MAPS™ BICC over IP EMULATOR
Bearer Independent Call Control Protocol Emulation over IP
MAPS™ BICC IP Emulator

Wireless

UE

BSC

RNC

2G/3G

Serving Node A

MSC

MGC

IP

BICC

Serving Node B

GMSC

MGC

ISUP

PSTN

RTP

MGW

Mc

IuCS

RTP

MGW

Mc

Nb

GL Communications Inc.
Protocol Specific Features

- BICC simulation over IP network
- User-friendly GUI for configuring the BICC IP Layers
- 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, and more
- Simulate MSC and GMSC Nodes in the BICC over IP network
- User-friendly GUI for configuring the M3UA Layers
- Supports transmission and detection of various RTP traffic such as, digits, voice file, single tone, and dual tones over established calls.
- High density of up to 20,000 calls with traffic is easily achievable per appliance (5000 calls per port)
- Supports Client-Server functionality requires additional license; clients supported are TCL, Python, VBScript, Java, and .Net
Supported Protocol Standards

<table>
<thead>
<tr>
<th>Supported Protocols</th>
<th>Standard / Specification Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>BICC</td>
<td>ITU-T Q.1902</td>
</tr>
<tr>
<td>IPBCP</td>
<td>RFC 2327</td>
</tr>
<tr>
<td>M3UA</td>
<td>RFC 3332</td>
</tr>
<tr>
<td>SCTP</td>
<td>RFC 4960</td>
</tr>
</tbody>
</table>
Supported BICC IP Procedures

• Successful Basic Call procedure with enBloc and Overlap operation includes
  ➢ IAM, SAM, ACM, ANM messages
• Mid Call Procedures
  ➢ Suspend
  ➢ Resume
• Normal Call Release Procedures
• Unsuccessful call Setup
• Codec modification/mid-call Codec negotiation procedures

• Additional Setup procedures
  ➢ Call progress
  ➢ Information Messages
  ➢ Echo Control procedures
  ➢ Signaling Procedures for Connection Type
  ➢ Information message
  ➢ Calling Geodetic Procedures
  ➢ Inter - Nodal Traffic group Identification
  ➢ Charging
  ➢ Support for Temporary Alternative Routing (TAR)
  ➢ Hop Counter Procedures
BICC over IP Call Procedure

MSC Server

InitialAddress (IAM)
“Connect Forward Bearer Characteristics”
and available codecs

ApplicationTransport (APM)
“Connect Forward, no notification”
and selected codec

ApplicationTransport (APM)

GMSC Server

IPBCP request

ApplicationTransport (APM)

IPBCP accepted

Bearer Established

Address Complete (ACM)

Answer (ANM)

Note: Codec negotiation is optional
BICC IP Testbed Setup
BICC IP Profile Editor
BICC IP Call Generation

MAPS™ Features

Loading Scripts and Profiles

Message Sequence

Decode Message

Active Calls  Call Status  Call Events
BICC IP Call Reception

- **Message Sequence:**
  - DUT
    - Message Transport
    - Application Transport
    - Address Complete
  - File Transmit
    - Release Complete

- **Decode Message:**
  - MAPS™ Features

- **Call Results:**
  - MAPS (Message Automation Protocol Simulation) Serving Node (BICC-IIP UK M3UA) - [Call Reception]
  - Call Results

**MAPS™ Features**

**GL Communications Inc.**

10
### BICC IP Event Log

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Event Log</th>
<th>Captured Events</th>
<th>Call Trace Id</th>
<th>Script Name</th>
<th>Script Id</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016-4-25 10:23:47</td>
<td>10:070000</td>
<td>CIC = 9985 &amp; Range = 16</td>
<td>1.1.2.2.2.9985</td>
<td>Rx_CIC_Management.js</td>
<td>ProtScriptId_627_2405052</td>
</tr>
<tr>
<td>2016-4-25 10:23:47</td>
<td>10:070000</td>
<td>Status bits =</td>
<td>1.1.2.2.2.9985</td>
<td>Rx_CIC_Management.js</td>
<td>ProtScriptId_627_2405052</td>
</tr>
<tr>
<td>2016-4-25 10:23:52</td>
<td>704000</td>
<td>RTP Stats Query Script started</td>
<td>1.1.2.2.2.9985</td>
<td>RTP_Stats_Display.js</td>
<td>ProtScriptId_628_2405108</td>
</tr>
<tr>
<td>2016-4-25 10:25:44</td>
<td>519000</td>
<td>RequestPath = maps\bicc-ip\utu\serving node\m3ua_message\b...</td>
<td>1.1.2.2.2.100000</td>
<td>BICC_Call.js</td>
<td>CGProtScriptId_0_2405216</td>
</tr>
<tr>
<td>2016-4-25 10:25:44</td>
<td>519000</td>
<td>AcceptPath = maps\bicc-ip\utu\serving node\m3ua_message...</td>
<td>1.1.2.2.2.100000</td>
<td>BICC_Call.js</td>
<td>CGProtScriptId_0_2405216</td>
</tr>
<tr>
<td>2016-4-25 10:25:44</td>
<td>519000</td>
<td>Call Initiated</td>
<td>1.1.2.2.2.100000</td>
<td>BICC.js</td>
<td>CGProtScriptId_0_2405216</td>
</tr>
<tr>
<td>2016-4-25 10:25:44</td>
<td>443000</td>
<td>Call Connected</td>
<td>1.1.2.2.2.100000</td>
<td>BICC.js</td>
<td>CGProtScriptId_0_2405216</td>
</tr>
<tr>
<td>2016-4-25 10:25:44</td>
<td>443000</td>
<td>Sending RTP File</td>
<td>1.1.2.2.2.100000</td>
<td>BICC_Call.js</td>
<td>CGProtScriptId_0_2405216</td>
</tr>
<tr>
<td>2016-4-25 10:26:04</td>
<td>849000</td>
<td>RTP File Sent</td>
<td>1.1.2.2.2.100000</td>
<td>BICC_Call.js</td>
<td>CGProtScriptId_0_2405216</td>
</tr>
<tr>
<td>2016-4-25 10:26:44</td>
<td>898300</td>
<td>Call Released</td>
<td>1.1.2.2.2.100000</td>
<td>BICC.js</td>
<td>CGProtScriptId_0_2405216</td>
</tr>
<tr>
<td>2016-4-25 10:27:09</td>
<td>761000</td>
<td>RequestPath = maps\bicc-ip\utu\serving node\m3ua_message...</td>
<td>1.1.2.2.2.100000</td>
<td>BICC_Call.js</td>
<td>CGProtScriptId_1_2405707</td>
</tr>
<tr>
<td>2016-4-25 10:27:09</td>
<td>761000</td>
<td>AcceptPath = maps\bicc-ip\utu\serving node\m3ua_message...</td>
<td>1.1.2.2.2.100000</td>
<td>BICC_Call.js</td>
<td>CGProtScriptId_1_2405707</td>
</tr>
<tr>
<td>2016-4-25 10:27:09</td>
<td>766000</td>
<td>Call Initiated</td>
<td>1.1.2.2.2.100000</td>
<td>BICC.js</td>
<td>CGProtScriptId_1_2405707</td>
</tr>
<tr>
<td>2016-4-25 10:27:09</td>
<td>043000</td>
<td>Call Connected</td>
<td>1.1.2.2.2.100000</td>
<td>BICC.js</td>
<td>CGProtScriptId_1_2405707</td>
</tr>
<tr>
<td>2016-4-25 10:27:09</td>
<td>846000</td>
<td>Sending RTP File</td>
<td>1.1.2.2.2.100000</td>
<td>BICC_Call.js</td>
<td>CGProtScriptId_1_2405707</td>
</tr>
<tr>
<td>2016-4-25 10:27:29</td>
<td>846000</td>
<td>RTP File Sent</td>
<td>1.1.2.2.2.100000</td>
<td>BICC_Call.js</td>
<td>CGProtScriptId_1_2405707</td>
</tr>
<tr>
<td>2016-4-25 10:28:09</td>
<td>875000</td>
<td>Call Released</td>
<td>1.1.2.2.2.100000</td>
<td>BICC.js</td>
<td>CGProtScriptId_1_2405707</td>
</tr>
</tbody>
</table>

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**save events**

- **clear**
- **capture events to file**
MAPS™ Features

BICC IP Load Generation

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

- Fixed
- Ramp
- Uniform
- Normal
- Saw-tooth
- Step

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GL Communications Inc.
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
BICC IP HD Testbed Setup
BICC IP HD Profile Editor
### BICC IP HD Incoming Call Handler Configuration

#### MAPS™ Features

**Incoming Call Handlers Configuration - default**

<table>
<thead>
<tr>
<th>Message Name</th>
<th>Script Name</th>
<th>Scripts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Address</td>
<td>BICC_Call.gls</td>
<td>BICC_Call.gls</td>
</tr>
<tr>
<td>Circuit Group Reset</td>
<td>Rx_CIC_Management.gls</td>
<td></td>
</tr>
<tr>
<td>Circuit Group Blocking</td>
<td>Rx_CIC_Management.gls</td>
<td></td>
</tr>
<tr>
<td>Circuit Group Unblocking</td>
<td>Rx_CIC_Management.gls</td>
<td></td>
</tr>
<tr>
<td>Release</td>
<td>Rx_IdleStateMsgHandler.gls</td>
<td></td>
</tr>
<tr>
<td>Circuit Group Blocking Acknowledgement</td>
<td>Rx_CIC_Management.gls</td>
<td></td>
</tr>
<tr>
<td>Circuit Group Unblocking Acknowledgement</td>
<td>Rx_CIC_Management.gls</td>
<td></td>
</tr>
<tr>
<td>Circuit Group Reset Acknowledgement</td>
<td>Rx_CIC_Management.gls</td>
<td></td>
</tr>
<tr>
<td>Release Complete</td>
<td>Rx_IdleStateMsgHandler.gls</td>
<td></td>
</tr>
<tr>
<td>Reset Circuit</td>
<td>Rx_CIC_Management.gls</td>
<td></td>
</tr>
<tr>
<td>ASP Up</td>
<td>M3UA.gls</td>
<td></td>
</tr>
<tr>
<td>ASP Down</td>
<td>M3UA.gls</td>
<td></td>
</tr>
<tr>
<td>ASP Active</td>
<td>M3UA.gls</td>
<td></td>
</tr>
<tr>
<td>ASP Inactive</td>
<td>M3UA.gls</td>
<td></td>
</tr>
<tr>
<td>Address Complete</td>
<td>Rx_IdleStateMsgHandler.gls</td>
<td></td>
</tr>
<tr>
<td>Connect</td>
<td>Rx_IdleStateMsgHandler.gls</td>
<td></td>
</tr>
<tr>
<td>Answer</td>
<td>Rx_IdleStateMsgHandler.gls</td>
<td></td>
</tr>
<tr>
<td>Suspend</td>
<td>Rx_IdleStateMsgHandler.gls</td>
<td></td>
</tr>
<tr>
<td>Resume</td>
<td>Rx_IdleStateMsgHandler.gls</td>
<td></td>
</tr>
<tr>
<td>Application Transport</td>
<td>Rx_IdleStateMsgHandler.gls</td>
<td></td>
</tr>
</tbody>
</table>

### GL Communications Inc.
Bulk Call Simulation Results

Call Statistics

Message Statistics
Customizations - Call Flow (Scripts)
Customizations - Protocol Messages
MAPS™ API Architecture

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

```plaintext
load mapsclientlic.dll
maps connect 1 192.168.10.32 10024
maps cmd 1 "start TestBedDefault.xml"
maps cmd 1 startscript1 "Script.gis" "Profile.xml"
1 # Host = 1, cardno = 2
```
Command Line Interface

MAPS™ Feature

Serving Node Client

MAPS™ CLI Server

GL Communications Inc.
Thank You