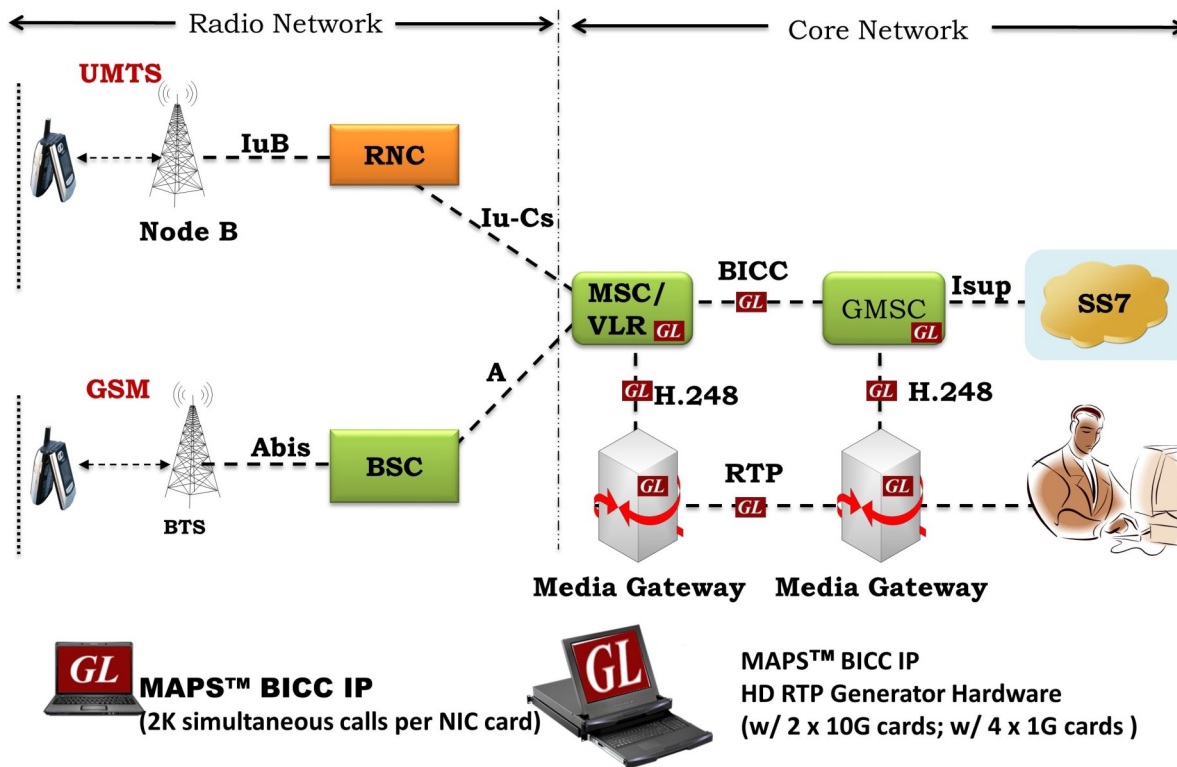


# MAPS™ BICC over IP Emulator

(Bearer Independent Call Control Protocol - SS7 Protocol Suite)



## Overview

GL's Message Automation & Protocol Simulation (MAPS™) architecture is a powerful Protocol Test platform supporting a wide range of protocols.

MAPS™ BICC IP is an emulator for Bearer Independent Call Control (BICC) emulation over IP networks. Specifically, it can emulate BICC call control signaling as defined by the ITU-T standards between Mobile Switching Centre (MSC) and Gateway MSC (GMSC) server nodes. Functions supported includes testing network elements, error tracking, regression testing, conformance testing, load testing/call generation and generation of high volumes of traffic.

MAPS™ BICC IP also supports transmission and detection of various RTP traffic such as, digits, voice file, tones, FAX, IVR, and User defined traffic over IP networks (requires additional RTP traffic licensing).

MAPS™ BICCIP High Density supports generation of high volume of calls with traffic for load testing network using MAPS™ RTP HD network appliance, specialized 1U rack mounted designed to easily achieve up to 20,000 endpoints per appliance (5000 simultaneous calls with duplex traffic per port). Network Simulation Appliance is available in the following appliance: 4x1GigE, 2x1/10 GigE, and 2x40/100 GigE.

MAPS™ supports [Command Line Interface \(CLI\)](#) allowing remote controlling of the application through multiple command-line based clients

For more information, refer to [MAPS™ BICC over IP Protocol Emulator](#) webpage.



818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A  
(Web) [www.gl.com](http://www.gl.com) - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) [info@gl.com](mailto:info@gl.com)

## Main Features

- BICC emulation over IP network
- Supports BICC IP bearer control (call control or APM) messages
- Supported procedures includes Successful Basic Call, Additional Setup, Mid Call, Normal Call Release, Unsuccessful Call Setup, Codec modification/mid-call Codec Negotiation
- Access to all BICC Call Control Message Parameters OPC, DPC, calling number, called number, etc.
- Supports RTP traffic transmission and detection - Digits, Voice, Tones, IVR, FAX
- High density of up to 20,000 calls with traffic is easily achievable per appliance (5000 calls per port)
- Simulate MSC and GMSC Nodes in the BICC over IP network
- CSV file configurations supporting multiple SCTP connections (up to 1024) scaling up the Serving Nodes client and server node configurations
- User-friendly GUI for configuring the M3UA, M2 PA Layers
- Supports Client-Server functionality with additional licensing. clients are “TCL”, “Python”, “VBScript” and “.Net”

## Testbed Setup Configuration

Test Bed setup is provided to establish communication between MAPS™ BICC IP and the DUT. It allows users to configure SCTP layer parameters to transmit and receive messages over M3UA and M2PA layers. It supports multiple Serving Nodes (SCTP connection) configuration using CSV file as SCTP configuration source. This feature considerably contributes to increased performance of MAPS™ application.

End User is configured with default XML file, which defines a set of multiple profiles with varying parameter values allowing users to configure call instances in call generation and to receive calls.

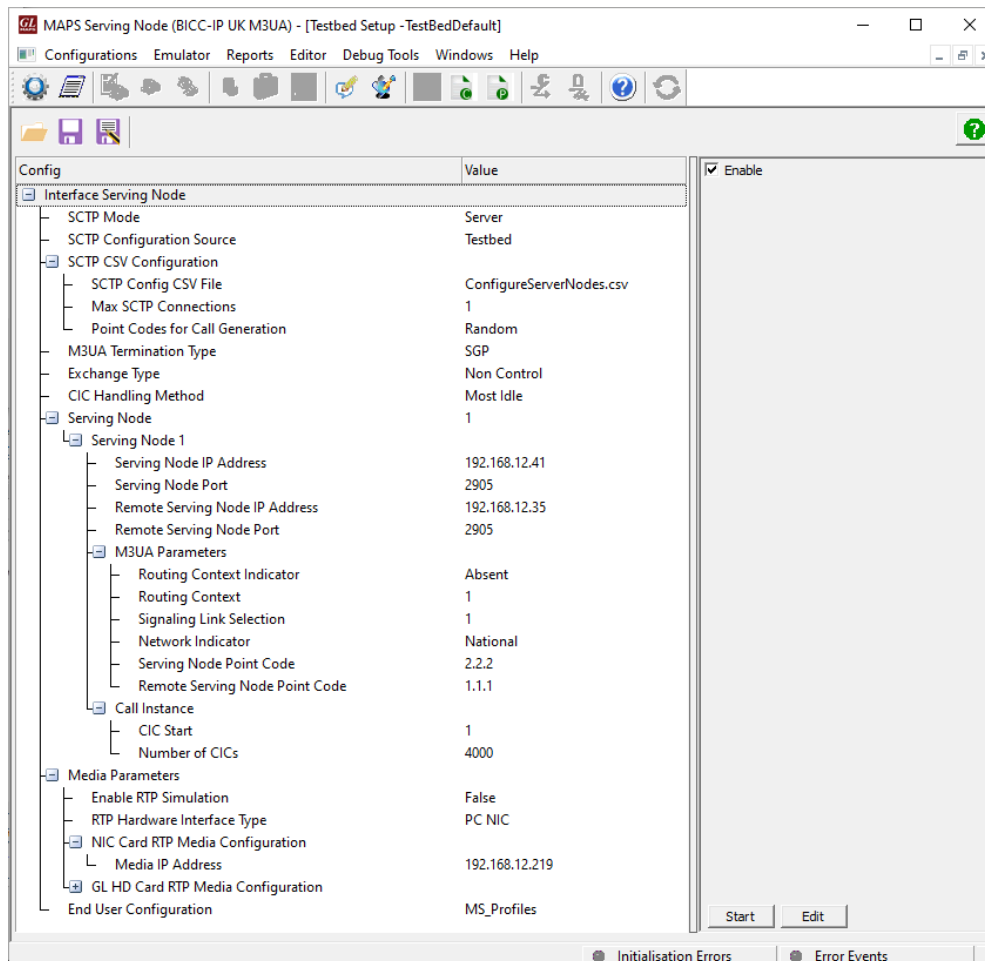


Figure: Testbed setup configuration

## Pre-processing Tools

### Profile Editor

This feature allows loading profile to edit the values of the variables using GUI, replacing the original value of the variables in the message template. An XML file defines a set of multiple profiles with varying parameter values that allow users to configure call instances in call generation and to receive calls. Traffic profiles are available supporting RTP auto traffic types - Digits, File, Tones, IVR, FAX, and also User-defined traffic.

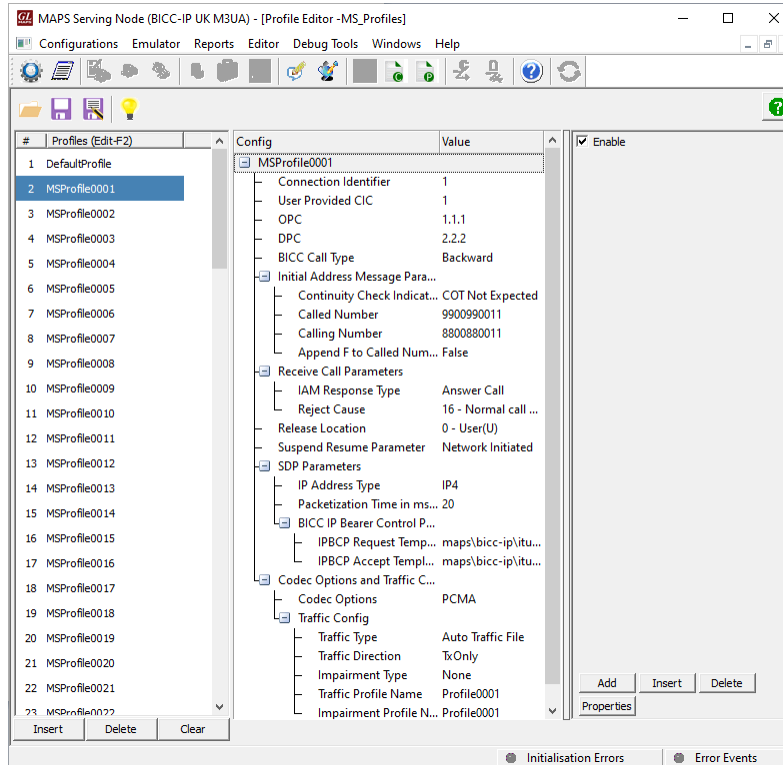


Figure: Profile editor

### SCRIPT EDITOR

The script editor allows the user to create/edit scripts and access protocol fields as variables for the message template parameters. The script uses pre-defined message templates to perform send and receive actions.

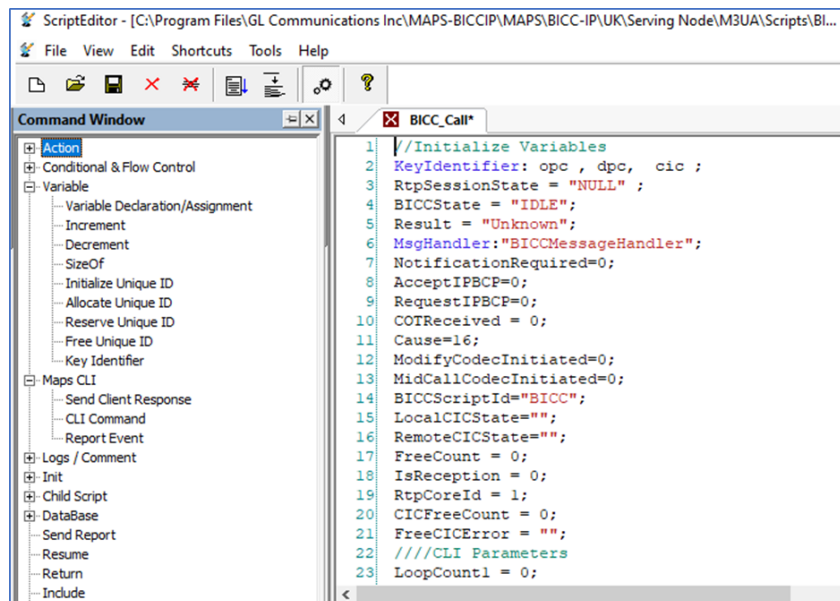


Figure: Script editor

## Pre-processing Tools (Contd.)

### MESSAGE EDITOR

With message editor, users can build a template for each protocol message type. The value for each field may be changed in the message template prior to testing. The protocol fields comprises of mandatory fixed parameters, mandatory variable parameters, and optional variable parameters.

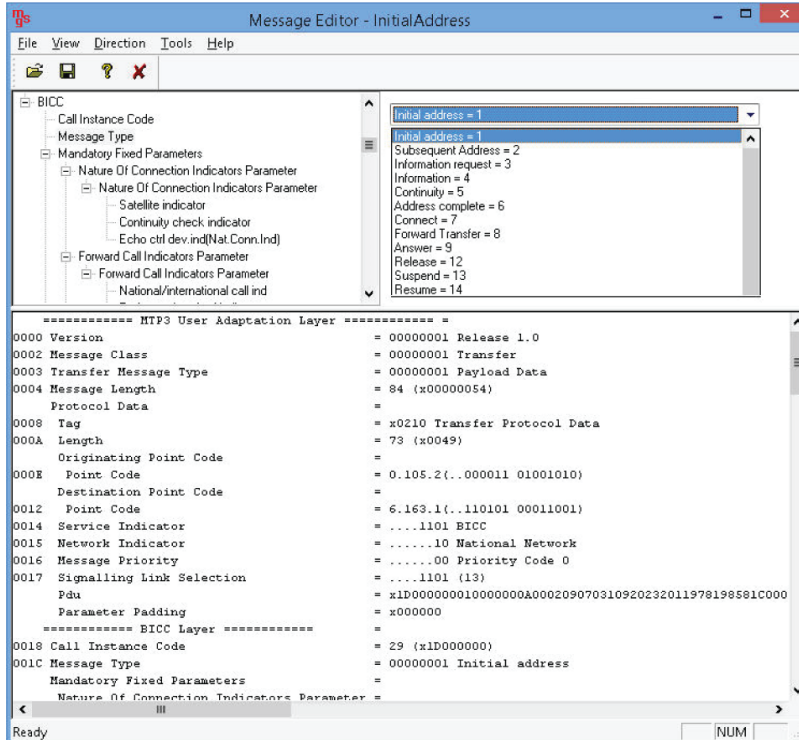
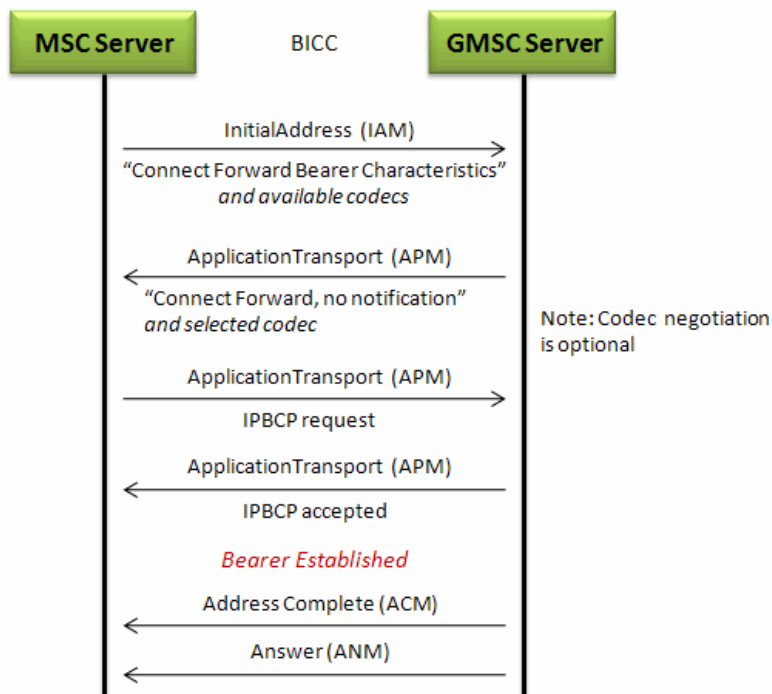


Figure: Message editor

## Typical BICC Call Procedure

MAPS™ BICC can be configured as MSC Server and also as GMSC Server nodes in the BICC IP network, initiating and processing the complete call procedure as indicated in the call flow below.



## Call Generation and Reception

In call generation, MAPS™ is configured for the out going messages, while in call receive mode, it is configured to respond to incoming messages. Tests can be configured to run once, multiple iterations and continuously. Also, allows users to create multiple entries using quick configuration feature.

The editor allows to run the added scripts sequentially (order in which the scripts are added in the window) or randomly (any script from the list of added script as per the call flow requirements). The test scripts may be started manually or they can be automatically triggered by incoming messages.

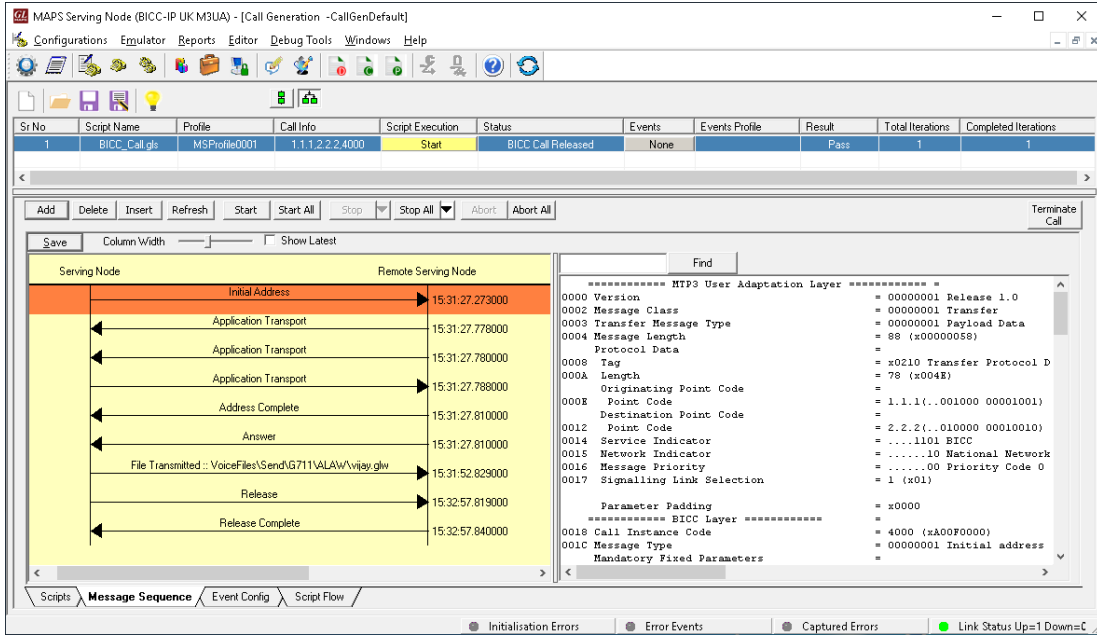


Figure: Call Generation at Client Node

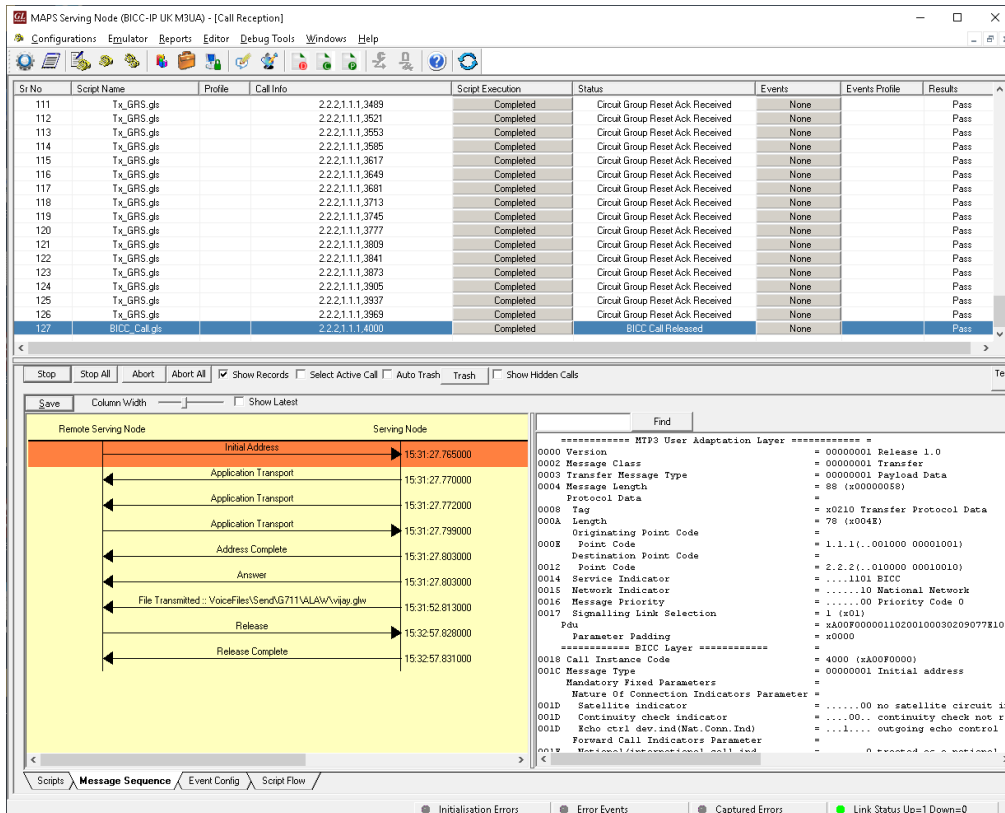
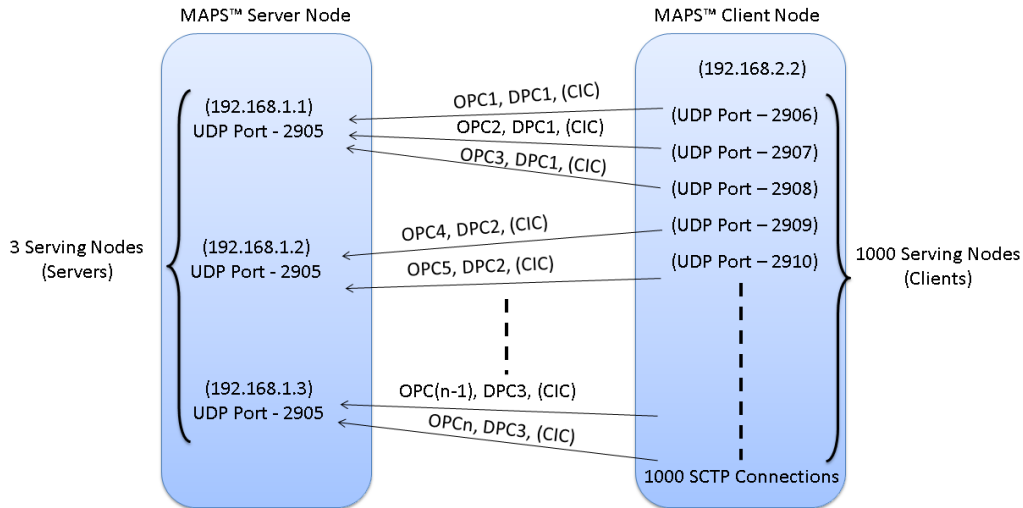


Figure: Call Reception at Server Node

## Multiple Serving Nodes Configurations

MAPS™ now supports multiple Serving Nodes (SCTP connection) configuration using CSV file as SCTP configuration source. A single MAPS™ Server Node can be configured to scale-up the multiple (up to 1024) Client Nodes configuration. Multiple clients can be configured with a unique IP address and varying UDP port numbers (or) varying IP addresses with unique port creating multiple connections.



When MAPS™ is configured with multiple Serving nodes, it accesses the SCTP and M3UA layer parameters from CSV file.

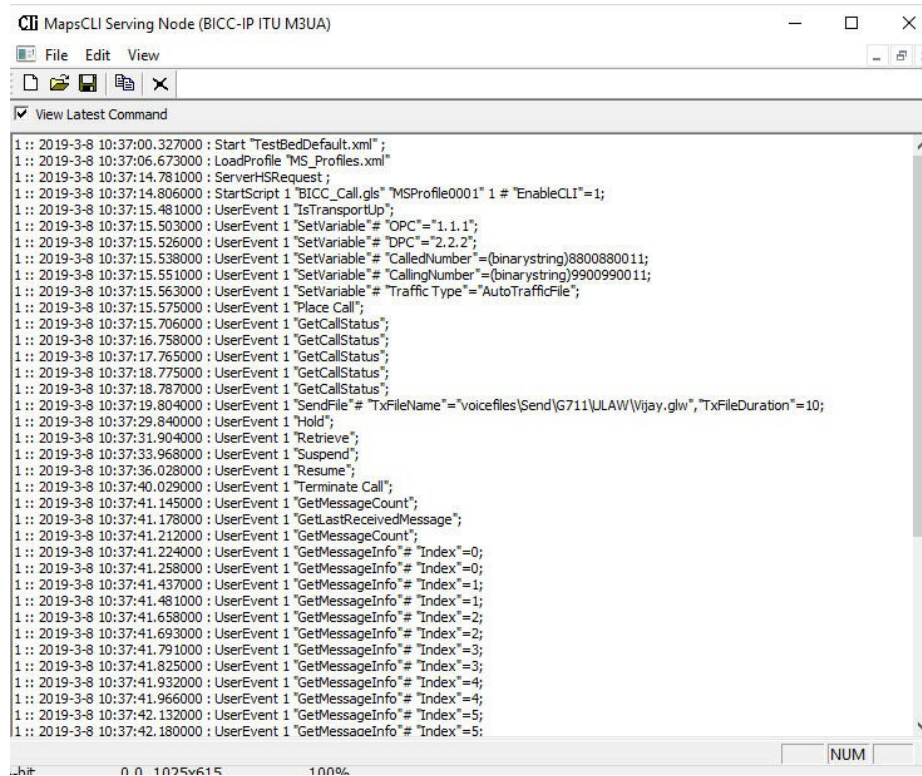
The CSV file includes the following necessary Serving Node parameters, which can be manually configured and saved. The Data Types of all the parameters are as per the specification. Some the parameters are - Connectionid, SourceIPAddress, SourcePort, DestinationIPAddress, DestinationPort, Opc, Dpc, and MediaIPAddress.

connectionid	SourceIPAddress	SourcePort	DestinationIPAddress	DestinationPort	opc	dpc	SubPrefix	CICstart	CICrange	RC	SLS	NetInd	MediaIPAddress
1	192.168.1.36	2906	192.168.1.50	2905	1.1.1	2.1.1	4	1	5	12512	1	2	192.168.1.36
2	192.168.1.36	2907	192.168.1.50	2905	1.2.1	2.2.1	4	1	5	12512	1	2	192.168.1.36
3	192.168.1.36	2908	192.168.1.50	2905	1.3.1	2.3.1	4	1	5	12512	1	2	192.168.1.36
4	192.168.1.36	2909	192.168.1.50										
5	192.168.1.36	2910	192.168.1.50										
6	192.168.1.36	2911	192.168.1.50										
7	192.168.1.36	2912	192.168.1.50										
8	192.168.1.36	2913	192.168.1.50										
9	192.168.1.36	2914	192.168.1.50										
10	192.168.1.36	2915	192.168.1.50										
11	192.168.1.36	2916	192.168.1.50										
12	192.168.1.36	2917	192.168.1.50										
13	192.168.1.36	2918	192.168.1.50										
14	192.168.1.36	2919	192.168.1.50										
15	192.168.1.36	2920	192.168.1.50										
16	192.168.1.36	2921	192.168.1.50										
17	192.168.1.36	2922	192.168.1.50										
18	192.168.1.36	2923	192.168.1.50										
19	192.168.1.36	2924	192.168.1.50										
20	192.168.1.36	2925	192.168.1.50										
21	192.168.1.36	2926	192.168.1.50										

## Command Line Interface (CLI)

MAPS™ can be configured as server-side application, to enable remote controlling of the application through multiple command-line based clients. Supported clients include TCL, Python, VBScript, Java, and .Net.

Clients can remotely perform all functions such as start testbed setup, load scripts, and profiles, apply user events such as send digits/file/tones, detect digits/file/tones, dial, originate call, terminate call, start and stop traffic and so on. User can also generate and receive calls through commands. This client application is distributed along with MAPS™ Server application



```

CLI MapsCLI Serving Node (BICC-IP ITU M3UA)
File Edit View
View Latest Command
1:: 2019-3-8 10:37:00.327000 : Start "TestBedDefault.xml";
1:: 2019-3-8 10:37:06.673000 : LoadProfile "MS_Profiles.xml"
1:: 2019-3-8 10:37:14.781000 : ServerHSRequest;
1:: 2019-3-8 10:37:14.806000 : StartScript 1 "BICC_Call.gls" "MSProfile0001" 1 # "EnableCLI"=1;
1:: 2019-3-8 10:37:15.481000 : UserEvent 1 "IsTransportUp";
1:: 2019-3-8 10:37:15.503000 : UserEvent 1 "SetVariable" # "OPC"="1.1.1";
1:: 2019-3-8 10:37:15.526000 : UserEvent 1 "SetVariable" # "DPC"="2.2.2";
1:: 2019-3-8 10:37:15.538000 : UserEvent 1 "SetVariable" # "CalledNumber"=(binarystring)8800880011;
1:: 2019-3-8 10:37:15.551000 : UserEvent 1 "SetVariable" # "CallingNumber"=(binarystring)9900990011;
1:: 2019-3-8 10:37:15.563000 : UserEvent 1 "SetVariable" # "Traffic Type"="AutoTrafficFile";
1:: 2019-3-8 10:37:15.575000 : UserEvent 1 "Place Call";
1:: 2019-3-8 10:37:15.706000 : UserEvent 1 "GetCallStatus";
1:: 2019-3-8 10:37:16.758000 : UserEvent 1 "GetCallStatus";
1:: 2019-3-8 10:37:17.765000 : UserEvent 1 "GetCallStatus";
1:: 2019-3-8 10:37:18.775000 : UserEvent 1 "GetCallStatus";
1:: 2019-3-8 10:37:18.787000 : UserEvent 1 "GetCallStatus";
1:: 2019-3-8 10:37:19.804000 : UserEvent 1 "SendFile" # "TxFileName"="voicefiles/Send/G711\JLAW\Wijay.glw", "TxFileDuration"=10;
1:: 2019-3-8 10:37:29.840000 : UserEvent 1 "Hold";
1:: 2019-3-8 10:37:31.904000 : UserEvent 1 "Retrieve";
1:: 2019-3-8 10:37:33.968000 : UserEvent 1 "Suspend";
1:: 2019-3-8 10:37:36.028000 : UserEvent 1 "Resume";
1:: 2019-3-8 10:37:40.029000 : UserEvent 1 "Terminate Call";
1:: 2019-3-8 10:37:41.145000 : UserEvent 1 "GetMessageCount";
1:: 2019-3-8 10:37:41.178000 : UserEvent 1 "GetLastReceivedMessage";
1:: 2019-3-8 10:37:41.212000 : UserEvent 1 "GetMessageCount";
1:: 2019-3-8 10:37:41.224000 : UserEvent 1 "GetMessageInfo" # "Index"=0;
1:: 2019-3-8 10:37:41.258000 : UserEvent 1 "GetMessageInfo" # "Index"=0;
1:: 2019-3-8 10:37:41.437000 : UserEvent 1 "GetMessageInfo" # "Index"=1;
1:: 2019-3-8 10:37:41.481000 : UserEvent 1 "GetMessageInfo" # "Index"=1;
1:: 2019-3-8 10:37:41.658000 : UserEvent 1 "GetMessageInfo" # "Index"=2;
1:: 2019-3-8 10:37:41.693000 : UserEvent 1 "GetMessageInfo" # "Index"=2;
1:: 2019-3-8 10:37:41.791000 : UserEvent 1 "GetMessageInfo" # "Index"=3;
1:: 2019-3-8 10:37:41.825000 : UserEvent 1 "GetMessageInfo" # "Index"=3;
1:: 2019-3-8 10:37:41.932000 : UserEvent 1 "GetMessageInfo" # "Index"=4;
1:: 2019-3-8 10:37:41.966000 : UserEvent 1 "GetMessageInfo" # "Index"=4;
1:: 2019-3-8 10:37:42.132000 : UserEvent 1 "GetMessageInfo" # "Index"=5;
1:: 2019-3-8 10:37:42.180000 : UserEvent 1 "GetMessageInfo" # "Index"=5;

```

Figure: MAPS™ CLI Server



```

Python 3.7.5 Shell
File Edit Shell Debug Options Window Help
Type "copyright", "credits" or "license()" for more information.
>>>
RESTART: C:\Program Files\GL Communications Inc\MAPS-BICCIP\MAPSCLI\Python Client\examples\Bicc
Ip_RecvCall.py
BICC IP Server Connection... True
BICC IP Testbed Starting... True
BICC IP Profile Loading... True
Waiting for BICC IP Call... BICC CALL RECEIVED
Set Traffic Type: 0
BICC IP Call Answer... True
BICC IP Call Status...BICC CALL CONNECTED
BICC IP Call Hold... True
BICC IP Call Retrieve... True
BICC IP Call Suspend... True
BICC IP Call Resume... True
BICC IP Call Terminating... True
BICC IP Call MsgCount: 11
BICC IP Call's LastMSGrcv.....
Time Stamp      Route      Message
10:43:20.774    <-       Release Complete

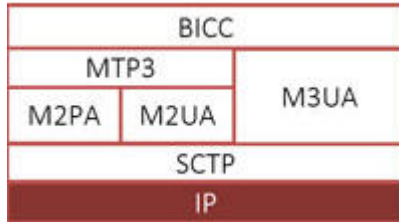
***** BICC IP Call Message Flow *****
CLI <-> DUT

Time Stamp      Route      Message
10:43:10.239    <-       Initial Address
10:43:10.311    ->       Application Transport
10:43:10.332    <-       Application Transport
10:43:10.380    ->       Address Complete
10:43:10.450    ->       Answer
10:43:10.487    ->       Call Progress
10:43:12.557    ->       Call Progress
10:43:14.630    ->       Suspend
10:43:16.706    ->       Resume

```

Figure: Sample Python Client CLI Script

## Supported Protocol and Specifications



Supported Protocols	Standards Used
BICC	ITU-T Q.1902
IP BCP	RFC 2327
MTP3	ITU-T Q.782
M2PA	RFC 4165
M3UA	RFC 3332
SCTP	RFC 4960



## Buyer's Guide

Item No	Product Description
<a href="#">PKS155</a>	MAPS™ BICC over IP Protocol Emulator
<a href="#">PKS109</a>	MAPS™ RTP HD
<a href="#">PKS102</a>	RTP Traffic Option
<a href="#">PKS108</a>	RTP Voice Quality Measurements
<a href="#">PKS106</a>	RTP Video Traffic Generation
<a href="#">PKS200</a>	RTP Pass Through Fax Emulation

Item No	Related Software
<a href="#">XX649</a>	MAPS™ SS7
<a href="#">XX647</a>	MAPS™ SS7 Conformance Test Suite (Test Scripts)
<a href="#">XX649</a>	MAPS™ MAP Protocol Emulator
<a href="#">PKS132</a>	MAPS™ MAP over IP Protocol Emulator
<a href="#">XX648</a>	MAPS™ ISDN
<a href="#">XX692</a>	MAPS™ GSM -A Interface Emulator
<a href="#">XX693</a>	MAPS™ GSM- Abis Interface Emulator
<a href="#">PKS130</a>	MAPS™ SIGTRAN (SS7 over IP)
<a href="#">PKS135</a>	MAPS™ ISDN -SIGTRAN (ISDN over IP)
<a href="#">XX100</a>	ISDN Analyzer Software
<a href="#">XX120</a>	SS7 Analysis Software

**Note:** PCs which include GL hardware/software require Intel or AMD processors for compliance.

For more information, please visit [Signaling and traffic simulator](#) webpage.



**GL Communications Inc.**

818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A  
 (Web) [www.gl.com](http://www.gl.com) - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) [info@gl.com](mailto:info@gl.com)