

Fragmentation and Reassembly



Splitting, Recombining and Sequencing Datagram



Analyzes Host of PPP Protocols



Testing across LAN and WAN Environments



Analysis of PPP Routed and Bridged Protocols



Real-time and Offline Analysis



Supports LCP, PAP, BPDU, SNMP, DNS, DHCP, HTTP, SMTP, POP3, and more



Summary, Detail, Statistics, and Hex Dump views



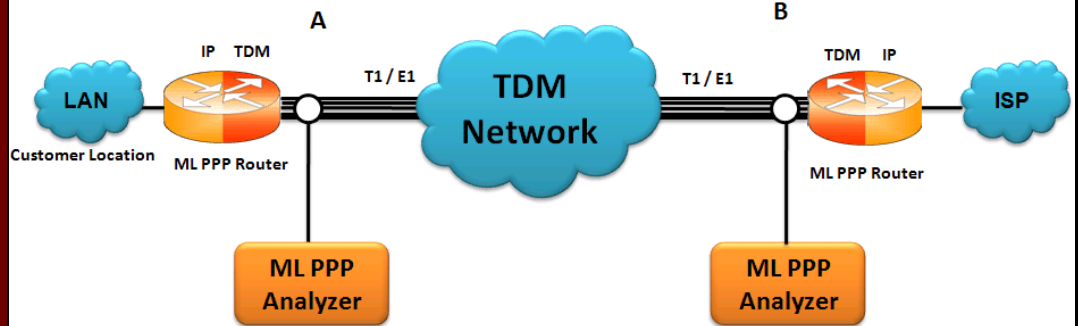
Filtering and Search Capabilities



Statistics based on Frame count, Byte count, and more



MLPPP Analyzer



Overview

The **Point-to-point protocol (PPP)** is a link layer protocol, which encapsulates other network layer protocols like IP for transmission on synchronous (like T1/E1) and asynchronous communications lines. When transmitted over T1/E1 line, PPP frames are based on HDLC frame structure. Today the PPP protocol standard finds wide use in synchronous connections between LANs, bridges, routers and other intermediate devices. Two major features of PPP protocol are authentication and encapsulation of higher layer protocols. **MLPPP** bundles multiple link-layer channels into a single network-layer channel. A bundle can consist of multiple physical links of the same type or physical links of different types. Data sent through this channel will be distributed among all the links

The GL's **MLPPP Analyzer** can be used to capture and decode a host of PPP protocols exchanged between pairs of nodes over T1/E1 links. It provides useful analysis of the PPP, MLPPP, and MC-MLPPP protocols. MLPPP analyzer also supports **Packet Data Analysis** module (requires additional license) to perform detail analysis of MLPPP packets over IP and segregates them into SIP / H323 / Megaco / MGCP / T.38 fax calls. GL Communications supports the following types of MLPPP Analyzers:

- Real-time MLPPP Analyzer with Packet Data Analysis
- Offline MLPPP Analyzers

MLPPP Analyzer Main Features

- Ability to test and analyze HDLC based PPP protocol, PPP SIGTRAN and PPP over IP protocols
- Supports a host of protocols PPP, MLPPP, Multi-class MLPPP, IPCP, BCP, PPP MUX CP, BPDU, PAP, CHAP, SNMP, STUN, DNS, DHCP, SIP, SCTP, SUA, M3UA, IUA, and more.
- Ability to test and perform numerous measurements across WAN- LAN or LAN-LAN connection.
- Provides Summary, Detail, Hex dump, Statistics Views; includes powerful Packet Data Analysis features to analyze PPP over IP protocols.

PDA Main Features

- Supported protocols - SIP (Session Initiation Protocol RFC 2543 and RFC 3261), Megaco, MGCP, H323/H225, T.38 Fax, and RTP.
- Full RTP Analysis with audio capture/playback supported for all common codecs.
- Provides the registration summary of each SIP registration including the user agent, registrar, status, registration request delay (RRD), etc. and graphical view of the active registrations and registration trace of each registration.
- Call Quality Of Service (QoS) for all calls with E-Model based (G.107) MOS and R-factor
- Provides Video QoS Statistics such as Missing Packets, Delay, Gap, Video Frame Count, Media Delivery Index (MDI- (Delay Factor : Media Loss Rate)), and Frame Rate, and more.
- Supported Audio and Video codecs: Mulaw, Alaw, G.726 (40/32/24/16 kbps), G.726 with VAD, GSM610, G729, G729B, AMR (Wide and Narrow band codec), ILBC (20 , 30 msec), SPEEX, EVRC, EVRCB, H263+, and H264.

For more details, please visit our web page. <http://www.gl.com/pppanalyzer.html>.



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MLPPP Analyzer Features

- Capability to export Summary View details to comma separated values (CSV) format for subsequent import into a database or spreadsheet.
- Capability to export detail decodes information to an ASCII file.
- Supports decoding of frames with two MLPPP layers.
- Remote monitoring capability using GL's Network Surveillance System.
- Ability to configure .INI file to customize decoding options such as layer2 protocol, MLPPP frames presence, RTP payload, sequence no & so on.

Summary, Detail, and Hex dump Views

The analyzer displays Summary, Detail, and Hex dump Views in different panes. The Summary View displays Frame Number, Time, Length, Error, PPP Layer3 Protocol, LCP Code, IPCP code, BCP code, Class, Seq No, PPP Message type and more. The user can select a frame in Summary View to analyze and decode each frame in the Detail View. The Hex dump View displays the frame information in HEX and ASCII formats.

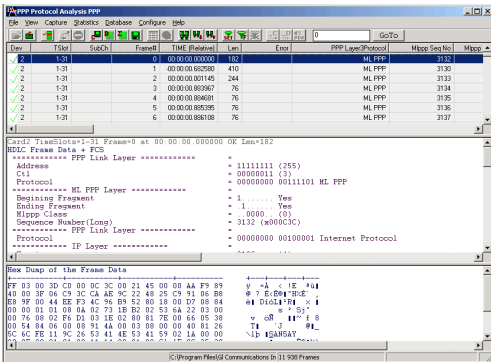


Figure: Summary, Detail, & Hex dump Views

The MLPPP analyzer supports reassembly and decoding of multiple MLPPP bundles simultaneously. Each MLPPP bundle will reassemble packets from PPP links.

The real-time capturing requires user to specify timeslots, bit inversion, octet bit reversion, user/network side, hyper channel selection, CRC, and MLPPP options (fragment format, max differential delay). The captured raw data can then be transmitted using the HDLC File Playback application. The recorded trace file can be used for offline analysis or exported to a comma-delimited file, or ASCII file.

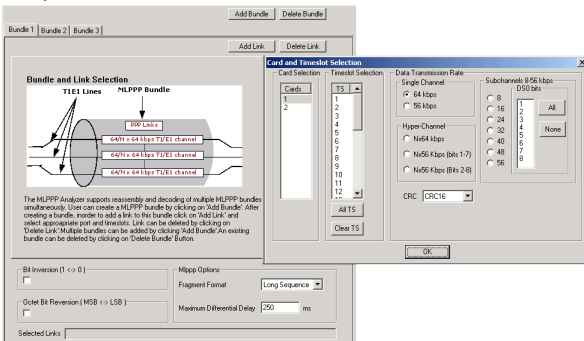


Figure: Stream / Interface Selection

Filtering and Search

Users can record all or filtered traffic into a trace file. Filter and search capabilities adds a powerful dimension to the MLPPP analyzer. These features isolate required frames from the captured frames in real-time, as well as offline.

In real-time capturing, filter based on length of frames can be set. The frames can be also be filtered after completion of capture based on Frame Number, Time, Length, Error, Layer3 Protocol, LCP Code, IPCP code, Seq no, MLPPP class, & so on. Similarly, search capability helps user to search for a particular frame based on specific search criteria.

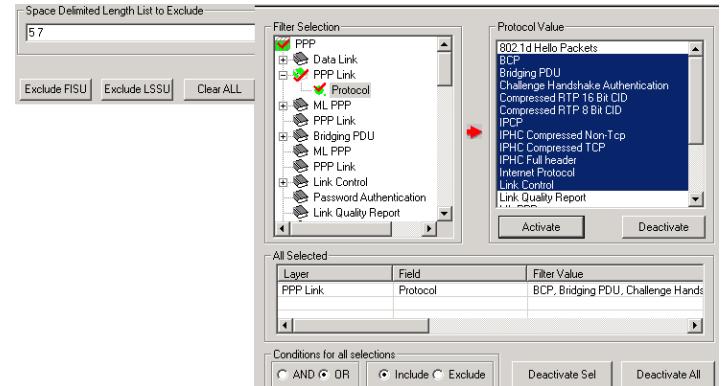


Figure: Real-time and Offline Filter

Statistics View

Statistics is an important feature available in MLPPP analyzer and can be obtained for all frames both in real-time as well as offline mode. Various statistics can be obtained to study the performance and trend in the PPP network based on protocol fields and parameters.

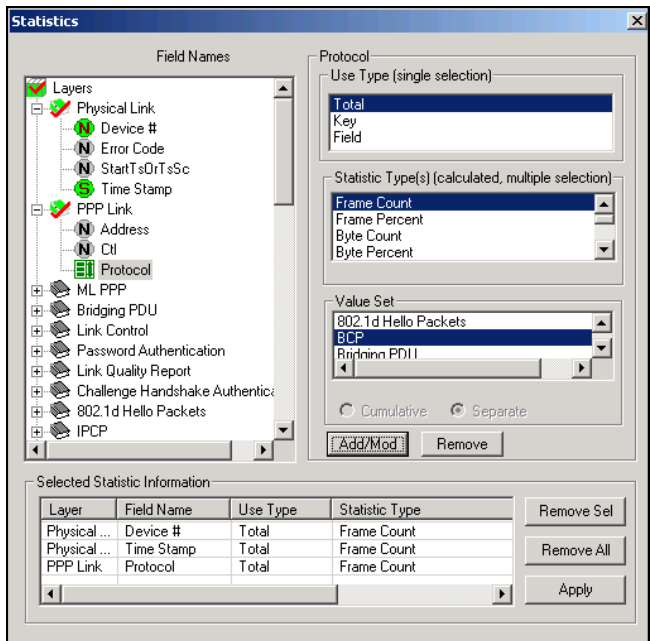


Figure: Statistics Definition Dialog



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Packet Data Analysis (PDA) – Summary View

Main Features

- Call Quality Of Service (QoS) for all calls with E-Model based (G.107) Mean Opinion Score (MOS) and R-factor with individual and summary statistics presented in graphical and tabular formats.
- Calculates minimum, maximum, and average Round Trip Delay (RTD) values for SIP calls.
- Graphs are provided for key values to give a pictorial representation of the statistics; some of the graphs available are – active calls, average jitter, E-Model MOS/R-Factor/ Packets Discarded, RTP packets summary, ladder diagram for T.38 traffic, and call signaling.
- Displays summary of signaling, audio, and video (for all video calls) parameters of each call in call summary.
- Generates alert summary when particular vital parameters go beyond a specified value.

PDA - Summary View

TA Summary view displays summary of data transmission in each direction including calling number, called number, duration, max/min RTD, average RTD and so on. It includes separate statistical counts on total packets, calls, failed calls for SIP, H323, MEGACO, and RTP based calls. The user can get the statistics of active calls, purged calls, and so on.

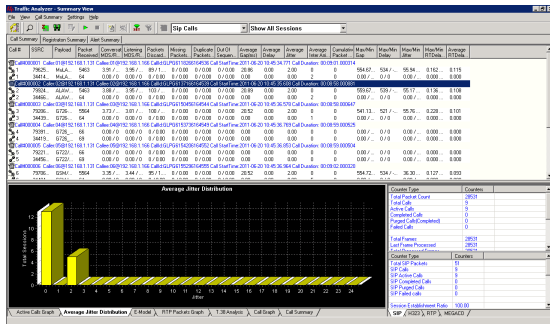


Figure: Traffic Analyzer Summary View

Call Summary – Signaling, Audio, and Video Parameters

The Call Summary displays the signaling, audio, and video parameters of each call for SIP, RTP, MEGACO, and H323 in a tabular format. 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.

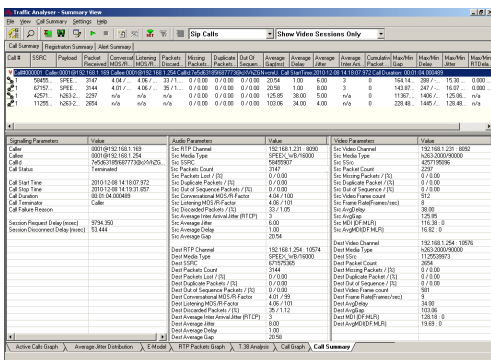


Figure: Signaling, Audio, and Video Parameters

Graphs in PDA – 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

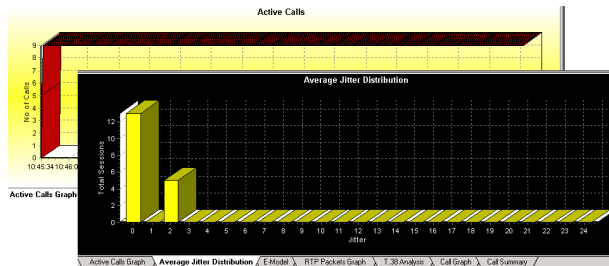


Figure: Active Calls and Average Distribution Graphs

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.

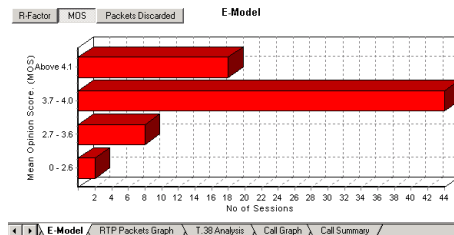


Figure: E-Model Graph

T.38 Analysis - Supports decoding, and monitoring of Fax (T.38 data) over VoIP. Identified T.30 messages is displayed in T.38 ladder diagram.

Call Graph - Displays the message sequence of captured VoIP (SIP or MEGACO) calls.

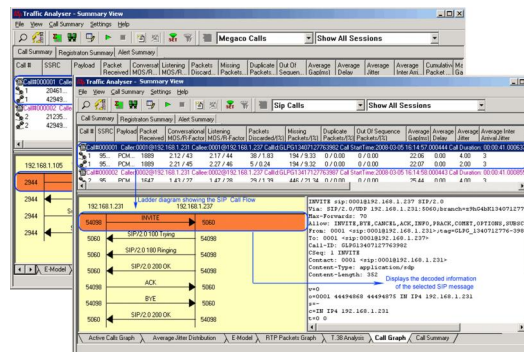


Figure: T.38 analysis and Call Flow Ladder Diagram



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Packet Data Analysis (PDA) – Detail View

Main Features

- Provides further detail statistics on the two (or one) RTP sessions that are part of a single call.
- RTP sessions include the graphical representation of R-Factor statistics which includes Quality Metrics with R-Factor and MOS Factors graphs, Jitter Buffer Statistics, Degradation Factor, Burst Metrics, and Delay Metrics.
- Codecs: Mulaw, Alaw, G.726 (40/32/24/16 kbps), G.726 with VAD, GSM610, G729, G729B, AMR (Wide & Narrow band), ILBC (20 , 30 msec), SPEEX, EVRC, EVRCB, H263+, & H264

PDA - 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.

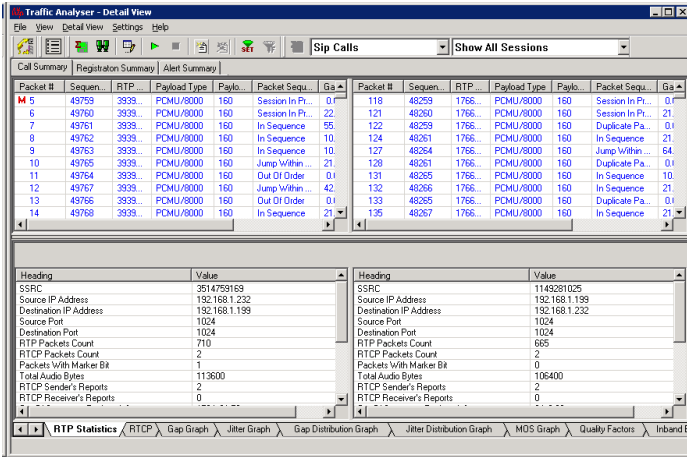


Figure: Traffic Analyzer Detail View

Graphs in PDA – 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.

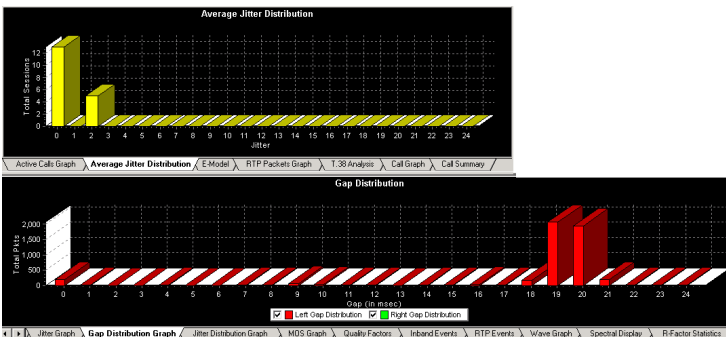


Figure: Gap/Jitter Distribution Graph

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

Quality Factor - Plots and compares Good Quality packets, Packets Discarded, and Echo level against total Packets for each individual session.

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.

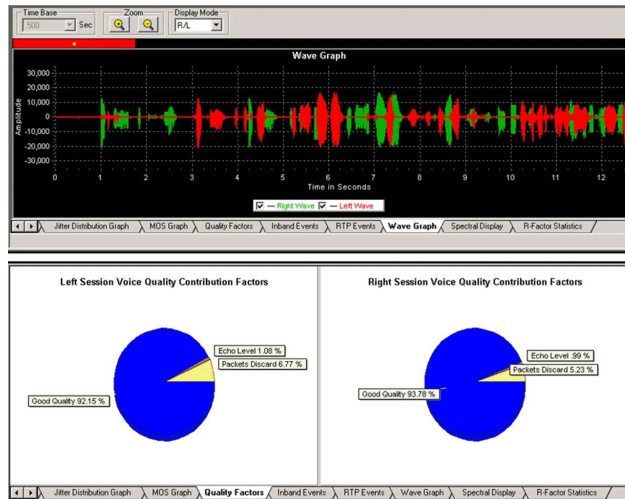


Figure: Wave Graph and Quality Factors

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.

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.

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.

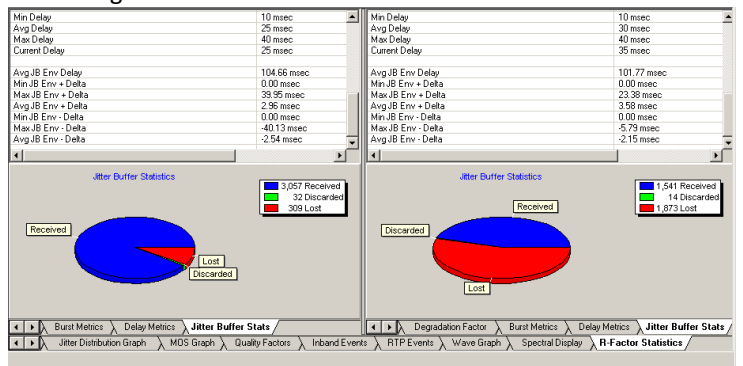


Figure: Jitter Buffer Statistics



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Other Features in PDA

Play Audio, Write to File, & Record Video

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 option is available for both auto detected RTP calls and SIP calls. Supported video codecs are: H263++ (CIF 190/350 kbps, 512 kbps, QCIF 64 /80/128 kbps) and H264 is an industry standard for video compression, the codec offers better compression performance over previous standards.

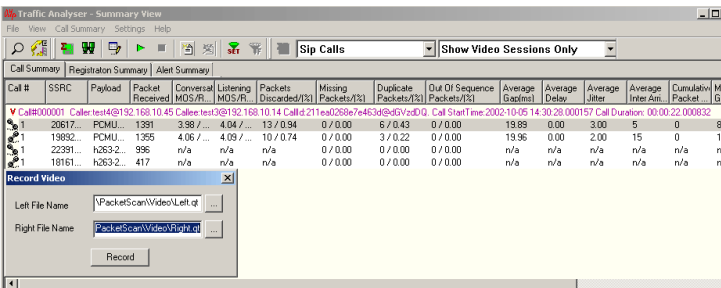


Figure: Record Video

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. Call Summary details could also be saved for a particular call and this will be saved 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.

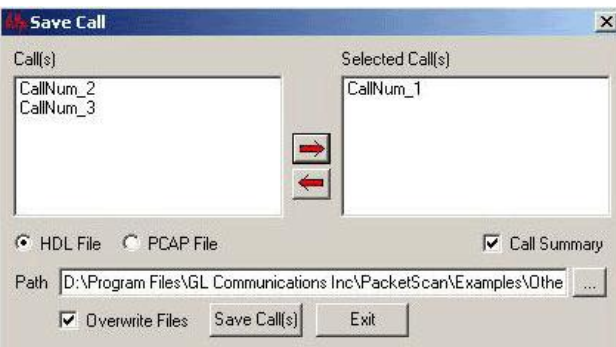


Figure: Save Call

RTP/RTCP Statistics and Inband 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.

Inband Events display inband DTMF and MF digits as they are received with details such as Timestamp, Type, Event, On-Time, Power, Freq1 / Power1, Freq2 / Power2.

Triggers and Action Settings

Triggers and Action Settings allow the user to filter calls based on certain SIP, RTP, MEGACO, and H323 parameters followed by a set of actions for the completed calls. The filtered file can be saved in either GL's proprietary HDL file format or Ethereal PCAP file format. Additionally, a summary of call signaling and audio parameters can be saved as *.rtf file.

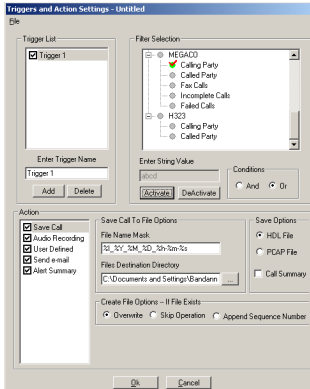


Figure: Trigger and Action Settings

Alert Summary

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.

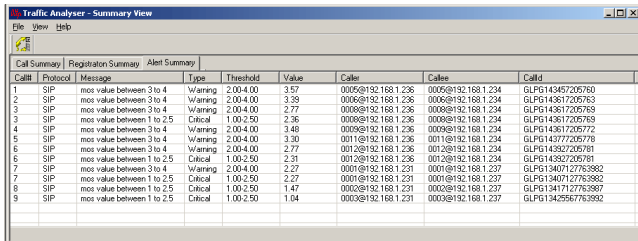


Figure: Alert Summary View

Packet Data Analysis (PDA) – Registration Summary

- Provides the registration summary of each SIP registration including the user agent, registrar, status, registered time, expiry time, time to live, remaining time, and registration request delay (RRD), and Re-registration Attempts.
- Provides graphical view of the active registrations and registration trace of each registration.

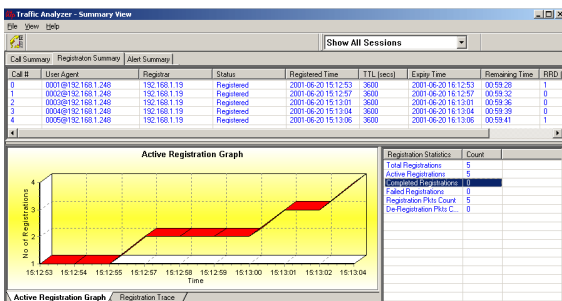


Figure: Registration Summary



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Supported Protocols & Specifications (For complete list, visit <http://www.gl.com/pppanalyzer.html>)

Available Standards	Supported Protocols	Standard / Specification Used
PPP	PPP	RFC 1331,1220,1333,1548,1661, 1570
PPP SIGTRAN	MultiPPP (PPP Multilink Protocol)	RFC1717, RFC1990
	Multiplexed PPP	RFC 3153
	CRTP	RFC 2508
	Cisco HDLC	http://www.protocols.com/pbook/bridge.htm#CISCOROUTER
	CHAP (Challenge Handshake Authentication Protocol)	RFC1334 http
	IPHC (IP Header Compression)	RFC 2507, RFC 3544
	LCP (Link Control Protocol)	RFC1570, RFC1661
	NCP	RFC 801
	LQR (Link Quality Report)	RFC1333
	Multi-class extensions to PPP (MC MLPPP)	RFC2686
	PPP (Point-to-Point Protocol) over HDLC	RFC1662
	PPP-BPDU (PPP Bridge Protocol Data Unit)	RFC1638
	BCP (Bridging Control Protocol)	RFC 3518
	IPCP (IP Control Protocol)	RFC1332
	IPCP Extensions for Name Server Addresses	RFC 1877
	PPPMuxCP	RFC 3153
	ISDN H.225	H.225 Q.931 Layer
	SCTP	RFC 2960
	SUA (SCCP UA)	RFC 3868
	SNMP (V1, V2)	RFC 1157,1155,1902,3416,2863, 2578,3418,2011,2012 etc
	SIP3261, MGCP, MEGACO, RTP, and RTCP	RFC 3261, RFC 3435, RFC 3015, RFC 2833, and RFC 3550
	H.263, H.245, and H.450	ITU-T H.263, ITU-T H.245, and ITU-T H.450.1 to H.450.12

MLPPP Emulation Capabilities

Automated testing can be accomplished using client-server based PPP, MLPPP, & Multi-Channel (MC) MLPPP Emulation and Analysis (MLPPPTerr) module. The application permits traffic generation and verification over PPP links and may be accessed through a GUI or through command line scripts. For more details on automated testing of MC-MLPPP using Client Server click <http://www.gl.com/mlppptxrinxwcs.html>.

Buyer's Guide

[XX135](#) – Real-time MLPPP Protocol Analyzer (T1/E1)

[OLV135](#) – Offline MLPPP Protocol Analyzer

[XX136](#) – PPP and MLPPP Packet Analysis – Real-time Packet Voice, Video, and Fax Analysis

Related Software

[XX600](#) – Basic Client/Server Scripted Control Software

[XX634](#) – w/ Client-server Multi-Channel HDLC Emulation and Analysis, File based High Throughput HDLC Record/Playback

[XX635](#) – w/PPP Emulation and Analysis

[XX636](#) – w/Multi-Class (MC) MLPPP Emulation and Analysis

Related Hardware

[UTE001](#) – USB based Dual T1/E1 Laptop Analyzer

[UTA001/UEA001](#) – Basic USB based Dual T1/E1 Laptop Analyzer Software

[HTE001](#) – Universal HD T1/E1 PCI Cards

[HUT001/HUE001](#) – Basic Universal HD T1/E1 Software

*Specifications and features subject to change without notice



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