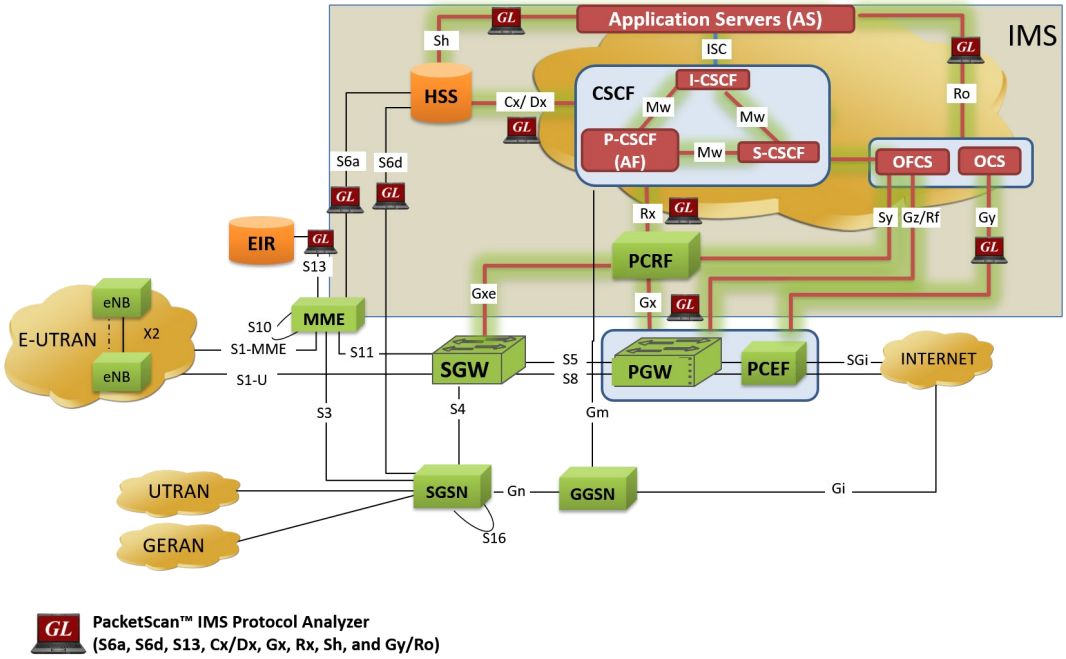
PacketScan™ IP Multimedia Subsystem (IMS) Protocol Analyzer for Wireless & IP Networks



Overview

Internet Protocol (IP) Multimedia Subsystem, popularly known as “IMS”, is built on Session Initiation Protocol (SIP) as the base to further support packaging of voice, video, data, fixed, and mobile services on a single platform to end users. It provides a unique convergence platform for different types of networks – whether it is mobile, satellite, broadband, cable, and fixed networks, with a goal of building an efficient interoperating networks.

GL's IMS Protocol Analysis option (PKV110) is available with additional licensing with PacketScan™ Analyzer (PKV100) or PacketScan™ HD Analyzer (PKV120/PKV122).

With the **IMS Protocol Analysis** option, PacketScan™ can capture, decode and analyze all SIP packets used to setup sessions as well as the Diameter signaling used for accessing subscriber data and charging data on IMS networks. PacketScan™ permits continuous monitoring of communication over IMS network over S6a, S6d, S13, Sh, Cx/Dx, Gx, Gq, Gy, Rx, Rf, Ro, Zn, Zh, Dh, Wa, Wd, Wg, Wx, Wm, and Pr interfaces. PacketScan™ also supports wide range of voice code for SIP-MS calls such as AMR, AMR WB, EVS, OPUS, and many more . Visit Voice Codec webpage for more details.

GL’s PacketScan™ an All-IP monitoring and analysis probe, along with NetSurveyorWeb™ allows centralized monitoring of entire LTE-IMS network.

For more details, visit IMS Network Protocol Analyzer webpage.

Main Features

- Real-time and Offline Analysis
- Capture and Decode all SIP and Diameter Interfaces with Traffic - Voice, Fax, Video, & more
- Includes Protocol Analysis & Traffic Analysis Views
- Support for Filter and Search Features
- Support for variety of Voice and Video Codec Options
- Use as Stand alone or Network Probe with Central Monitoring System - NetSurveyorWeb™

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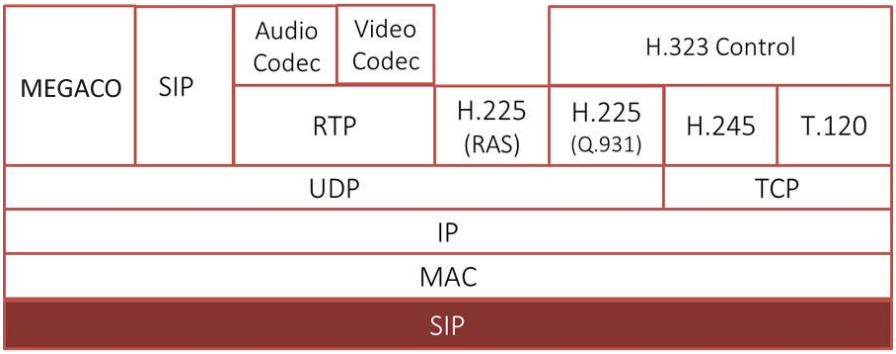
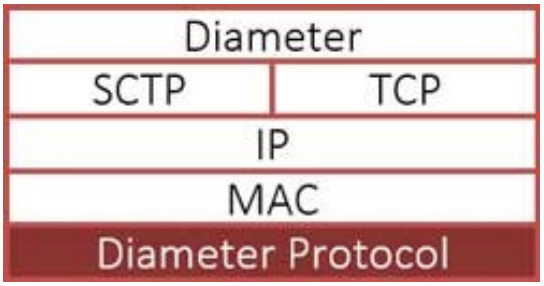
Protocol Stack and Standards





Protocols	Standard / Specification Used
SIP	RFC 3261
SIP Extensions	RFC 3262 - Reliability of Provisional Responses in the SIP RFC 3311 - The Session Initiation Protocol (SIP) UPDATE Method RFC 3455 - Private Header (P-Header) Extensions to the Session Initiation Protocol (SIP) for the 3rd-Generation Partnership Project (3GPP) RFC 3515 - Session Initiation Protocol (SIP) Refer Method RFC 3310 - HTTP/SIP Digest Authentication Using Authentication and Key Agreement (AKA) RFC 3263 - Locating SIP Servers
RTP, RTCP	RFC 3550
MEGACO	RFC 3525, RFC 3015
S6 , S13	3GPP TS 29.272 V12.6.0 (2014-09)
Sh	3GPP TS 29.329 V12.4.0 (2014-09)
Cx	3GPP TS 29.229 V12.3.0 (2014-09)
Dx	3GPP TS 29.229 V10.1.0
Gx	3GPP TS 29.212 V12.6.0 (2014-09)
Gq	3GPP TS 29.209 V6.7.0 (2007-06)
Gy	3GGP TS 32.225, 3GPP TS 32.299 & IETFRFC 4006), 3GPP TS 29.061 V10.3.0
Rx	3GPP TS 29.214 V14.1.0 (2016-09)
Rf	3GGP TS 32.225 , 3GPP TS 32.299 and IETFRFC 4006),3GPP TS 29.061 V10.3.0
Ro	3GGP TS 32.225 , 3GPP TS 32.299 and IETFRFC 4006),3GPP TS 29.061 V10.3.0
Zn	3GPP TS 29.109 V10.0.0 (2011-03) and 3GPP TS 33.220 V10.0.0 (2010-10)
Zh	3GPP TS 29.109 V10.0.0 (2011-03) and 3GPP TS 33.220 V10.0.0 (2010-10)
Dh	3GPP TS 29.329 V11.0.0
Wa	3GPP TS 29.234 V10.1.0 (2011-06)
Wd	3GPP TS 29.234 V10.1.0 (2011-06)
Wg	3GPP TS 29.234 V10.1.0 (2011-06)
Wm	3GPP TS 29.234 V10.1.0 (2011-06)
Wx	3GPP TS 29.234 V10.1.0 (2011-06)
Pr	3GPP TS 29.234 V10.1.0 (2011-06)

For more details on supported protocols, visit Protocols Supported in PacketScan™ webpage.

Summary and Detail Views

Displays Summary, Detail, Hex dump, Statistics, and Call Detail Views. Any protocol field can be added to the summary view, providing users more flexibility to monitor required protocol fields. User can select a frame in Summary View to analyze and decode each frame in the Detail View.

Hex dump View displays the frame information in HEX and ASCII format, the contents of this view can also be copied to clipboard.

Statistics View displays statistics based on frame count, byte count, frames/sec, bytes/sec etc. for the entire capture data.

The detail decode view of SIP-IMS call displays the following

- MAC layer
- IPV6 (or IPv4) layer
- GTP IP and UDP Layer
- SIP 3261

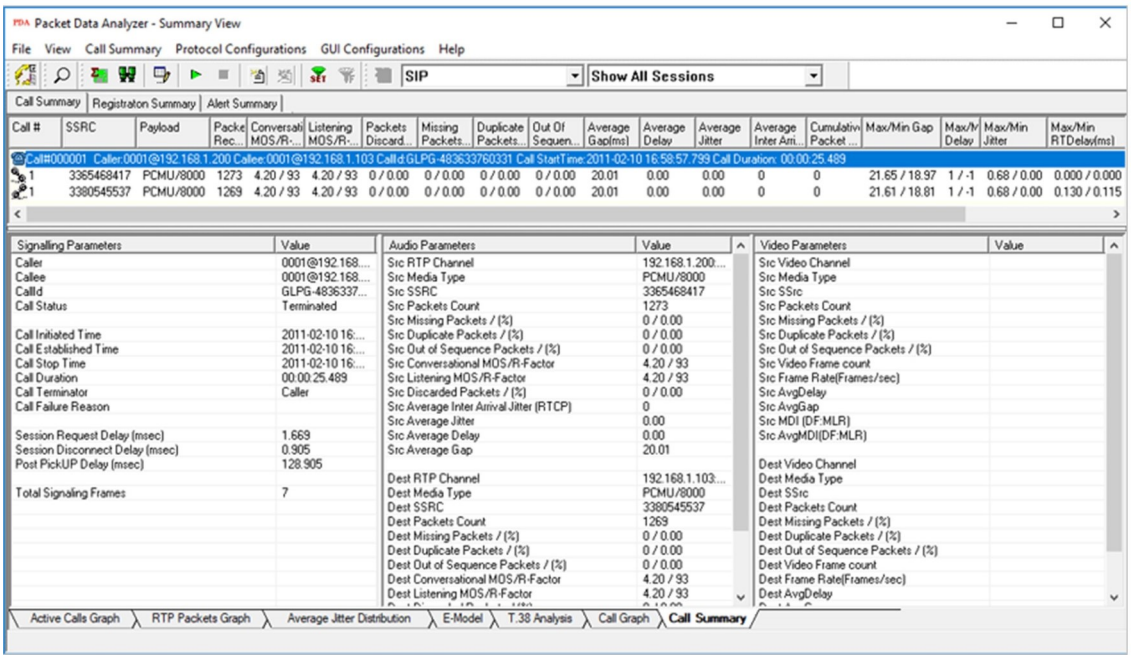


Figure: Detail View of SIP

The detail view of Diameter interface displays the following:

- MAC Layer
- IP Layer
- SCTP Layer
- Diameter Layer

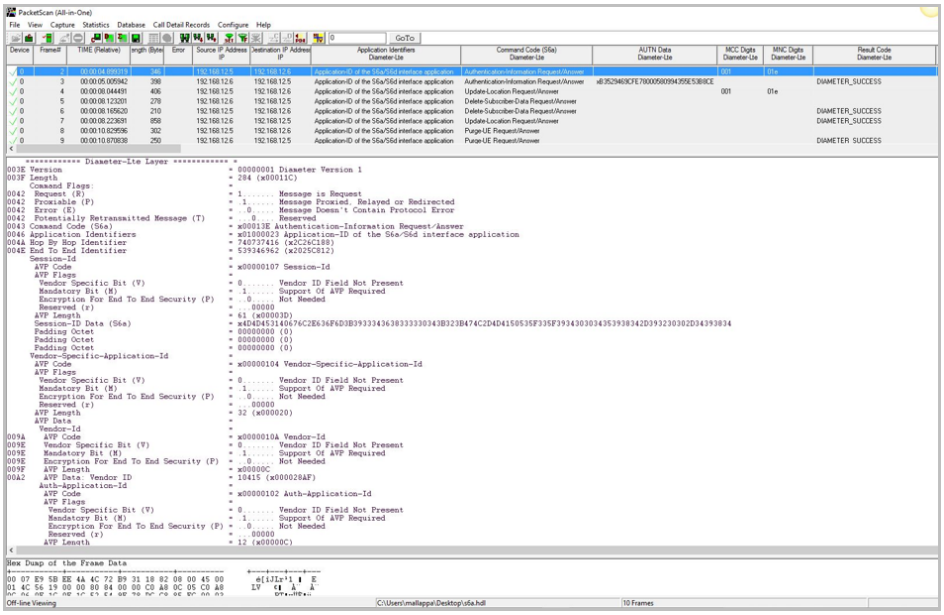


Figure: Detail View of Diameter S6a Interface

Search and Filters

Similarly any protocol field can be added to the Advanced filtering and search features to drill down to specific frames for detail troubleshooting. Filter and search capabilities adds a powerful dimension to the IMS analyzer. These features isolate required frames from original frames in real-time/offline. Users can record all or filtered traffic into a trace file.

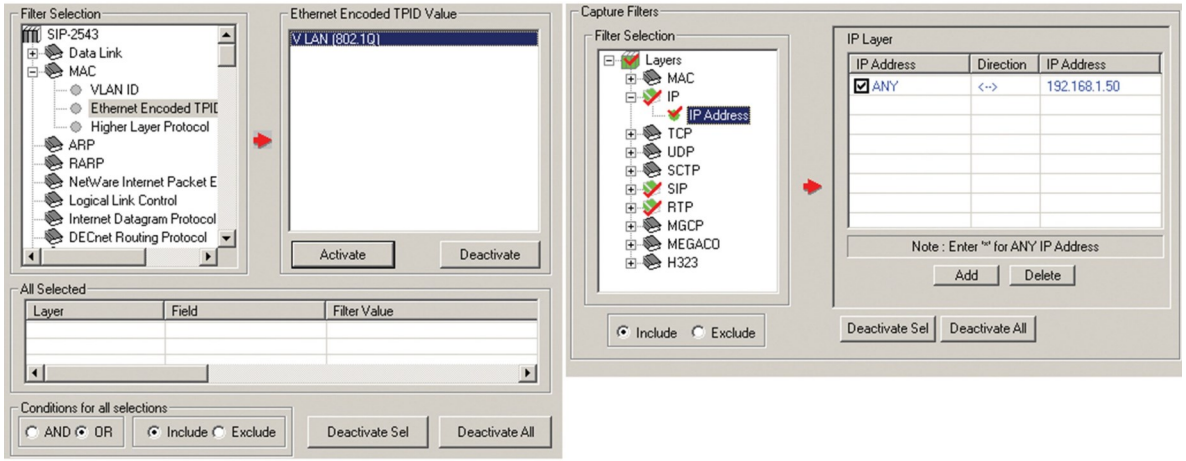


Figure: Filters and Search View

Consolidated Configurations

- Provides a consolidated interface for all the important settings required in the analyzer. All the configuration settings done in any of these options can be saved to a file, loaded from a configuration file
- Allows the captured frames to be saved to a trace file using different conventions such as user-defined prefixes, date-time prefixes, total number of files, file size, frame count, or time limit
- Allows user to decode required interfaces and to enter the custom values for each protocol as per network setup

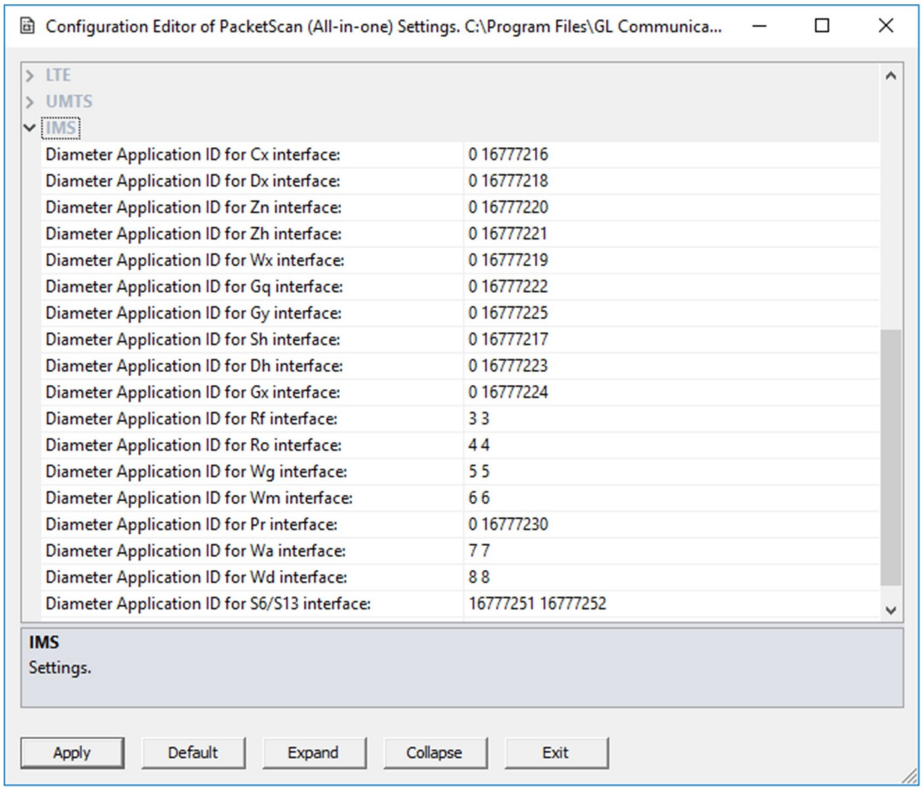


Figure: IMS Configuration Settings

Traffic Analyzer—Summary View

Call Summary, Signaling, Audio, & Video QoS Statistics

The Call Summary displays the signaling, audio, and video parameters of each call for SIP, RTP, MEGACO, H.323, GSMA, IuCS, and SCCP protocols. Video QoS parameters such as Codec Info, Frame Rate, Missing Packets, Delay, Gap, Video Frame Count, Out Of Sequence count, Duplicate Packets count, Media Delivery Index (MDI), etc are displayed for all video calls with H.263 and H.264 codecs.

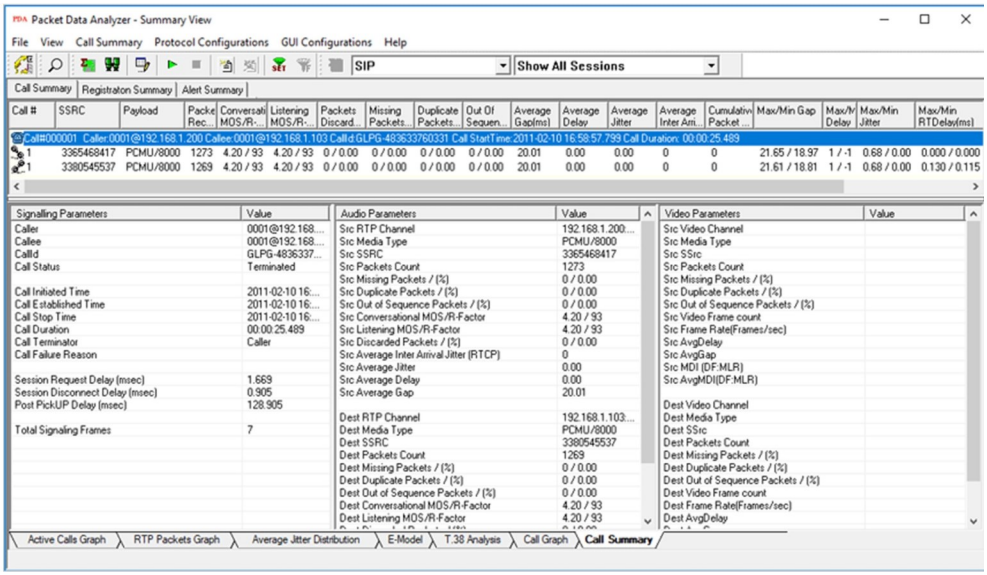


Figure: Traffic Analyzer—Call Summary, Audio/Video Statistics

Graphs Traffic Analyzer—Summary View

- **Active Calls** – A line graph, depicting the Number Of Calls Vs Time
- **Average Jitter Distribution** – Distribution of the Average Jitter values across the Total Sessions
- **E-model** - This graph provides R-factor, MOS and packets discarded against number of sessions- all these three graphs show statistics of terminated calls
- **R-Factor** – A bar Graph that plots R-Factor across No of Sessions
- **MOS** – A bar Graph that plots Mean Opinion Score values across No. of Sessions
- **Packets Discarded** – A bar Graph that plots Packets Discarded across No. of Sessions
- **RTP Packets Graph** – Plots and compares out of ordered packets, missing packets and duplicate packets against Total Audio Packets
- **T.38 Analysis** - Fax (T.38 data) over VoIP monitoring and decoding capability
- **Call Graph** - Displays the message sequence of captured VoIP calls

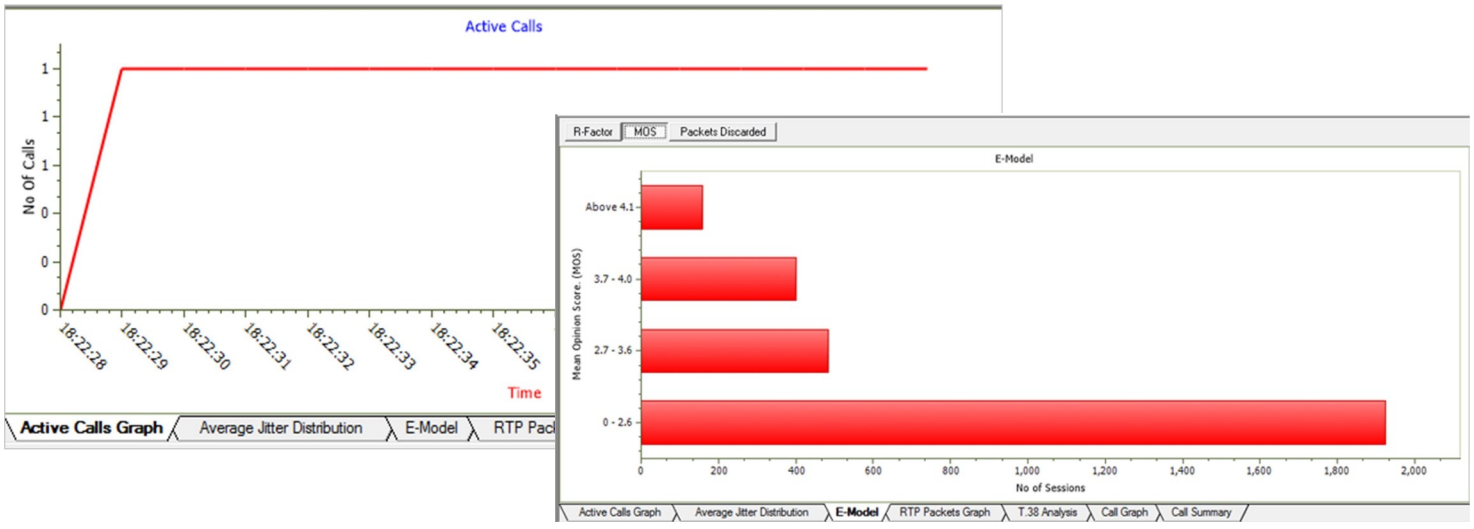


Figure: Active Calls and E-Model Graph

Traffic Analyzer - Detail View

This display assists in any comparisons that are to be made between the two RTP sessions of a call. Each frame of the selected session is dissected and its contents are displayed in a tabular form for easier viewing and comparisons. Vital aspects from the RTP frame needed for close analysis are included in the table.

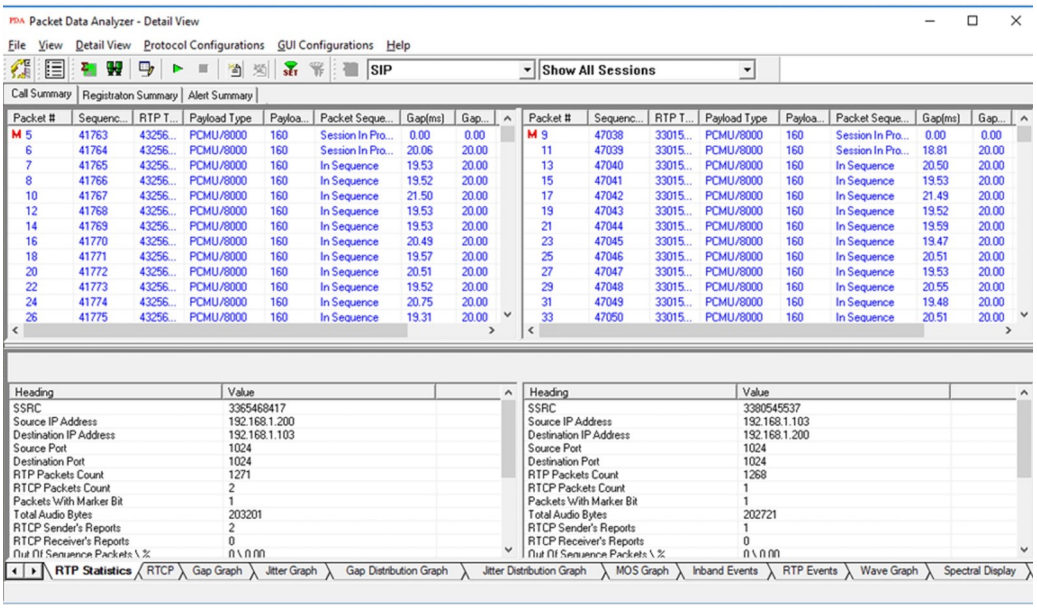


Figure: Traffic Analyzer—Detail View

Graphs in Detail View

Gap/Jitter graphs - Plots the Gap (in milliseconds)/Jitter versus the packet number

Gap Distribution Graph - Number of packets with a particular value of gap is plotted against the (gap) value.

Jitter Distribution Graph - Number of packets with a particular value of jitter is plotted against the jitter value

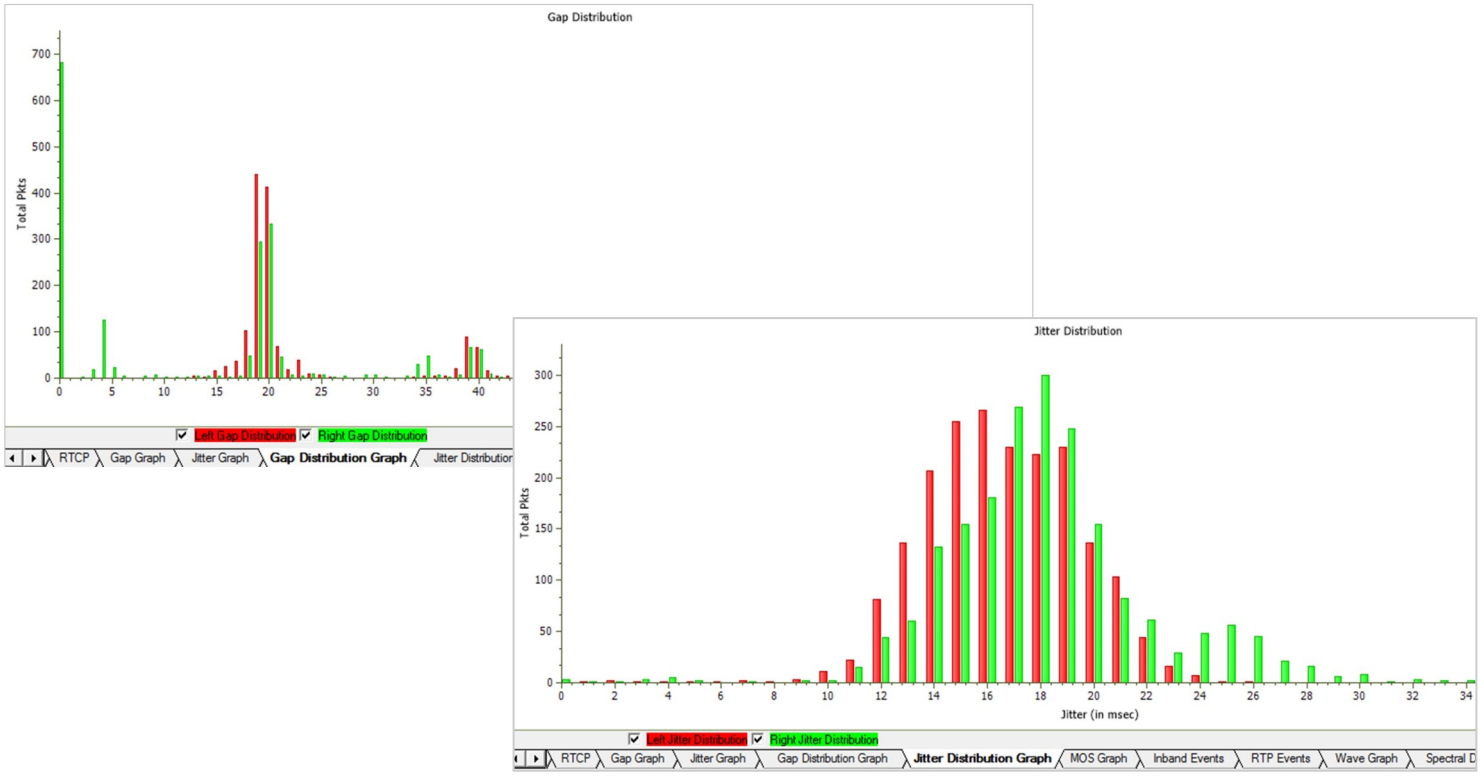


Figure: Gap/Jitter Distribution Graph

Graphs in Detail View (*Contd.*)

MOS Graph – Plots Mean Opinion Score values throughout the duration of the call.

Wave graph – Displays the amplitude of the incoming signal in a selected call as a function of time.

Spectral Display – Displays the power of incoming signal while the capturing is going on as a function of frequency.

Degradation Factor – A pie chart plots and compares different statistics such as Good Quality, Packets discarded, Echo level, Packet loss, and Regency against total Packets for each individual sessions.

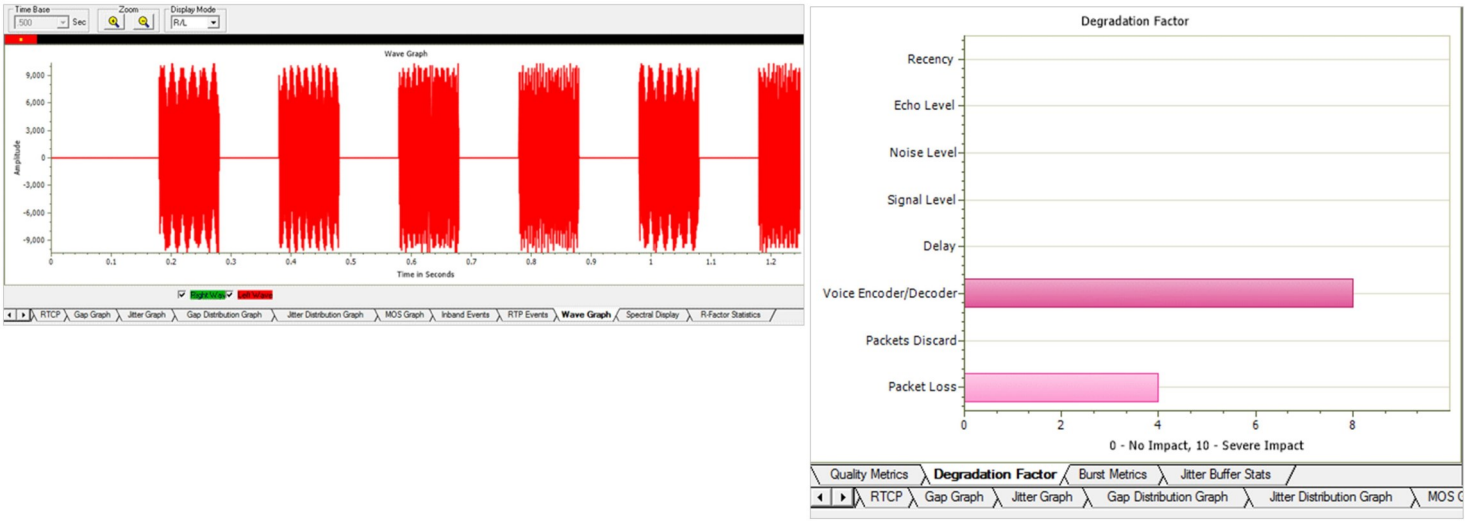


Figure: Wave Graph and Degradation Factors

R-Factor Statistics

Quality Metrics based on E-model includes R-Factor and MOS Factor. **R-Factor** bar graph will display statistics such as R Listening, R Conversational, R-G107, and R-Nominal values.

MOS Factor bar graph will display statistics such as MOS CQ, MOS PQ, and MOS Nominal values during a call.

Jitter Buffer Statistics – A pie chart plots and compares packets received, packets discarded and packets lost against total Packets for each individual sessions. Also provides a tabular data on average.

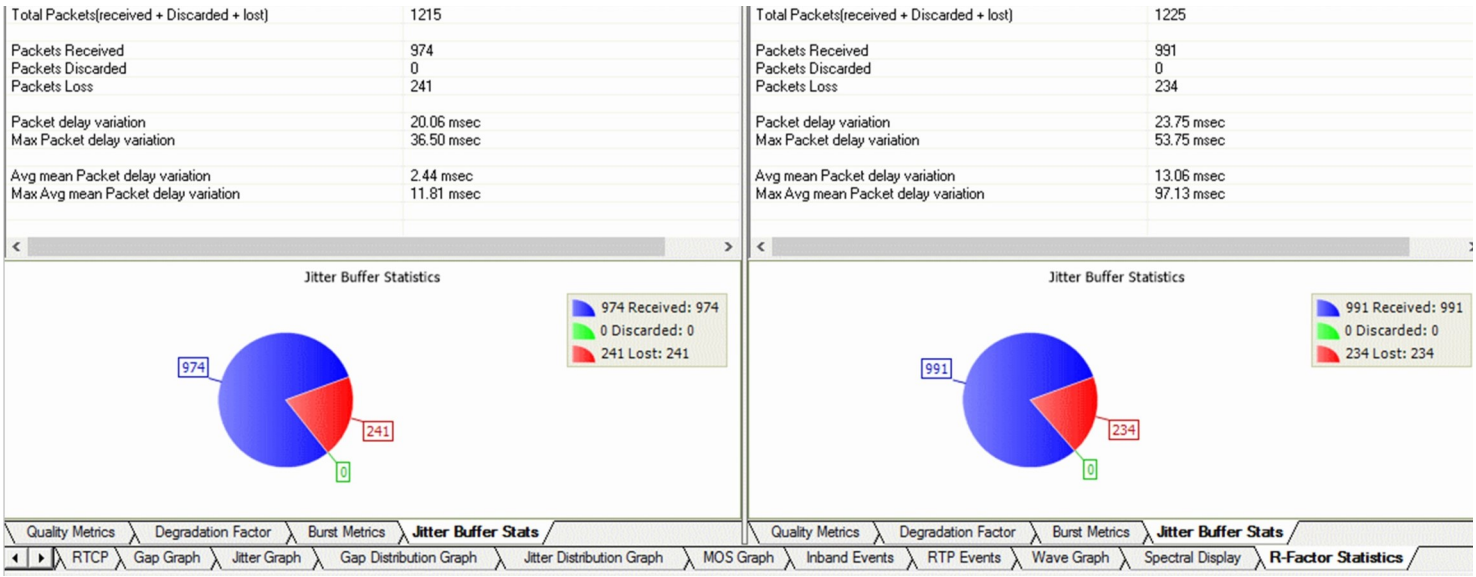


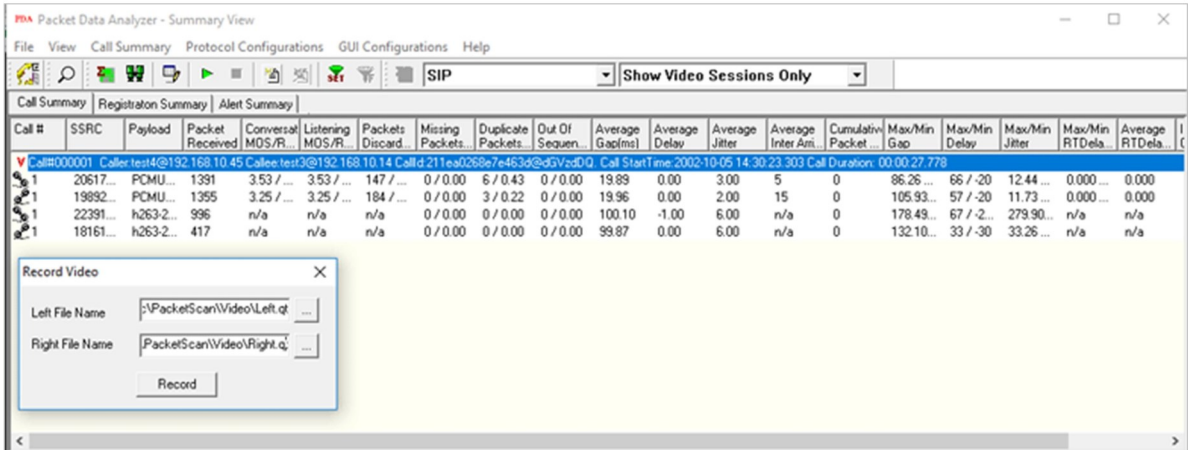
Figure: Jitter Buffer Statistics

Play Audio and Write to File

The Play Audio plays the selected call to the PC speaker. Write to File is similar to the Play Audio option. The basic difference being that the output is written to a file instead of playing to the speaker.
PDA can monitor video calls and display both audio and video RTP streams in summary view. Users can record video calls to a file in QuickTime format, which can be viewed by VLC player.

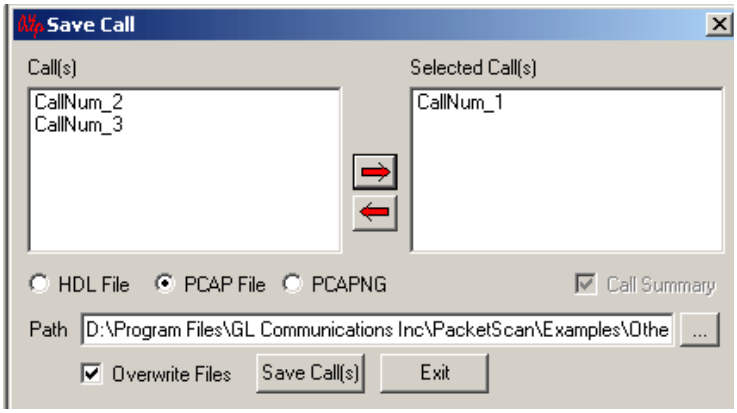
Record Video

Record Video option is available for both auto detected RTP calls and SIP calls. Supported video codecs are: H263++ CIF 190 kbps, H263++ CIF 350 kbps, H263++ CIF 512 kbps, H263++ QCIF 128 kbps, H263++ QCIF 64 kbps, H263++ QCIF 80 kbps.



Save Call

The Save Call feature enables the user to save a particular call either in GL's proprietary *.HDL file format or in Ethereal *.PCAP file format or *.PCAPNG file format. Call Summary details could also be saved for a particular call as a *.rtf file. This is especially useful to get data from real-time traffic locations to the lab for detail analysis of a flawed call.



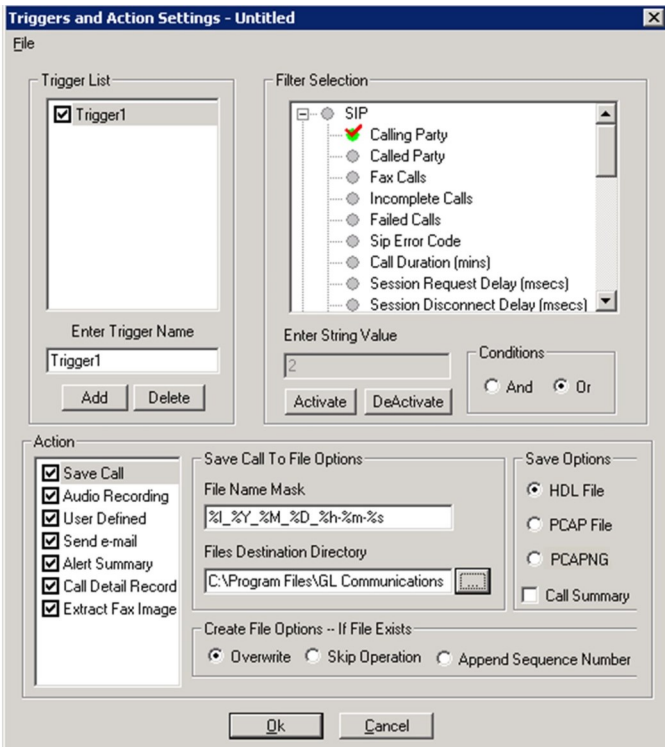
RTP/RTCP Statistics, Inband Events, Outband Events

The user can get the complete details of a single selected call such as total packets count, SSRC, RTP packet count, RTCP packet count, total Audio bytes, and more.

Inband Events display Inband DTMF and MF digits as they are received with details such as Timestamp, Type, Event, On-Time, Power, & Frequency. Outband Events display RTP events as per RFC 2833 or 4733 with details such as Timestamp, Event, Power, & Duration.

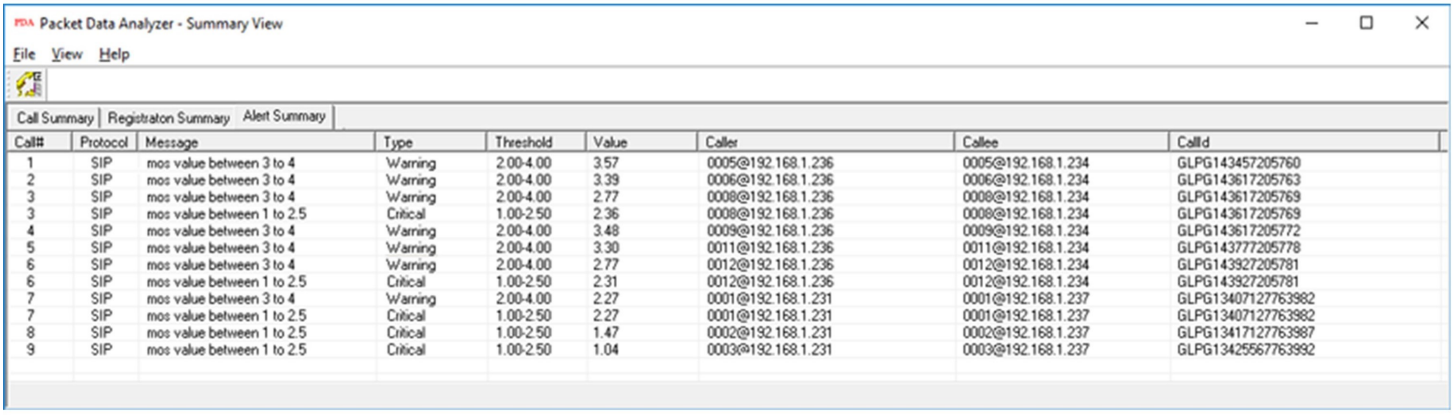
Triggers and Action Settings

Triggers and Action Settings allow the user to filter calls based on certain SIP, RTP, MEGACO, H.323, GSMA, and IuCS parameters followed by a set of actions for the completed calls. The filtered file can be saved in either GL's proprietary HDL file, Ethereal PCAP, or PCAPNG file format. It extracts fax image for the selected fax calls. Additionally, a summary of call signaling and audio parameters can be saved as *.rtf file, or generate Call Detail Records in CSV file format along with voice files for each direction. The CSV files can be used for further analysis and retrieval of **calls of interest**.



Alert Summary

PacketScan™ PDA generates alerts when particular vital parameters go beyond a specified value and display in Alert Summary table. The user can specify the criteria based on which the alerts are to be generated. The tab provides an active list of the alerts that have occurred during the test session in tabular columns.



Call#	Protocol	Message	Type	Threshold	Value	Caller	Callee	CallId
1	SIP	mos value between 3 to 4	Warning	2.00-4.00	3.57	0005@192.168.1.236	0005@192.168.1.234	GLPG143457205760
2	SIP	mos value between 3 to 4	Warning	2.00-4.00	3.39	0006@192.168.1.236	0006@192.168.1.234	GLPG143617205763
3	SIP	mos value between 3 to 4	Warning	2.00-4.00	2.77	0008@192.168.1.236	0008@192.168.1.234	GLPG143617205769
3	SIP	mos value between 1 to 2.5	Critical	1.00-2.50	2.36	0008@192.168.1.236	0008@192.168.1.234	GLPG143617205769
4	SIP	mos value between 3 to 4	Warning	2.00-4.00	3.48	0009@192.168.1.236	0009@192.168.1.234	GLPG143617205772
5	SIP	mos value between 3 to 4	Warning	2.00-4.00	3.30	0011@192.168.1.236	0011@192.168.1.234	GLPG143777205778
6	SIP	mos value between 3 to 4	Warning	2.00-4.00	2.77	0012@192.168.1.236	0012@192.168.1.234	GLPG143927205781
6	SIP	mos value between 1 to 2.5	Critical	1.00-2.50	2.31	0012@192.168.1.236	0012@192.168.1.234	GLPG143927205781
7	SIP	mos value between 3 to 4	Warning	2.00-4.00	2.27	0001@192.168.1.231	0001@192.168.1.237	GLPG13407127763982
7	SIP	mos value between 1 to 2.5	Critical	1.00-2.50	2.27	0001@192.168.1.231	0001@192.168.1.237	GLPG13407127763982
8	SIP	mos value between 1 to 2.5	Critical	1.00-2.50	1.47	0002@192.168.1.231	0002@192.168.1.237	GLPG13417127763987
9	SIP	mos value between 1 to 2.5	Critical	1.00-2.50	1.04	0003@192.168.1.231	0003@192.168.1.237	GLPG13425567763992

Buyer's Guide

Item No	Product Description
PKV110	IMS Protocol Decodes (Optional with PacketScan™)
PKV100	PacketScan™ (Real-time and Offline)
PKV101	PacketScan™ - Offline
PKV120	PacketScan™ HD – High Density IP Traffic Analyzer w/ 4x1GigE - includes PKV100 – Online (not Offline) for temporary audio codec support
PKV122	PacketScan™ HD – High Density IP Traffic Analyzer w/ 2x10GigE - includes PKV100 – Online (not Offline) for temporary audio codec support

Item No	Related Software
PCD103	AMR Codec for PacketScan™
PCD104	EVRC Codec for PacketScan™
PCD105	EVRC-B Codec for PacketScan™
PCD106	EVRC-C Codec for PacketScan™
PKV170	NetSurveyorWeb™ (Network Surveillance Software) for IP Network

For more details, visit IMS Network Protocol Analyzer webpage.

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