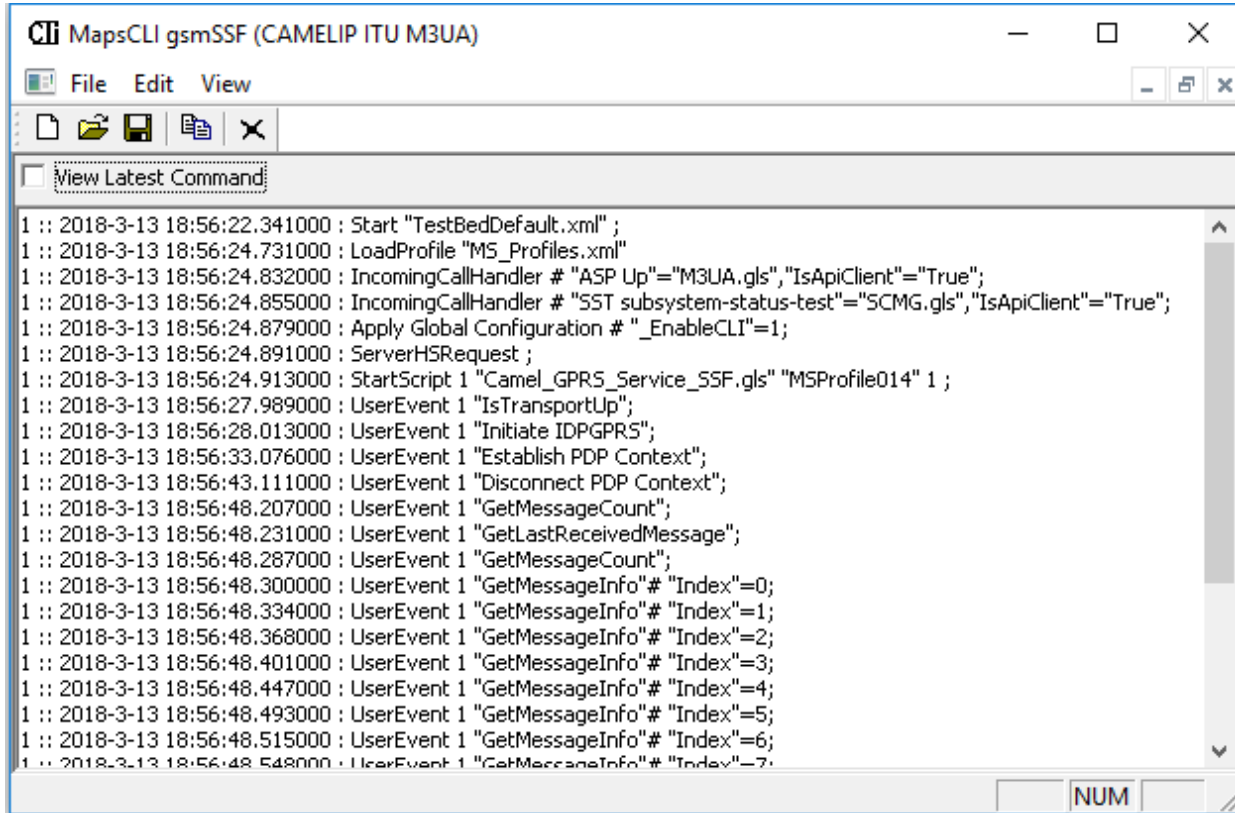
# MAPS™ API Architecture



- 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

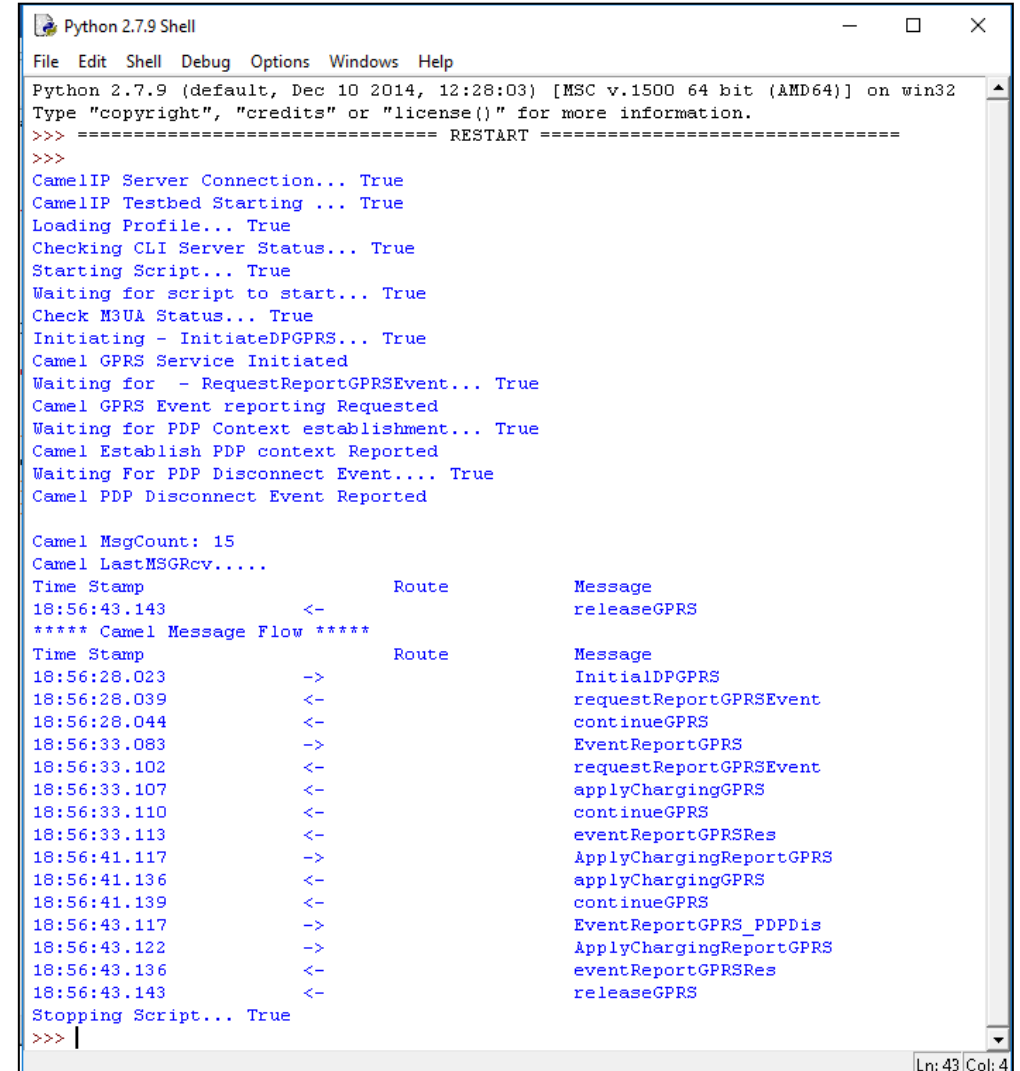
# CLI Support

## MAPS CLI Server



```
CLI MapsCLI gsmSSF (CAMELIP ITU M3UA)
File Edit View
View Latest Command:
1 :: 2018-3-13 18:56:22.341000 : Start "TestBedDefault.xml" ;
1 :: 2018-3-13 18:56:24.731000 : LoadProfile "MS_Profiles.xml"
1 :: 2018-3-13 18:56:24.832000 : IncomingCallHandler # "ASP Up"="M3UA.gls", "IsApiClient"="True";
1 :: 2018-3-13 18:56:24.855000 : IncomingCallHandler # "SST subsystem-status-test"="SCMG.gls", "IsApiClient"="True";
1 :: 2018-3-13 18:56:24.879000 : Apply Global Configuration # "_EnableCLI"=1;
1 :: 2018-3-13 18:56:24.891000 : ServerHSRequest ;
1 :: 2018-3-13 18:56:24.913000 : StartScript 1 "Camel_GPRS_Service_SSF.gls" "MSProfile014" ;
1 :: 2018-3-13 18:56:27.989000 : UserEvent 1 "IsTransportUp";
1 :: 2018-3-13 18:56:28.013000 : UserEvent 1 "Initiate IDPGPRS";
1 :: 2018-3-13 18:56:33.076000 : UserEvent 1 "Establish PDP Context";
1 :: 2018-3-13 18:56:43.111000 : UserEvent 1 "Disconnect PDP Context";
1 :: 2018-3-13 18:56:48.207000 : UserEvent 1 "GetMessageCount";
1 :: 2018-3-13 18:56:48.231000 : UserEvent 1 "GetLastReceivedMessage";
1 :: 2018-3-13 18:56:48.287000 : UserEvent 1 "GetMessageCount";
1 :: 2018-3-13 18:56:48.300000 : UserEvent 1 "GetMessageInfo" # "Index"=0;
1 :: 2018-3-13 18:56:48.334000 : UserEvent 1 "GetMessageInfo" # "Index"=1;
1 :: 2018-3-13 18:56:48.368000 : UserEvent 1 "GetMessageInfo" # "Index"=2;
1 :: 2018-3-13 18:56:48.401000 : UserEvent 1 "GetMessageInfo" # "Index"=3;
1 :: 2018-3-13 18:56:48.447000 : UserEvent 1 "GetMessageInfo" # "Index"=4;
1 :: 2018-3-13 18:56:48.493000 : UserEvent 1 "GetMessageInfo" # "Index"=5;
1 :: 2018-3-13 18:56:48.515000 : UserEvent 1 "GetMessageInfo" # "Index"=6;
1 :: 2018-3-13 18:56:48.548000 : UserEvent 1 "GetMessageInfo" # "Index"=7;
```

## Sample Python Client Script



```
Python 2.7.9 Shell
File Edit Shell Debug Options Windows Help
Python 2.7.9 (default, Dec 10 2014, 12:28:03) [MSC v.1500 64 bit (AMD64)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> ===== RESTART =====
>>>
CamelIP Server Connection... True
CamelIP Testbed Starting ... True
Loading Profile... True
Checking CLI Server Status... True
Starting Script... True
Waiting for script to start... True
Check M3UA Status... True
Initiating - InitiateDPGPRS... True
Camel GPRS Service Initiated
Waiting for - RequestReportGPRSEvent... True
Camel GPRS Event reporting Requested
Waiting for PDP Context establishment... True
Camel Establish PDP context Reported
Waiting For PDP Disconnect Event... True
Camel PDP Disconnect Event Reported

Camel MsgCount: 15
Camel LastMSGRCv.....
Time Stamp          Route          Message
18:56:43.143         <-            releaseGPRS
***** Camel Message Flow *****
Time Stamp          Route          Message
18:56:28.023         ->            InitialDPGPRS
18:56:28.039         <-            requestReportGPRSEvent
18:56:28.044         <-            continueGPRS
18:56:33.083         ->            EventReportGPRS
18:56:33.102         <-            requestReportGPRSEvent
18:56:33.107         <-            applyChargingGPRS
18:56:33.110         <-            continueGPRS
18:56:33.113         <-            eventReportGPRSRes
18:56:41.117         ->            ApplyChargingReportGPRS
18:56:41.136         <-            applyChargingGPRS
18:56:41.139         <-            continueGPRS
18:56:43.117         ->            EventReportGPRS_PDPDis
18:56:43.122         ->            ApplyChargingReportGPRS
18:56:43.136         <-            eventReportGPRSRes
18:56:43.143         <-            releaseGPRS
Stopping Script... True
>>> |
```

**Thank You**