MAPS™ HD - High-Density Call Generator
for IP & Wireless Networks

Overview

MAPS™ (Message Automation and Protocol Simulation) is GL’s standard framework for emulation of IP, TDM, and Wireless protocols. GL’s MAPS™ HD, is an advanced bulk call generator used to simulate high volume calls with traffic. It is available as special purpose 2U network appliance w/ 4x1GigE (PKS109) capable of high call intensity (hundreds of calls/sec) and high volume of sustained calls (tens of thousands of simultaneous calls/ platform).

The network appliance performs signaling and traffic generation for a vast array of communication protocols covering IP and Wireless networks. It supports simulation of SIP, IMS SIP UE, GSM A, BICC, MGCP, H.248/Megaco, and provides non-reference based voice quality using E-model (R-factor) and MOS with five mapping scales.

MAPS™ HD network appliance is designed to easily simulate up to 32,000 simultaneous calls appliance (8000 calls per port). Using a stack of multiple servers, a larger test system with 100K-200K calls is achievable for enterprise to carrier grade testing.

With this platform, it is possible to generate Bulk Video Calls using pre-recorded video traces supporting codecs like H.264, H.263 etc. The network appliance provides a modular and flexible solution to generate real voice calls using industry standard voice codecs such as G.711 A/µ-law, G.722, G.722.2 (AMR-WB), G.722.1, G.726, G.729A/B, GSM (EFR, FR and HR), AMR (Narrowband and Wideband), EVRC, EVRCB, EVRC-C, iLBC, Speex, SpeexWB, EVS, OPUS and RFC 2833/4733 out of band events.

GL also provides PacketScan™ HD for High Density IP Traffic Analysis and Network Monitoring and PacketScan™ FB, a File Based IP Traffic Analyzer Server for near real-time processing of traces.

For more details, refer to https://www.gl.com/maps-hd-high-density-call-simulator.html
## Features

### HD Characteristics
- Transport over UDP and TCP, IPv4 and IPv6, and TLS for secure transport
- Unique endpoint emulation using IP address, MAC address, and VLAN tagging
- With HD RTP (PKS109 licensing) Maximum Simultaneous Calls - 20,000 and Calls per Second - 350 (in high end server machine).
- Without RTP (only signaling) Maximum Simultaneous Calls - 70,000, and Calls per Second - 750 (in high end server machine).
- Scales up to 32,000 simultaneous calls per appliance (8000 calls per port) with duplex RTP traffic
- Manage 10+ MAPS™ systems from a Master Controller (single point of control)
- Powerful Load Generation, Scheduler, and Command Line Interface (CLI) for automation, remote control, and load testing
- Configurations, test scripts, and profiles can be saved and reused on a different systems
- Easy-to-use MAPS™ Scripting interface (UI) for test scripts to be created
- Real-time monitoring and reporting of registration and call statistics
- Export data to other applications for customized user report
- Create, manage RTP sessions and generate and receive RTP traffic over the sessions with complete automation capability

### Traffic Types
- Capability to generate more than 500 simultaneous video calls on a Core i7 systems.
- Simulation of [RTP Traffic](#) such as voice file, single tone, dual tones, FAX, Dynamic VF, IVR, and Video Quality over IP networks, and Impairments
- Automate the IVR testing process (call establishment and traffic generation / detection) process through scripts
- All Voice Codecs supported including –
  - G711 µ-law and A-law with VAD
  - GSM-FR, HR, EFR
  - G729A, G729B, G722, G722.1
  - G726 (40K, 32K, 24K, 16K) with VAD
  - AMR (codec rates-4.75, 5.15, 5.9, 6.7, 7.4, 7.95, 10.2, 12.2) with VAD (requires additional licenses)
  - AMR-WB (Codec rates-6.60 kbps, 8.85 kbps, 12.65 kbps, 14.25 kbps, 15.85 kbps, 18.25 kbps, 19.85 kbps, 23.05 kbps, 23.85 kbps) with VAD (requires additional licenses)
  - EVRC, EVRCB, EVRC-C (requires additional licenses)
  - SMV, SPEEX, SPEEX-WB, ILBC
  - EVS, OPUS and RFC 2833/4733
- Simulation of [RTP Video Traffic](#) (with H.264, H.263, and VP8 video codecs)
- RTP Voice Quality Measurements – MOS, R-Factor scores
- Simulation of [RTP FAX Traffic](#) - G.711 Pass-through and T.38 UDPTL
**Test Bed Configuration**

The configuration window allows users to setup the required test environment to simulate messaging from different SIP entities such as the User Agent Client (MAPS™) - to - User Agent Server (MAPS™).

MAPS™ HD testbed includes local IP addresses configured to Normal NIC for SIP Signaling, and 4 RTP cores for traffic management between MAPS™ SIP HD and RTP core. Each RTP core uses one port on the GL’s HD Interface for sending and receiving RTP traffic.

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**Bulk Video Call Simulation**

MAPS™ SIP provides the Bulk Video Call Simulation capability using its pre-recorded video traces supporting codecs like H.264, H.263 etc. On a high-performance computing platform (core-i7), it is possible to generate more than 500 simultaneous video calls. With a **High Density (MAPS™ HD)** platform, it is possible to achieve much more capacity.
**Bulk RTP Voice Simulation**

RTP allows to generate and to receive voice traffic over IP networks. Transmit and Receive pre-recorded Voice Files in wave, pcm, and GL's proprietary pre-compressed GLW files with a synchronous Tx/Rx option. You can also directly send live voice using Talk using Microphone feature, and play the recorded voice files directly on to PC speakers. Some additional features that help in the voice traffic simulation are listed below:

- Allows to specify a desired voice payload type to each codec for sending and receiving payload;
- Sampling rate of the codec is displayed for the selected codec.
- Comfort noise generation is supported for A-law, µ-law and G.726 codecs for sending and receiving payload.
- Allows to set the buffer used for delayed packets that arrive at receiving end (both static and dynamic jitter buffers are supported)
- Allows to set QoS (Type of Service) properties such as precedence, delay, throughput and reliability values to the outgoing stream
- Customize codec options (payload type, ptime) over Tx/Rx sessions. All Voice Codecs are supported (Visit [Voice Codecs](#) webpage for more comprehensive information

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**Digits, and Tones, and Impairments Options in RTP Traffic**

- RTP allows to generate and to receive RTP traffic over created sessions (RFC3550). Different RTCP packets are also generated at random intervals carrying control information about the session.
- In-band Digit transmission & detection (DTMF and MF digits)
- Out-band Digit transmission & detection (all events defined as per RFC2833 and RFC4733)
- Tone transmission & detection (single, dual and user defined tones)
- Loopback traffic

Users can introduce various impairments on outgoing RTP streams. The supported impairment types includes Latency, Packet Loss, and Duplicate Packets and Out of sequence Packets.
**Load Generation**

The Load Generation feature allows bulk call configuration, which includes Total Calls to generate, and Maximum Active Calls, Max/Min Call rate, Start Call Rate, and Maximum Call Rate parameters.

Sip Call Control script which can handle SIP signaling and traffic is loaded along with the profiles configured for each HD port.

MAPS™ SIP uses 4 ports on GL’s HD card to generate and receive RTP packets. Maximum supported simultaneous calls on each port is 8000.

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**QoS Statistics**

The QoS Statistics for each port is calculated for the received traffic for every specified number of sessions in RTPConfig.ini configuration file.

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**Figure: Load Generation**

**Figure: QoS Statistics**
**Statistics**

Statistics feature provides both the Call Statistics and Message Statistics with the pie graph indicating the Pass/Fail Call Ratio. By default, all call handling scripts are assessed by MAPSTM to provide statistical information. The statistical distribution of number of calls per second (time) and total number of simultaneous calls per second is also plotted for the statistics log as per the pattern configured in Load Generation.

![Statistics Graph](image)

**Figure: Call and Message Statistics**

**Buyer's Guide**

-PKS109 - MAPSTM HD (requires GL's high interface NIC)
-PKS102 - RTP Soft Core for RTP Traffic Generation
-PKS120 - MAPSTM SIP
-PKV100 - PacketScan™
-PKV120 - PacketScan™ HD (4 x 1GigE)
-PKV122 - PacketScan™ HD (2 x 10 GigE)
-PKV121 - PacketScan™ FB
-PKS106 - RTP Video Traffic Generation
-PKS103 - RTP IuUP Softcore
-PKS107 - RTP EUROCAE ED137
-PKS108 - RTP Voice Quality Measurements
-PKS200 - RTP Pass Through Fax Emulation, requires one of the licenses below, (w/dongle)
  -PKS202 - 2 Fax Ports, RO
  -PKS203 - 8 Fax Ports, RO
  -PKS204 - 30 Fax Ports, RO
  -PKS205 - 60 Fax Ports, RO
  -PKS206 - 120 Fax Ports, RO
-PCD103 - AMR codec for MAPSTM
-PCD104 - EVRC codec for MAPSTM
-PCD105 - EVR_B codec for MAPSTM
-PCD106 - EVR_C codec for MAPSTM