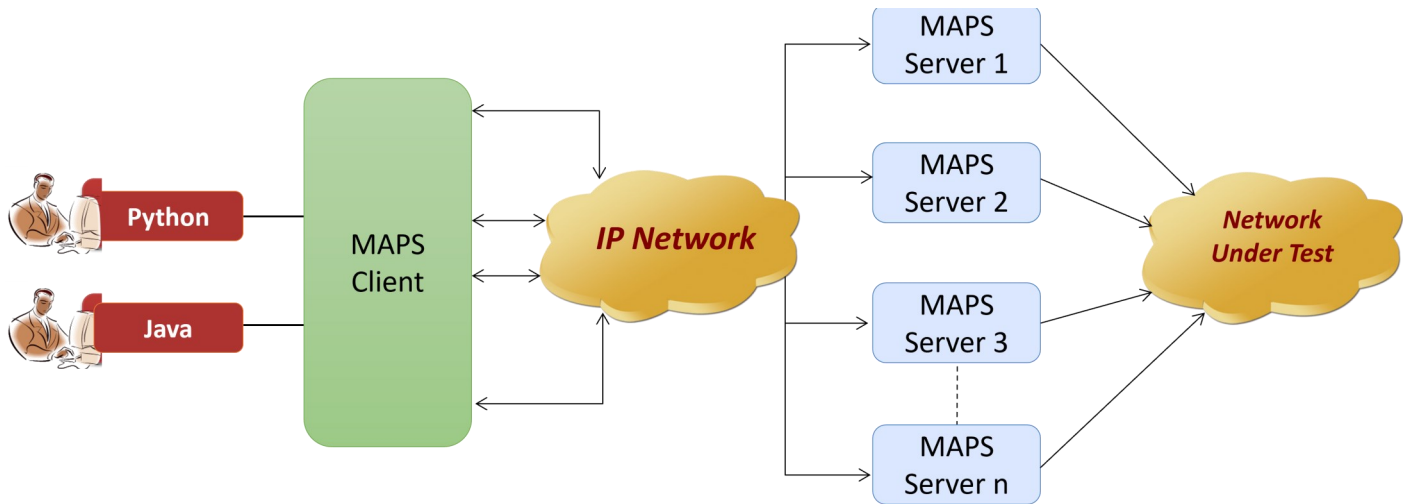


MAPS™ APIs for Complete Automation

(Signaling and Traffic Simulation over IP, Wireless, TDM and Analog Networks)



Overview

GL's [Message Automation and Protocol Emulation](#) (MAPS™) is a protocol and traffic simulation and conformance test tool that supports a variety of protocols such as SIP, MEGACO, MGCP, SS7, ISDN, GSM, MAP, CAS, LTE, UMTS, SS7 SIGTRAN, ISDN SIGTRAN, SIP I, GSM A over IP, Diameter and others.

MAPS™ can be configured as server-side application, to enable remote controlling through multiple command-line based clients which include Python and Java. Python is supported over all protocols as a standard and Java over limited protocols.

The MAPS™ APIs allows for programmatic and automated control over all MAPS™ platforms. Each MAPS™ server can receive multiple client connections and offer independent execution to each client. Likewise, a single client can connect to multiple MAPS™ servers, including servers running different protocols, permitting complex cross-protocol test cases.

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.

For more information, please visit [MAPS™ Application Programming Interface \(APIs\) for Complete Automation](#) webpage.

Main Features

- MAPS™ Command Line Interface (CLI) offers complete Lab Management, Device Provisioning and Test Automation solutions
- A unified solution for advanced testing with intuitive drag and drop user interface
- Tests can easily be executed over multiple test stations and at distributed testing labs
- Support for a wide range of test setups, interfaces, protocols, and script languages. Examples include CAS and SIP Test Systems that permit automated testing of network devices
- MAPS™ CLI streamlines both the source script and the output by executing only user requested messages
- Simultaneous bulk calls capability
- Remote monitoring capability
- All script commands are simple and self-explanatory
- Multiple MAPS™ CLI servers can be controlled remotely from single client application

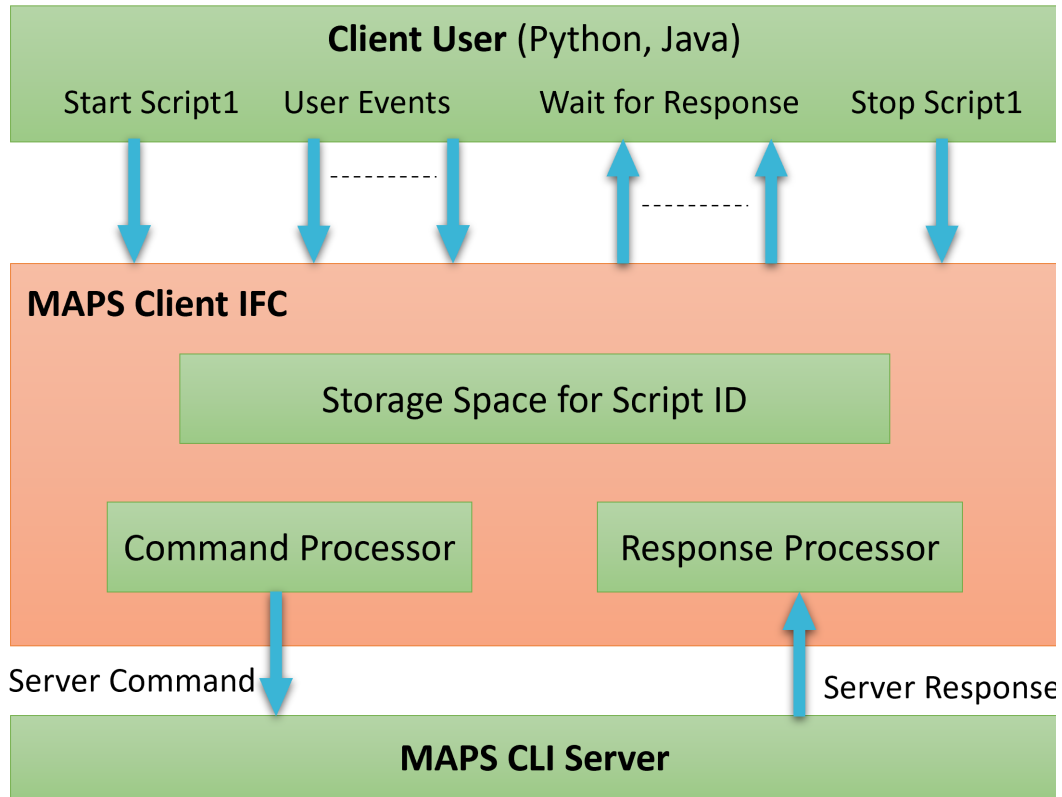
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Working Principle

Shown below is the working principle of the MAPS™ CLI Test System.

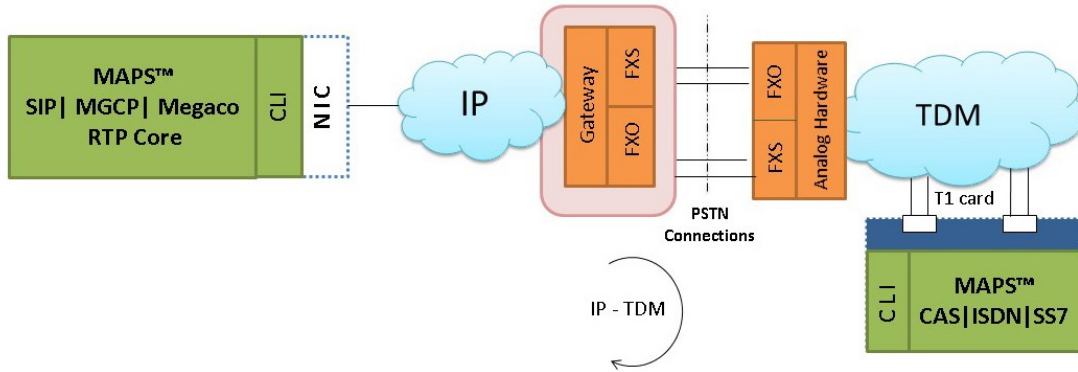
- Client user (Python and Java) run client scripts which executes the command that instructs the MAPS™ CLI Server
- MAPS™ Client interface interprets the User Events from Client user to MAPS™ CLI Server and vice versa
- MAPS™ CLI Server runs the CLI script which emulates the state machine to place/answer the call or send/receive traffic
- In case of T1 E1 Protocols, MAPS™ CLI Server additionally interacts with the T1 E1 WCS server to perform the requested task. The reports are generated for the event performed and is sent back to client user



Working Principle

Test Setup for Gateway Testing

As depicted in the figure, complete Gateway testing can be performed through MAPS™ CLI environment.



Test Setup for Gateway Testing

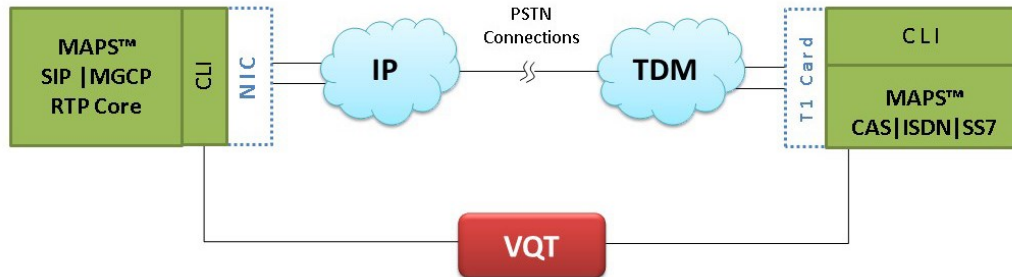
The following call flow depicts the messages exchanged between MAPS™ SIP to MAPS™ CAS via Gateway, thus testing the Gateway (Device-under-Test)



Voice Quality Analysis using VQT

MAPS™ RTP Core offers integrated, packet-based Voice Quality analysis with the optional licenses. The following screen depicts the Voice Quality statistics performed using python client.

The MAPS™ API is also now fully integrated with GL's VQT software which delivers PESQ/POLQA scores (i.e. waveform analysis, rather than packet analysis).



```

Python 2.7.9 Shell
File Edit Shell Debug Options Window Help
Python 2.7.9 (default, Dec 10 2014, 12:24:55) [MSC v.1500 32 bit (Intel)] on win
32
Type "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: C:\Python27\SipBasicCall.py =====
SERVER INITIALIZED
CONNECTED
RTP Action pass
CMOS = 4.195313
LMOS = 4.195313
CR_FACTOR = 93
LR_FACTOR = 93
TX_PACKETS = 104
RX_PACKETS = 114
LOST_PACKETS = 0
DISCARDED_PACKETS = 0
OUT_OF_SEQ_PACKETS = 0
DUPLICATE_PACKETS = 0
AVG_JITTER = 0.437500

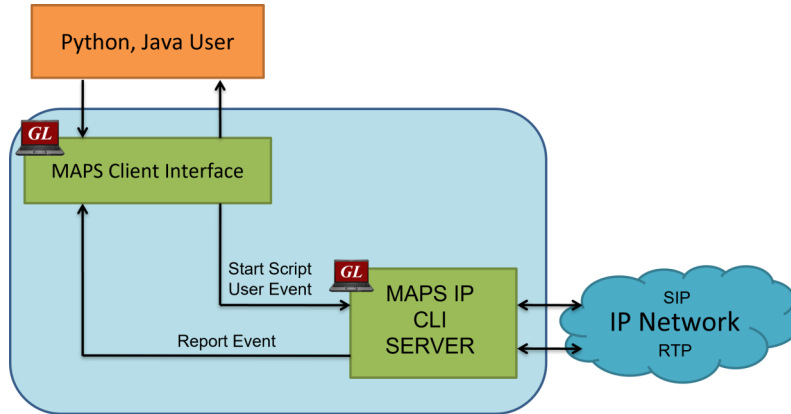
```

VQT Analysis - Python Client

SIP Test System

As depicted in the figure below, MAPS™ SIP CLI test system consists of the following -

- A Python / Java interface communicating over TCP/IP
- MAPS™ Client IFC, and MAPS™ SIP CLI Server

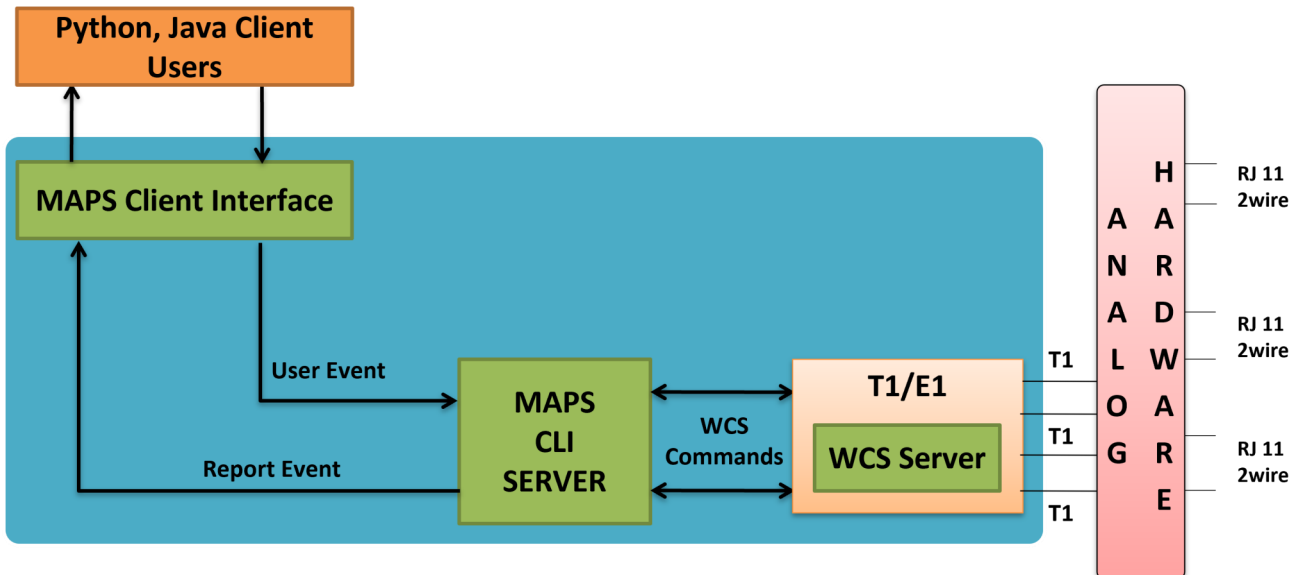


SIP Test System Module

CAS Test System

As depicted in the figure below, MAPS™ CAS CLI test system consists of the following -

- Python/Java interface communicating over TCP/IP
- MAPS Client IFC, MAPS™ CAS CLI Server, T1 Software (including Windows Client Server software) and a Dual T1 Card
- Analog Hardware with FXO Cards
- A patch panel for RJ-11 connections to the outside world



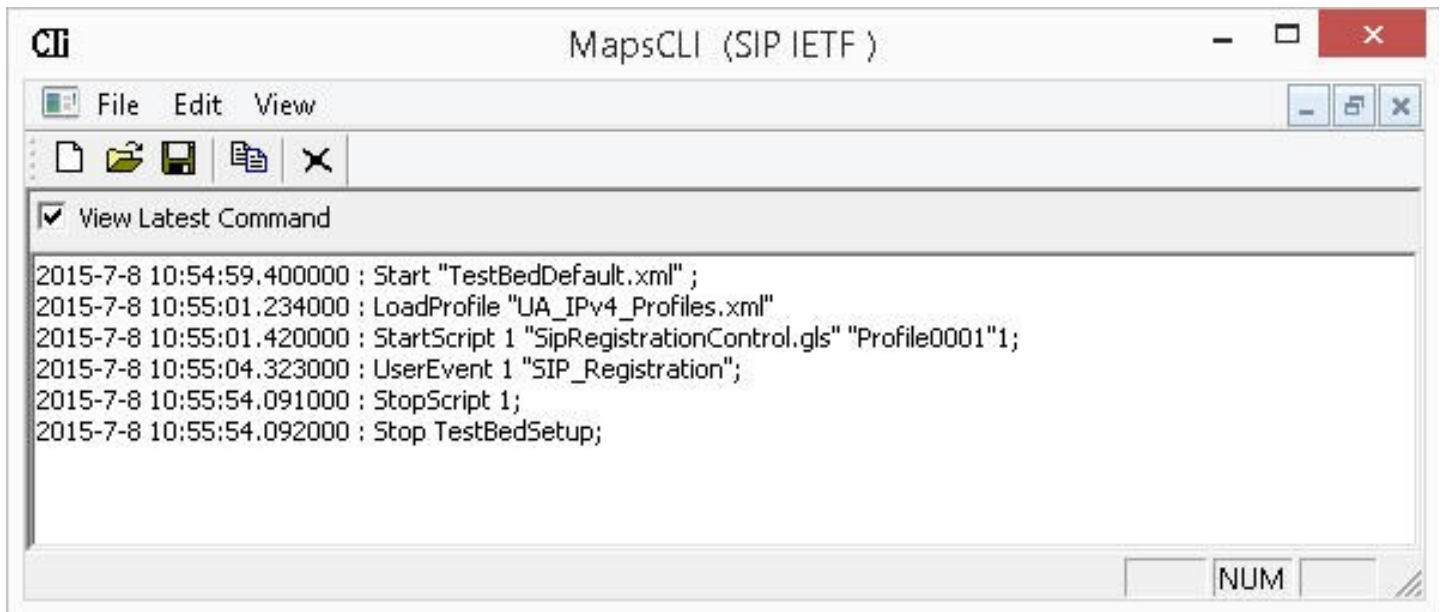
CAS Test System Modules

MAPS™ CLI Server

MAPS™ CLI Server is an executable which inherits all features of MAPS™ without GUI. It listens to a TCP message socket to receive and execute commands from client and sends the responses back to client.

CLI Server script execution is Event Driven, i.e., Server detects the Events such as Tone, Digits, Tx File Rx File, Signals etc., and sets or resets predefined Variables.

- **Signaling Events:** Signal Events are triggered when any CAS Signaling is detected such as Offhook, OnHook, Seizure, etc. and SIP Signaling User Events such as Answer Call, Place Call, and Terminate
- **Traffic Events:** Traffic Events are triggered when any traffic other than signaling are detected such as Tone, Digits, File, and others



The screenshot shows a window titled "MapsCLI (SIP IETF)" with a menu bar (File, Edit, View) and a toolbar. A checkbox labeled "View Latest Command" is checked. The main area displays a log of events with timestamps and descriptions:

```
2015-7-8 10:54:59.400000 : Start "TestBedDefault.xml" ;
2015-7-8 10:55:01.234000 : LoadProfile "UA_IPv4_Profiles.xml"
2015-7-8 10:55:01.420000 : StartScript 1 "SipRegistrationControl.gls" "Profile0001"1;
2015-7-8 10:55:04.323000 : UserEvent 1 "SIP_Registration";
2015-7-8 10:55:54.091000 : StopScript 1;
2015-7-8 10:55:54.092000 : Stop TestBedSetup;
```

At the bottom right, there is a "NUM" field and a scroll bar.

MAPS CLI Server log

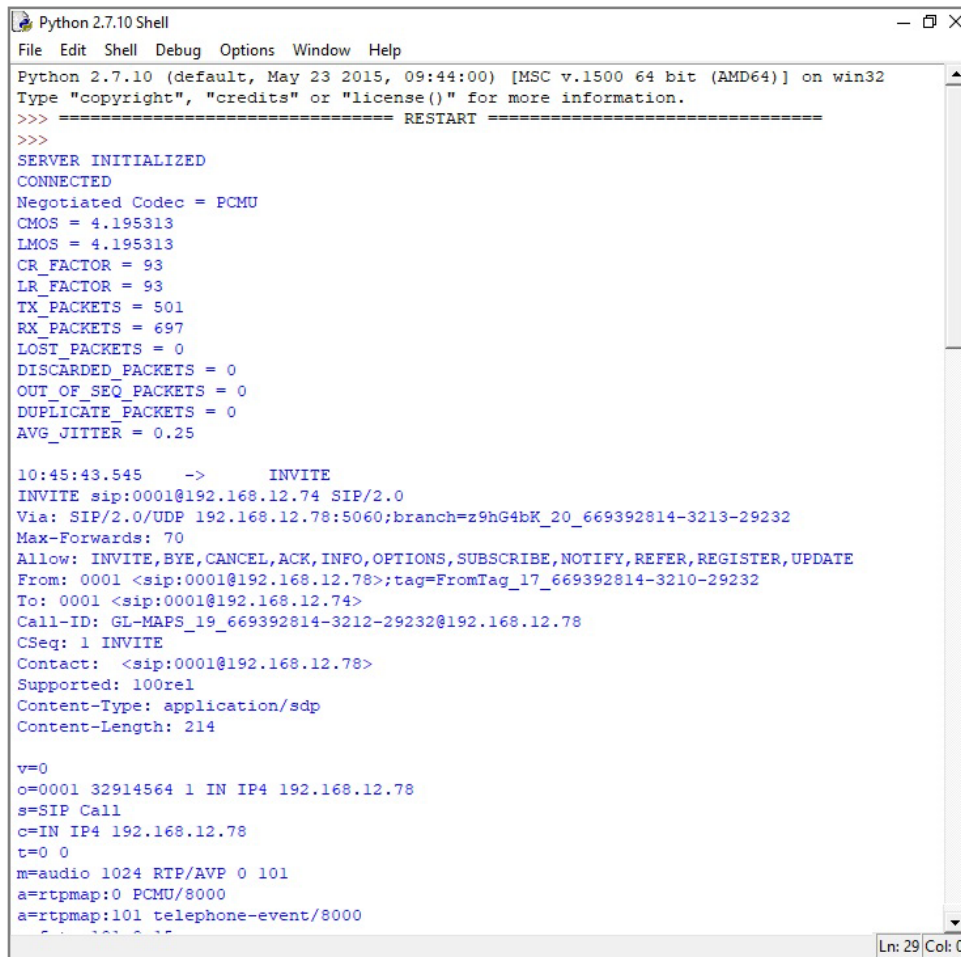
Java / Python Client and Scripting

GL Python and Java APIs for all variants of MAPS. The API is written using an object-oriented coding paradigm, designed to give the user simple and intuitive containers for their messages, calls and regressions. The Python client connects to the MAPS™ CLI server using TCP/IP sockets, so they can be on different computers.

Java Client internally invokes APIs, which are segregated into MAPS API (Mapscli includes MAPS GUI related APIs), Protocol Specific API (Mapscli.isdn includes protocol specific APIs), and End Action. Specific API (includes call related APIs used at end terminals).

The API is divided into “High” and “Low” level function calls. High level scripts leave the protocol logic to the underlying call control script on the MAPS server.

A Low Level call control scripts transplant that logic to the API language, giving the user full control over signaling. This necessarily leads to more complex API scripts but it gives the user complete control over the state machine.



```

Python 2.7.10 Shell
File Edit Shell Debug Options Window Help
Python 2.7.10 (default, May 23 2015, 09:44:00) [MSC v.1500 64 bit (AMD64)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> ===== RESTART =====
>>>
SERVER INITIALIZED
CONNECTED
Negotiated Codec = PCMU
CMOS = 4.195313
LMOS = 4.195313
CR_FACTOR = 93
LR_FACTOR = 93
TX_PACKETS = 501
RX_PACKETS = 697
LOST_PACKETS = 0
DISCARDED_PACKETS = 0
OUT_OF_SEQ_PACKETS = 0
DUPLICATE_PACKETS = 0
AVG_JITTER = 0.25

10:45:43.545  ->      INVITE
INVITE sip:0001@192.168.12.74 SIP/2.0
Via: SIP/2.0/UDP 192.168.12.78:5060;branch=z9hG4bK_20_669392814-3213-29232
Max-Forwards: 70
Allow: INVITE, BYE, CANCEL, ACK, INFO, OPTIONS, SUBSCRIBE, NOTIFY, REFER, REGISTER, UPDATE
From: 0001 <sip:0001@192.168.12.78>;tag=FromTag_17_669392814-3210-29232
To: 0001 <sip:0001@192.168.12.74>
Call-ID: GL-MAPS_19_669392814-3212-29232@192.168.12.78
CSeq: 1 INVITE
Contact: <sip:0001@192.168.12.78>
Supported: 100rel
Content-Type: application/sdp
Content-Length: 214

v=0
o=0001 32914564 1 IN IP4 192.168.12.78
s=SIP Call
c=IN IP4 192.168.12.78
t=0 0
m=audio 1024 RTP/AVP 0 101
a=rtpmap:0 PCMU/8000
a=rtpmap:101 telephone-event/8000

```

Python Client Script

Buyer's Guide

Item No	Product Description
PKS170	CLI Support for MAPS™
PKS120	MAPS™ SIP CLI Server
PKS120	MAPS™ SIP
PKS121	MAPS™ SIP Conformance Scripts
PKS139	MAPS™ Diameter Emulator
PKS155	MAPS™ BICC IP Emulator
XX648	MAPS™ ISDN Emulator
XX649	MAPS™ SS7 Emulator
XX651	MAPS™ CAS
XX651	MAPS™ CAS CLI Server

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

For more information on complete MAPS™ products, please visit [Signaling and traffic simulator](#) webpage.

For more information on MAPS™ CLI, please visit [MAPS™ Application Programming Interface \(APIs\) for Complete Automation](#) webpage



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