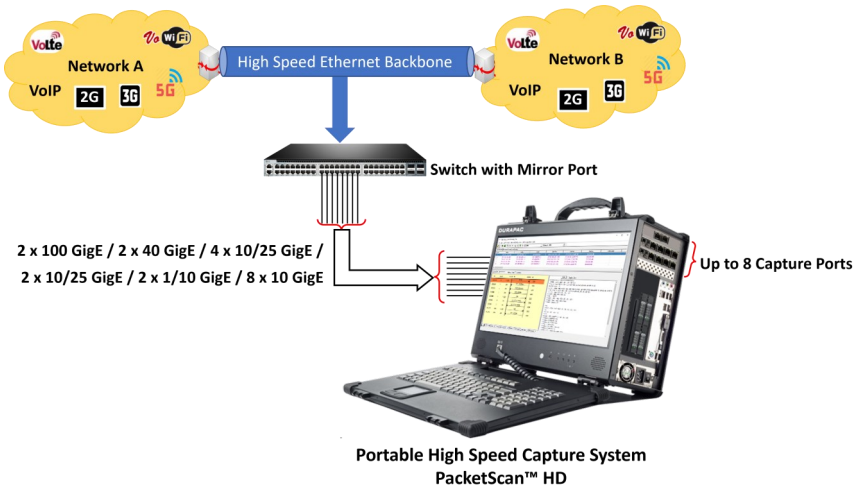
High Density Ethernet Monitoring Appliance – PacketScan™ HD

(1G, 10G, 25G, 40/100G)



Overview

PacketScan™ HD is a high density Ethernet monitoring appliance with specialized network interface cards, large storage capacity and protocol analysis software. Customers can choose the specific Ethernet data rate for the network interface cards including 4 x 1 GigE, 2 x 10 GigE, 2 x 40 GigE, and 2 x 40 / 2 x 100 GigE variations. Capture and analyze high speed Ethernet traffic over 1 Gbps, 10 Gbps, 40 Gbps and 100 Gbps networks. Almost all VoIP and Wireless protocols over IP transport layer can be captured and decoded for troubleshooting network problems. PacketScan™ HD appliance is also available in three variants.

Part Number	PKV120 (Rack system)/ PKV120P (Portable system)	PKV122 (Rack system)/ PKV122P (Portable system)	PKV124 (Rack system)/PKV124P (Portable system)
Processor	Single Processor	Dual Processor Xeon /Single Processor	Dual Processor Xeon/Single Processor
RAM	32 GB	32 GB	128 GB
Storage	500 GB NVME SSD, customizable up to 240 TB		
Data Rate	4x1GigE	4x1/10GigE or 2x1/10GigE	8x10GigE, 2x10/25GigE, 2x40GigE, 2x100GigE

GL's PacketScan™ HD 5G Protocol Analyzer can monitor 5G networks. It captures, decodes, and collects statistics over N1N2, N4, N8, N10, N11, N12 and N13 interfaces of the 5G network. The 5G Protocol Analyzer is an optional module available within PacketScan™ HD on purchasing of additional licensing.

PacketScan™ HD supports decoding of eCPRI protocol which enables analysis of eCPRI message types such as IQ Data, Bit Sequence, Generic Data Transfer, Remote Memory Access, One-way Delay Measurement, Remote Reset, and Event Indication.

GL's **TCP Analytics** application analyzes TCP connections between both internal LAN and external WAN computers including servers and clients. The application helps troubleshoot large bandwidth consumption, failed TCP sessions, packet loss, poor TCP throughput and more. TCP Analytics (PKV400) is an optional application with PacketScan™ HD network monitoring appliance. For more details, refer to TCP Analytics webpage.

For more details, refer to PacketScan™ HD - Network Monitoring Appliance webpage.

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Main Features

- Supports the following configurations: 4 x 1 GigE, 2 x 10 GigE, 2 x 40 GigE, and 2 x 40 / 2 x 100 GigE
- PacketScan™ HD works with FastRecorder™ and PacketExtractor™ application for wirespeed IP traffic filtering and recording capabilities of up to 320 Gbps directly onto disk for offline filtering, extraction, and analysis
- Using PacketScan™ HD system along with FastRecorder™ application, users can capture the traffic and analyze the captured data using GL IP Analytics™ tool
- Supports 5G interfaces – N1N2, N4, N8, N10, N11, N12, and N13
- Wirespeed unfiltered continuous capture to NVMe SSD – up to hard disk size
- PacketScan™ HD can monitor 20,000 simultaneous calls with bidirectional RTP traffic from 1 Gbps to 100 Gbps link rates. Up to 50,000 calls can be achieved by scaling with higher configurations
- Simultaneous operations with contiguous/multiple cards, (1GigE, 10 GigE, and 40 GigE) subject to the performance limitation and up to maximum of 4 cards are supported
- Provides wirespeed hardware filter capabilities to filter traffic of interest
- Supports almost all industry standard IP and Wireless Protocols (from SIP to LTE)
- Supports all RTP traffic – Voice, Data, Video, Fax T.38, Digits, Tones, Impairments
- Capture and Call processing is enhanced to handle different Tunnel traffic (VXLAN, GRE and GTP) and multiple tunnelling
- Support for eCPRI decode

As a Single Point Packet over IP CDR Analysis System

- PacketScan™ HD can work with GL's VoiceBand Analyzer (VBA) and Call Data Records (CDR) applications to generate Call Detail Records as (*.CSV files) along with voice files for each direction
- PacketScan™ HD can send protocol fields, and call detail records, along with traffic summary of captured calls to a central data-base and NetSurveyorWeb™ displays the data from the database in a simple web-based browser, featuring rich graphics, custom search, report and filter configurations

Filter and Search Capabilities

PacketScan™ HD supports three stages of filtering:

- Hardware Filter - high speed, discards unwanted packets at the hardware level
- Capture Filter - slower discards unwanted packets at the application level
- View Filter and Search (Post Capture Filter) - performs filtering on the captured trace only for viewing purposes; filtered trace can be exported to PCAP or GL's HDL file format

Supported Codecs

- G.711 (a-Law and µ-Law), G.711 App II (a-Law and µ-Law with VAD)
- G.722, G.722.1 (Wideband), G.726, G.726, with VAD, G729, G729B (8kbps)
- GSM, GSM HR, GSM EFR
- SPEEX/SPEEX_WB (Narrow band/Wideband)
- iLBC (20ms and 30ms), SMV
- AMR/AMR_WB (Narrow band/Wideband) (requires additional license)
- EVRC, EVRC0, EVRC-B, EVRC-B0, EVRC-C (requires additional license). Visit Voice Codec webpage for more details

Supported Protocols

- SIP, SIP-I, SIP-T, H.323, MEGACO, MGCP, Diameter, Skinny (SCCP)
- LTE, SIGTRAN – SS7, ISDN, GSM A and Abis over IP, GPRS Gb and Gn over IP
- UMTS IuCS, IuH, IuPS, and IuUP over IP, T.38 Fax and Video calls. Visit Supported Protocols for more details

Main Features (*Contd.*)

QOS Parameters

- E-model (G.107) based MOS/R-Factor scores
- Media Delivery Index (Delay Factor: Media Loss Rate) for video calls
- H.263, H.264 codec support for video conference monitoring capability

Traffic Handling

- All RTP traffic supported – Digits, Tones, Voice, Video, Fax
- SIP ED 137B for Air Traffic Monitoring (Air-to-Ground and Ground-to-Ground Calls)
- Segregation of IP traffic and signaling
- Listen and Record audio streams, Video QoS Statistics
- Filters based on WhiteList Calls, Criteria based Voice/Trace Recording

Performance Metrics

- Signaling, audio, and video QoS parameters for each call
- Minimum, maximum and average round trip delay
- Inband (DTMF and MF) events, Outband events as per RFC 2833 or RFC 4733 events, RTP/RTCP packet count and reports per direction

Triggers and Actions

- Filter the completed calls captures based on different signaling parameters and then specify a series of actions to be taken

Report Generation

- Ability to export summary report of selected or all completed calls in Packet Data Analyzer to CSV file format
- Analyze the CSV files using custom Excel® addins
- Ability to save a particular call in HDL, PCAP, or PCAPNG file format for further detail analysis
- Generates alert summary when particular vital parameters go beyond a specified value

Statistics

- Quality Metrics with E-Model R-Factor and MOS Factors graphs, Jitter Buffer Statistics, Degradation Factor, Burst Metrics, and Delay Metrics
- Active calls, Average jitter, Packets Discarded, RTP packets summary, Detail ladder diagram

Specifications

Supported Interfaces	**4x 1 Gbps**: 850/1310 nm SFP Module; Ethernet/ Optical SFP **2x 10 Gbps**: 10GBASE-SR SFP+; Optical only **2x 40 Gbps**: MTP/MPO Connector for CFP2; Optical only **2x 40/2x 100 Gbps**: MTP/MPO Connector for CFP2; Optical only
OSI	MAC, ARP, IP, IGMP, ICMP, TCP, UDP, SCTP, FTP, HTTP, TLS, SMTP
Protocols	GSM, UMTS, LTE, IMS, SIP, RTP, T.38, RTCP, and much more (some protocol support requires additional licensing)
Capture Timestamp	Absolute, Relative, Difference, NTP 4 Nano-second resolution
Captured Trace Format	GL's Proprietary HDL, PCAP, PCAPNG Frame Decodes can be saved to text file format

PacketScan™ HD Rack System -1G/10G/40G/100G

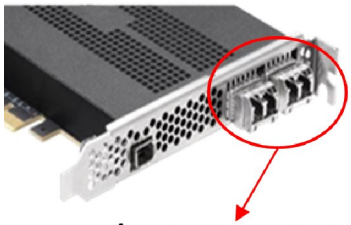
PacketScan™ HD Portable System 1G/10G/40G/100G

Pelican Carry Case

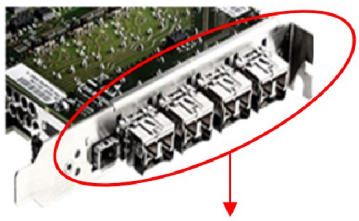
Specifications (*Contd.*)

Filter	Hardware Filter at line rate, Application Level Capture Filter, and Post Processing Filter and Search
Performance	**4 x 1GigE**: 20000 calls with bi-directional RTP traffic **2 x 10GigE**: 30000 calls with bi-directional RTP traffic Extracting/recording voice • 2500 simultaneous calls (maximum) • Option to record filtered calls of interest only
Protocols	5G, LTE, IMS, SIP, RTP, T.38, RTCP, UMTS, GSM, and more (some protocols require additional licensing)
Rack/Portable System Specifications	• Dual Processor Xeon/Single processor • Expandable memory up to 128 GB • Intel DQ67SW uATX LGA1155/Q67 motherboard • 17" 1280 x 1024 LCD (Optional Resistive Touch) • **LCD Specifications**: 180 H/180 V viewing angle, 250 nits, 1500:1 contrast ratio 16.7M colors, 8ms response time • DVI-A for integrated LCD video interface • **Standard I/O Interfaces**: Integrated GbE, Serial Port, 2 USB3, 4 USB2, 2 eSATA, 2 SATA6, 2 SATA3, 1394, Audio/ Speaker • **PCI Expansion Slots**: One PCIex 16, one PCIex 4 (or PCI) • **PCI Slot Lengths**: 9-13" depending on configuration • Removable hard drives up to 4x2.5" SATA/SSD • 500 GB NVME SSD, customizable up to 240 TB • **Optical Drive**: DVD/CD Writer or BluRay Burner • **Video Projector Ports**: DVI-I and Display Port • **Power Supply**: 275 Watt 90 – 264VAC 50 – 60 Hz • **Size Closed**: 16"W x 16.3"H x 5.4"D • **Size Open**: 16"W x 16.3"H x 8"D • **Environmental**: 0° - 50°C 10-90% Rel. humidity • **Transit Case (optional)**: Pelican 1610 with custom polyethylene foam • **Weight**: 26 pounds; Total Weight of Computer with Transit 40-45 pounds

Portable Platforms



w/ 2x 10GigE (PKV122)



w/ 4x 1GigE (PKV120)

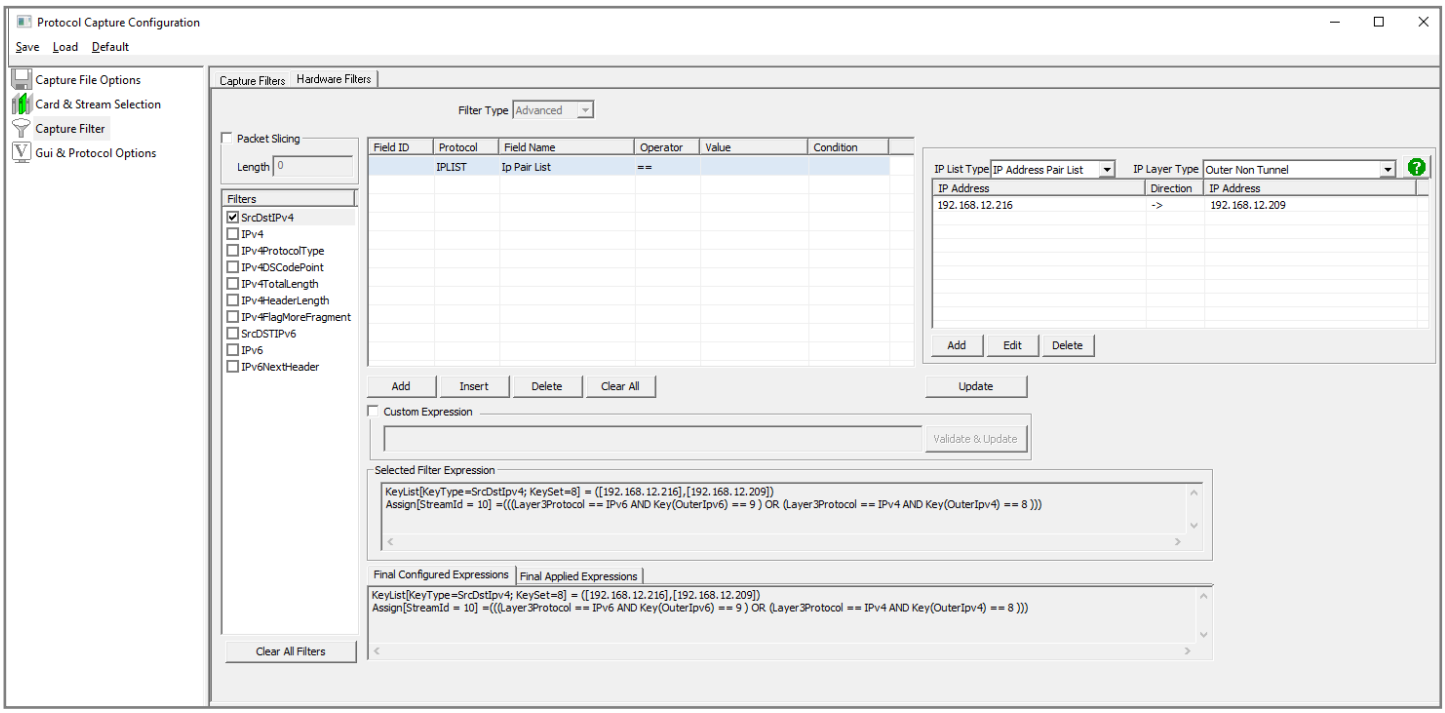
w/40 or 100 GigE (PKV124)

Comprehensive Filtering Capabilities

The PacketScan™ HD application permits users to filter out traffic of interest at two levels prior to capture.

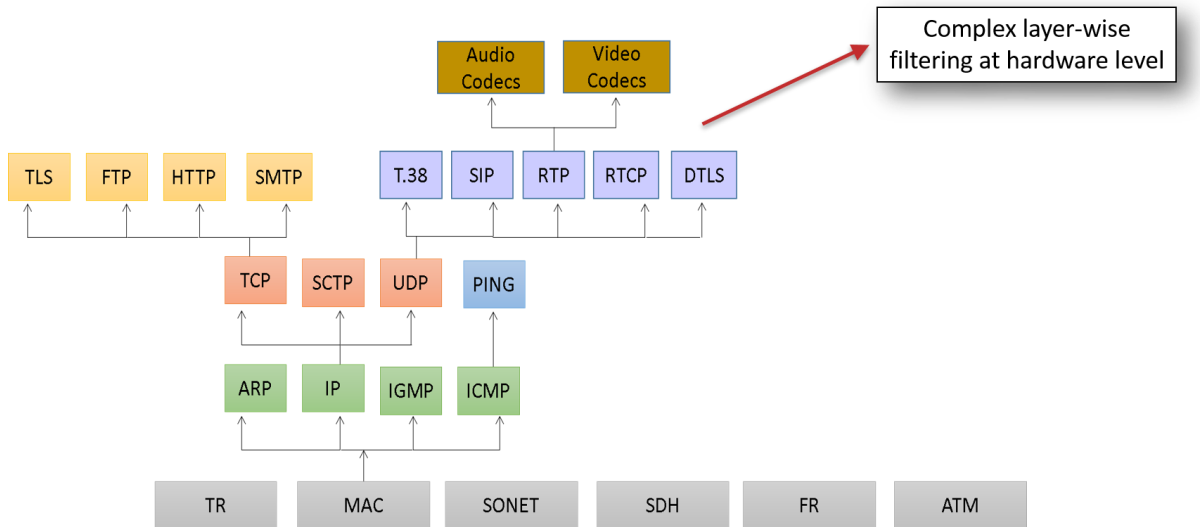
Hardware Filter

- Permits users to filter out packets of interest at hardware level on high density network and discard unwanted traffic
- Create up to 10 user defined hardware filters to filter-out traffic based on Layer-wise parameters such as Frame size and MAC, 802.1Q (VLANs), IPv4 /IPv6, TCP, UDP, SCTP, GTP, SIP, RTP and more
- Ability to set filter conditions either before capturing the packets, or while running real-time capture
- Complex filtering capabilities at the lower hardware level result in Low CPU load on the host server
- Users can create their own filters using custom filter option which provides flexibility to check the fields and use the logical conditions more efficiently



Software Filter

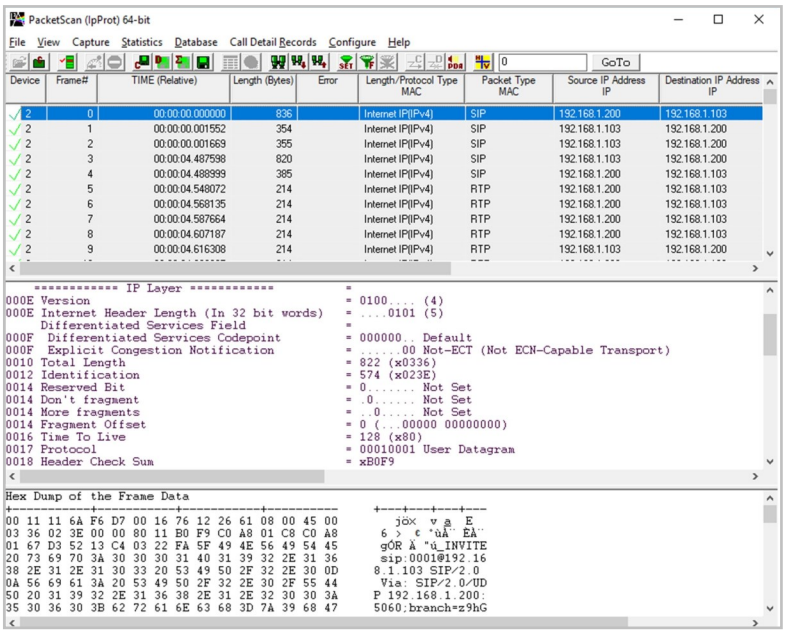
- Layer-wise complex software filtering further can be applied at the application level based on different signaling parameters further, with Triggers and action feature, one can perform automated actions on the filtered completed calls



Summary Frame View

Summary, Detail, and Hex Dump Views

The Summary View displays various information such as Frame Number, Time, Length, Message Types, IP source and destination addresses, and so on. Any field from the protocol headers can be added to Summary view, i.e., summary fields are completely user-configurable. Users 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 octet dump.



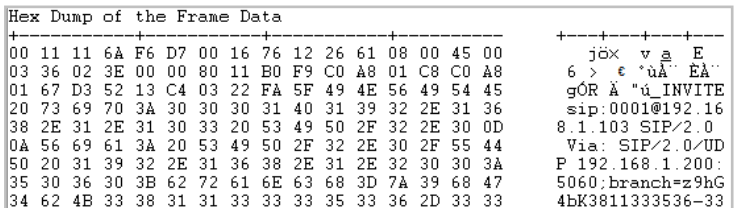
Different Views

Summary View

Device	Frame#	TIME (Difference)	Length (Bytes)	Error	Length/Protocol Type MAC	Packet Type MAC	Source IP Address IP	Destination IP Address IP	Source Port UDP	Destination Port UDP	SIP Method Sip3261	SIP From Sip3261
2	0	00:00:00.000000	836		Internet IP(IPv4)	SIP	192.168.1.200	192.168.1.103	54098	5060	INVITE	0001@192.168.1.200
2	1	00:00:00.001552	354		Internet IP(IPv4)	SIP	192.168.1.103	192.168.1.200	54098	5060	SIP/2.0 100 Trying	0001@192.168.1.200
2	2	00:00:00.000117	355		Internet IP(IPv4)	SIP	192.168.1.103	192.168.1.200	54098	5060	SIP/2.0 180 Ringing	0001@192.168.1.200
2	3	00:00:04.485929	820		Internet IP(IPv4)	SIP	192.168.1.103	192.168.1.200	54098	5060	SIP/2.0 200 OK	0001@192.168.1.200
2	4	00:00:00.001401	385		Internet IP(IPv4)	SIP	192.168.1.200	192.168.1.103	54098	5060	ACK	0001@192.168.1.200
2	5	00:00:00.059073	214		Internet IP(IPv4)	RTP	192.168.1.200	192.168.1.103	1024	1024		
2	6	00:00:00.020063	214		Internet IP(IPv4)	RTP	192.168.1.200	192.168.1.103	1024	1024		
2	7	00:00:00.019529	214		Internet IP(IPv4)	RTP	192.168.1.200	192.168.1.103	1024	1024		
2	8	00:00:00.019523	214		Internet IP(IPv4)	RTP	192.168.1.200	192.168.1.103	1024	1024		
2	9	00:00:00.009121	214		Internet IP(IPv4)	RTP	192.168.1.103	192.168.1.200	1024	1024		
2	10	00:00:00.012377	214		Internet IP(IPv4)	RTP	192.168.1.200	192.168.1.103	1024	1024		

Detail Decode View

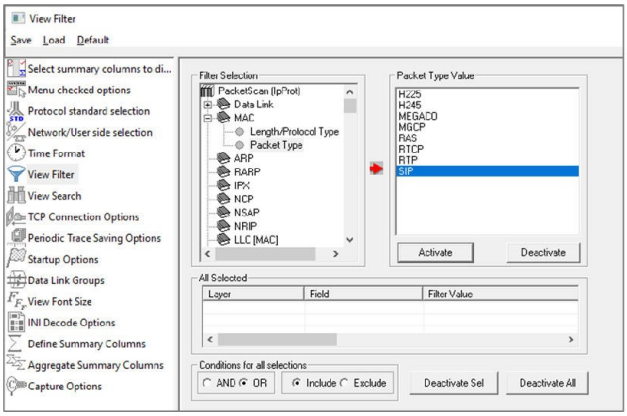
Hex Dump View



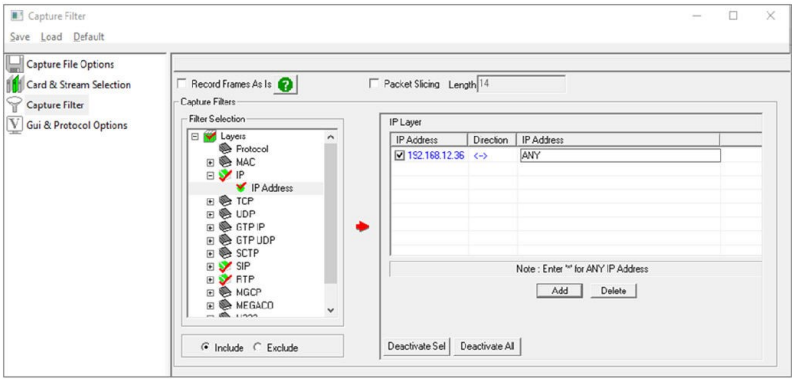
Filtering and Search

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

Allows real-time filtering based on parameters set in Data Link layer, MAC layer, IP, TCP/UDP, and more. The offline filter allows filtering based on Frame Number, Time, Length, Message Types, and so on. Similarly, search capability helps users to search for a particular frame based on specific search criteria.



View Filter



Capture Filter

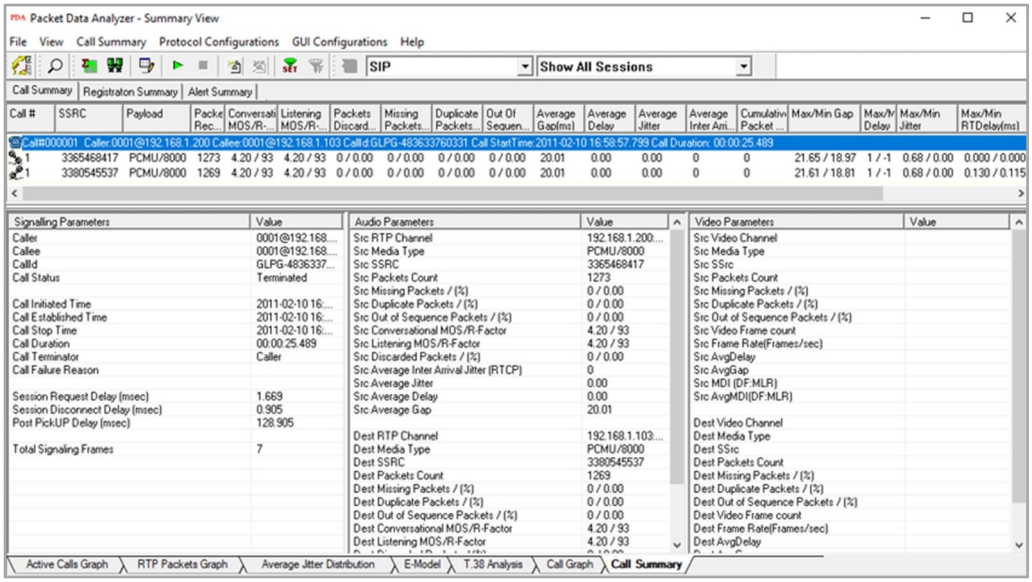
Analysis of VoIP and Wireless Calls – Summary View

Summary View

TA Summary view displays summary of data transmission in each direction including calling number, called number, call id, start time, duration, missing packets, max/min RTD, average RTD and so on. Calls and sessions are classified as active, completed, or failed giving the users an idea about the calls and its status in the network. It includes separate statistical counts on total packets, calls, failed calls, and more, for SIP, H.323, MEGACO, RTP, GSMA, IuCS, and SCCP based calls.

Call Summary – Signaling, Audio, and 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.

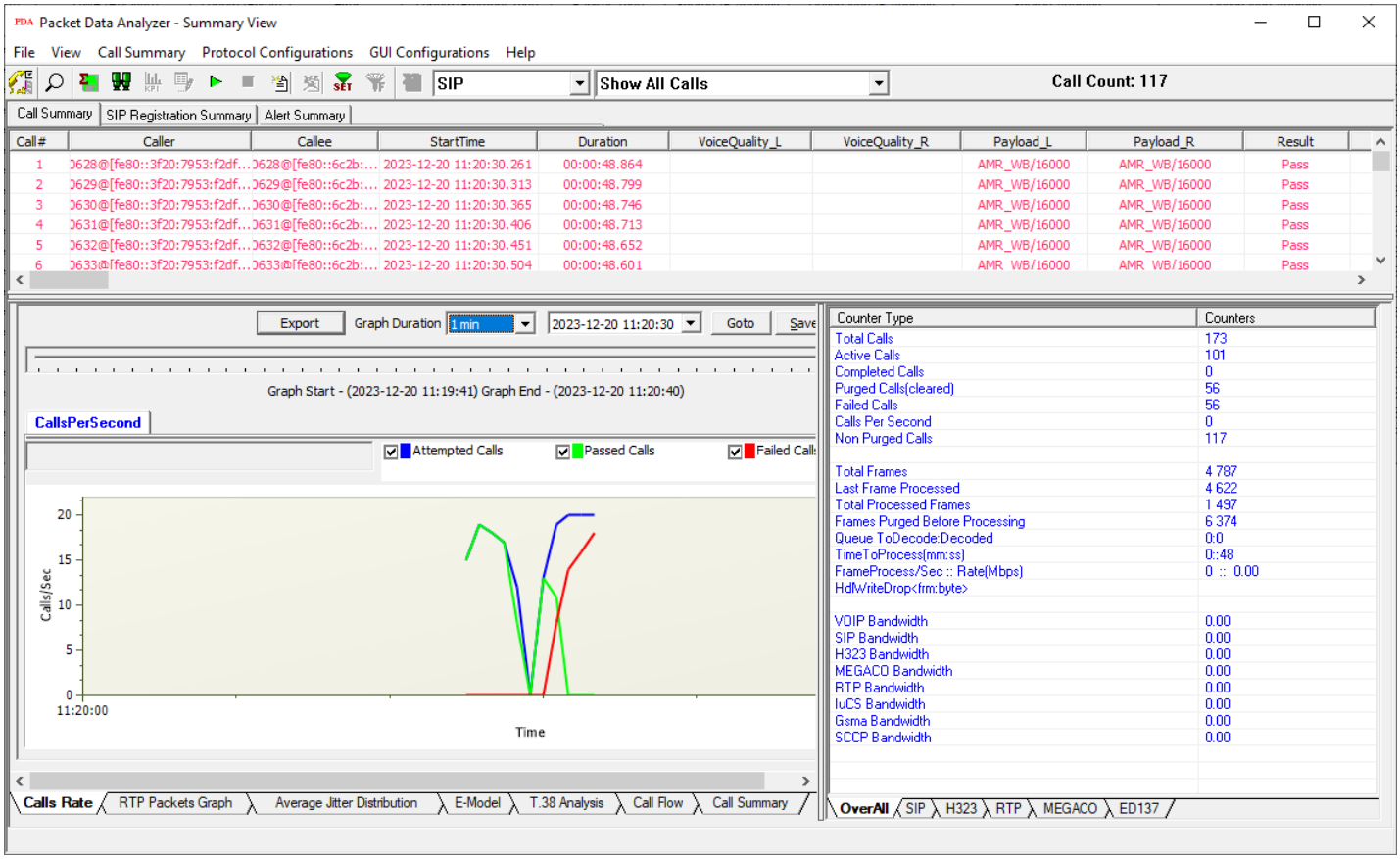


Call Summary, Audio and Video Statistics

Packet Data Analysis (PDA)

Features

- Call Quality Of Service (QoS) for all calls with E-Model based (G.107) Mean Opinion Score [MOS (ITU-T, G.107, E-model)] and R-factor with individual and summary statistics presented in graphical and tabular formats
- Provision for H.263+ and H.264 video capture and video conference monitoring capability
- Calculates minimum, maximum, and average round trip delay values for SIP calls
- Supports decoding of **AMR** and **AMR_WB** codec with **IuUP** Header
- Save calls in **HDL**, **PCAP**, or **PCAPNG** file format for further analysis
- Ability to copy the cell value to clipboard (Notepad)
- The PDA Summary View can also export all terminated call details as a text file (CSV format) during the live capture. This feature requires activating the Export Terminated Calls option from PDA prior to live capturing
- This structured text file can be imported into Excel® using a custom add-in (**Excel-Dashboard-Tool-IP.xlsm**) to generate different chart types such as call volumes, call duration, call failure causes, CMOS, LMOS, packet loss and more
- Individual and summary statistics presented in graphical and tabular formats
- Graphs are provided for key statistics for network monitoring and troubleshooting. Graphs available include – Active Calls, Average Jitter, E-Model MOS/R-Factor/Packets Discarded, RTP Packets Summary, ladder diagram for T.38 based fax calls and call signaling, Gap, Jitter, Gap/Jitter Distribution, Wave and Spectral Display for media stream analysis, VoIP calls and more
- Displays a summary of signaling, audio, and video parameters such as Source/Destination Video Channels, Media Type, SSRC, Average Delay/Gap, Packet Counts, Media Delivery Index and Frame Rate for all video calls
- Calls and sessions are classified as active, completed, or failed giving the users an idea about the calls and its status in the network
- Filter CDRs (Call Detail Records) based on parameters such as caller, time, message count, etc.
- Generates VoIP Key Performance Indicators (KPI) Reports: Call Success Ratio, Calls Per Second, Post Dial Delay, Error Code Distribution, Answer Seizure Ratio, and Call Duration
- Creates SIP Registration KPI Reports: Register messages per sessions ,Registrar(s) distribution, Registration(s) vs Deregistration(s) Over Time, Error code distribution
- Export KPI Report in PDF Format
- Generates alert summary when particular vital parameters go beyond a specified value

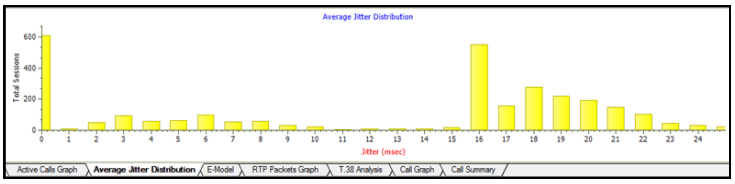


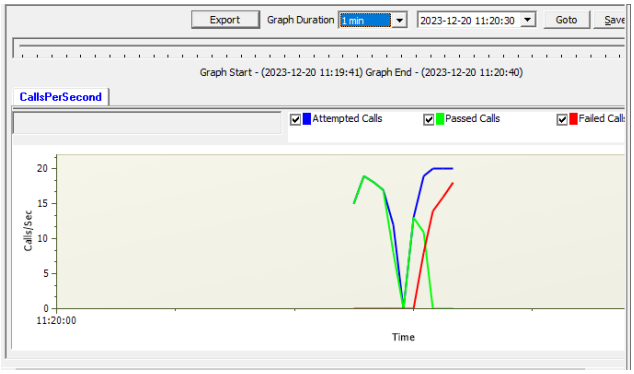
Call Summary View in PDA

PDA Graphs

Calls Rate Graph in PDA – Summary View

Calls Rate – A line graph, depicting the Number Of Calls Vs Time.
Average Jitter Distribution – Distribution of the Average Jitter values across the Total Sessions.

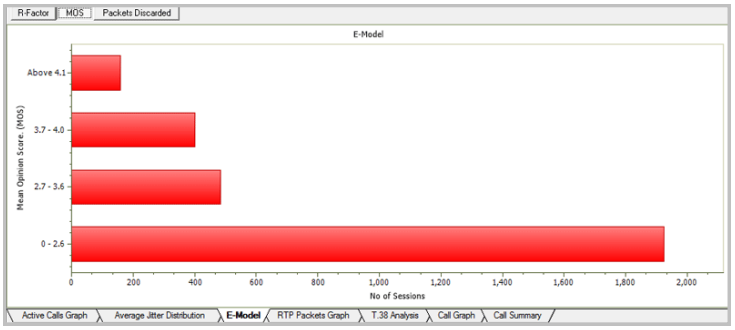




Average Distribution and Calls Rate Graphs

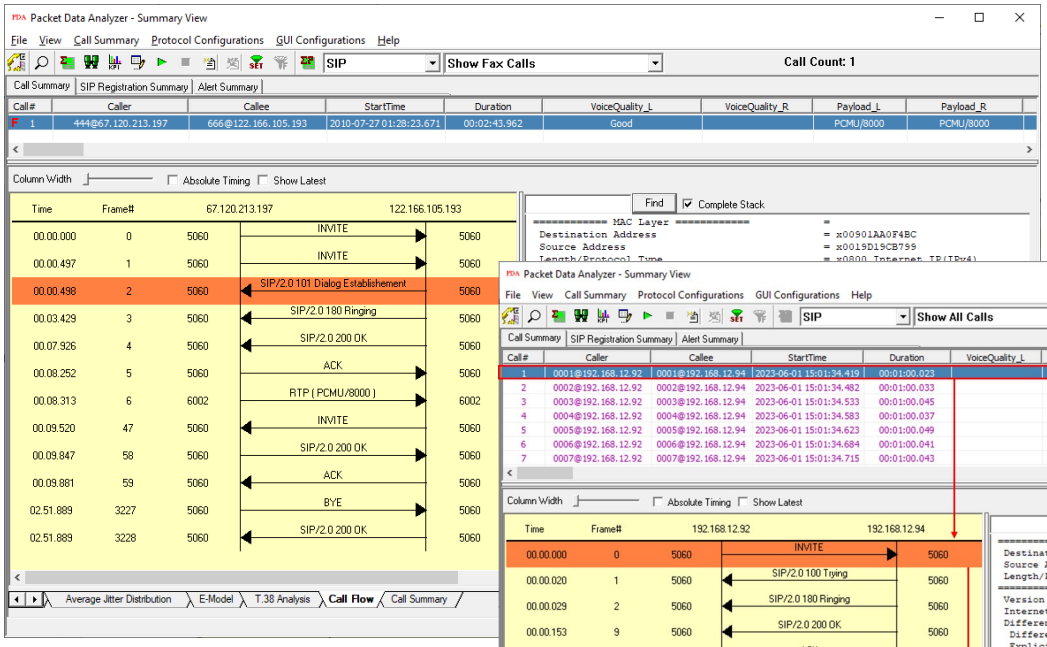
E-model - This graph provides R-factor, MOS and packets discarded against number of sessions- all these three graphs show statistics of terminated calls.

- **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

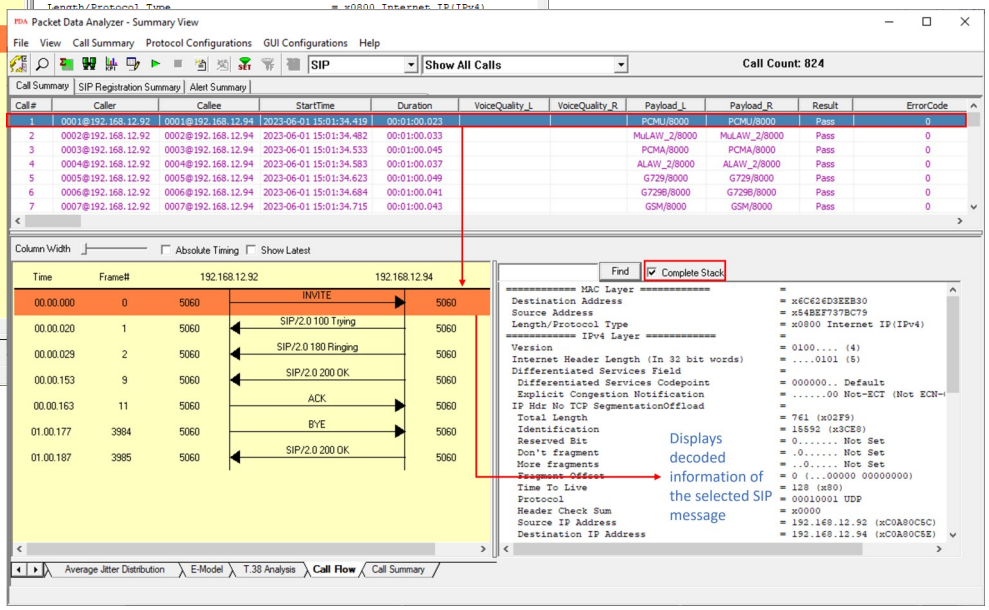


E-Model Graph

T.38 Analysis - Fax (T.38 data) over VoIP monitoring and decoding capability.
Call Flow - Displays the message sequence of protocols such as SIP, SIP ED137B, MEGACO, and H.323 captured VoIP calls.



FAX Call Flow

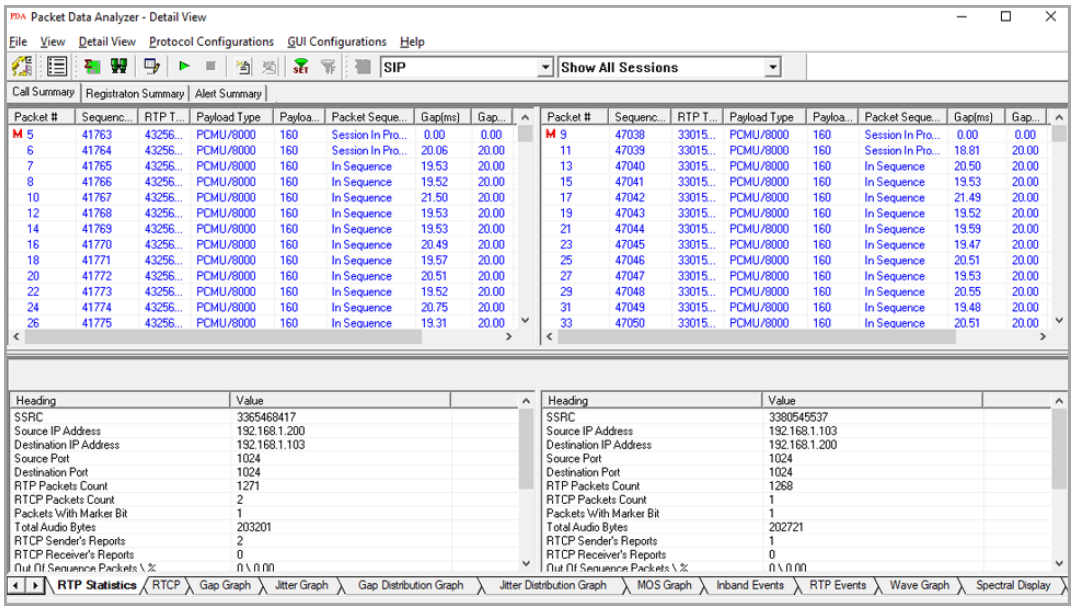


SIP Call Graph

Analysis of VoIP and Wireless Calls – Detail View

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.



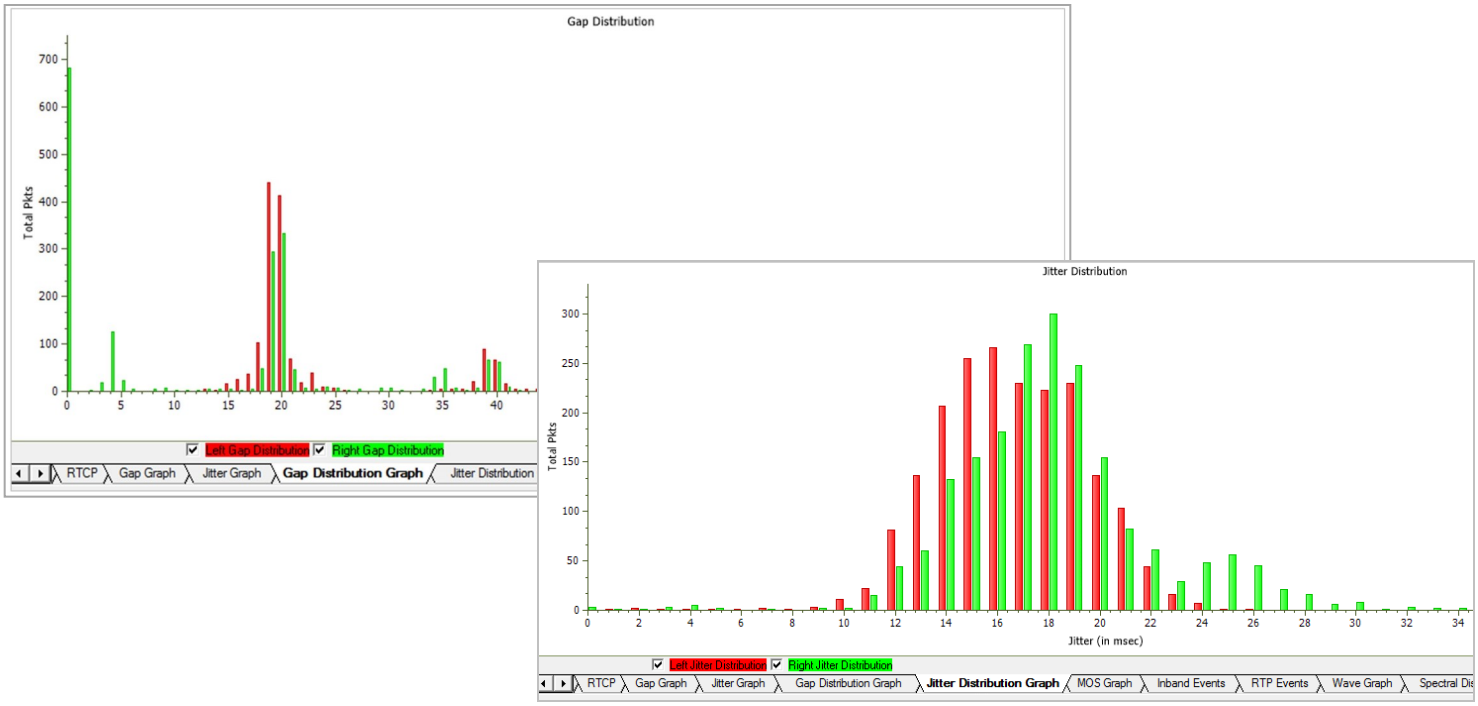
Traffic Analyzer Detail View

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.



Gap/Jitter Distribution Graph

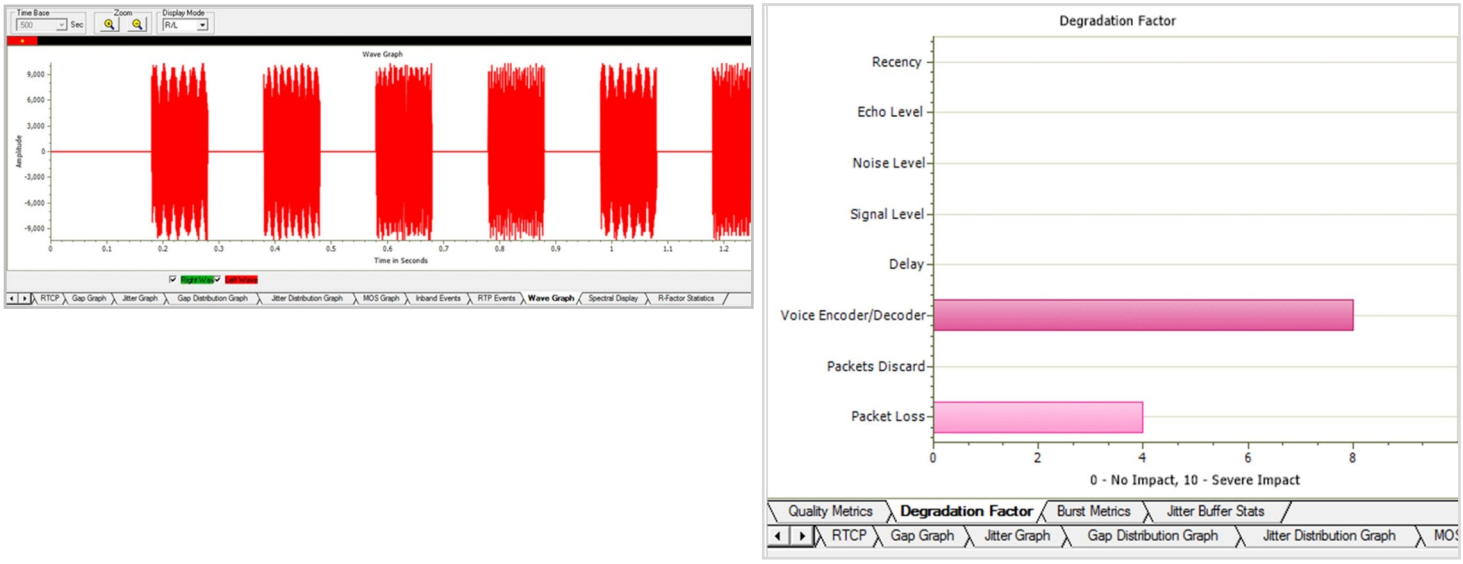
Analysis of VoIP and Wireless Calls – Detail View (*Contd.*)

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.



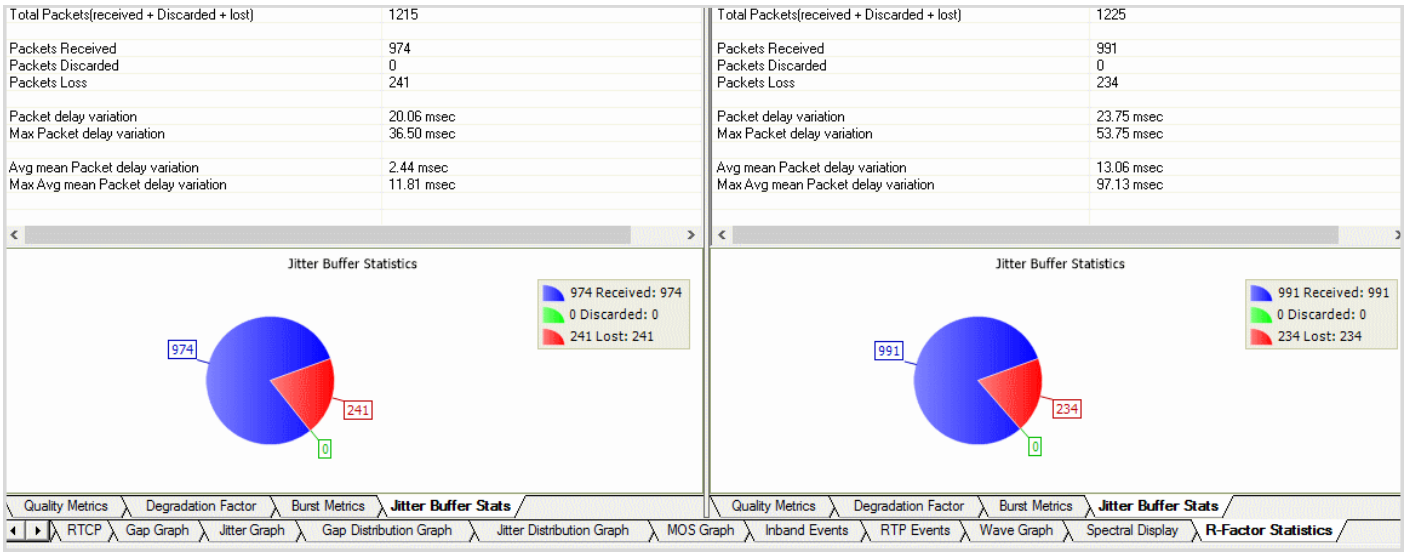
Wave Graph and Degradation Factors

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.

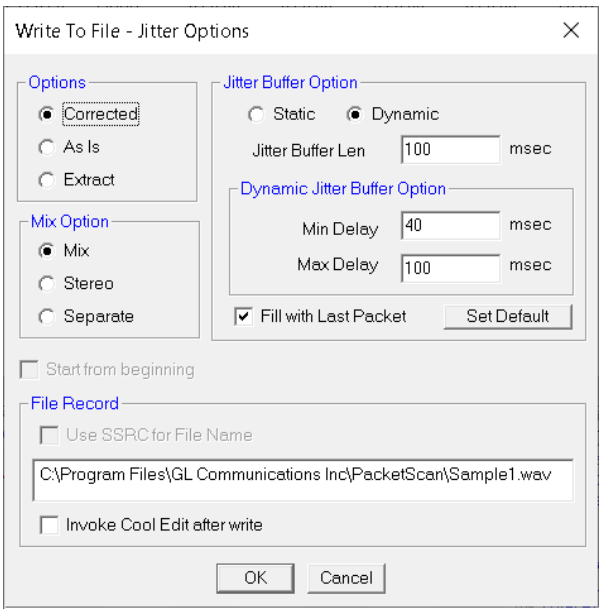


Jitter Buffer Statistics

Other Features

Play Audio and Write to File

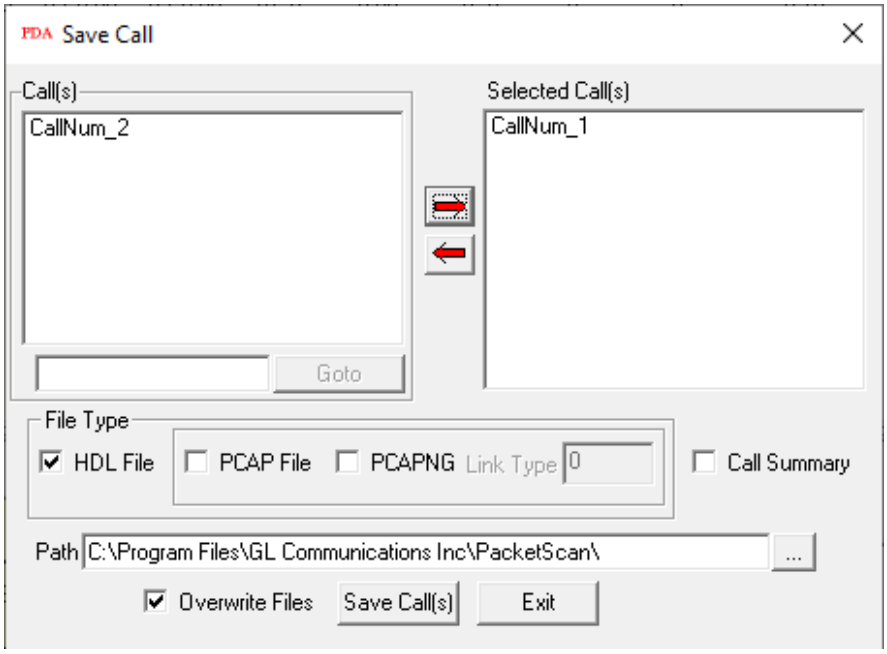
The Play Audio plays the selected call to the PC speaker. Write to File is similar to the Play Audio option. The basic difference being that the output is written to a file instead of playing to the speaker. PDA can monitor video calls and display both audio and video RTP streams in summary view.



Write to File

Save Call

The Save Call feature enables the users 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.



Save Call

Other Features (*Contd.*)

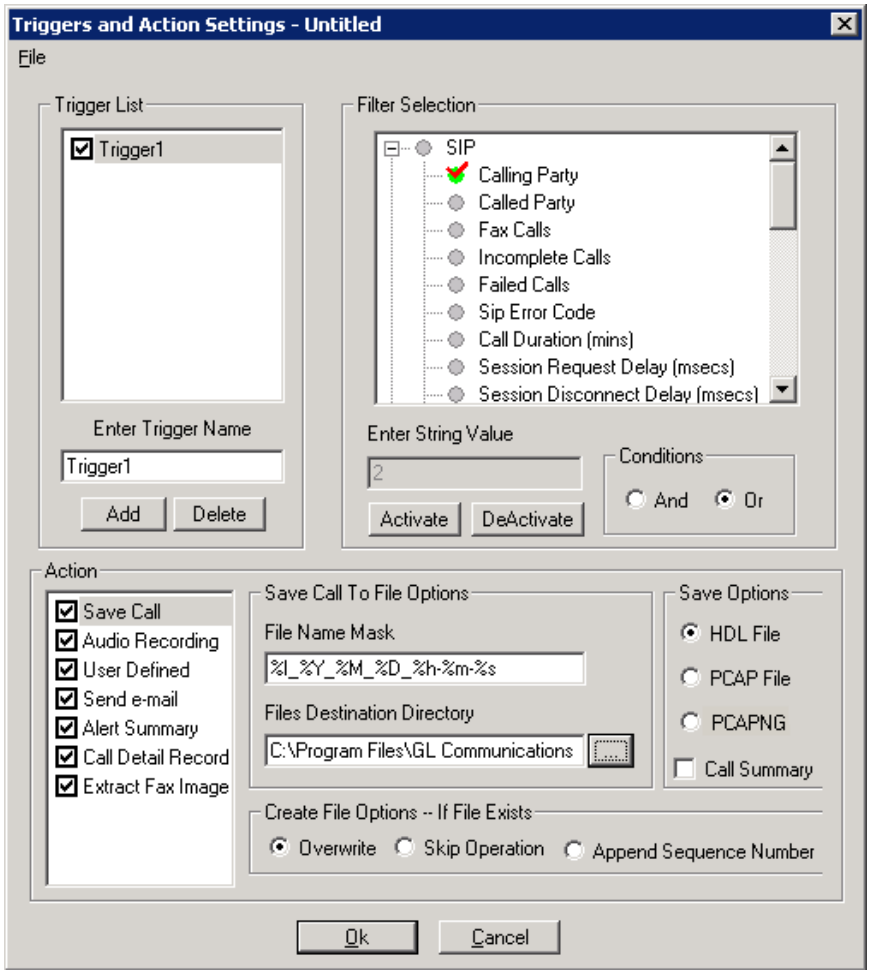
RTP/RTCP Statistics, Inband Events, Outband Events

The users 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, and Frequency. Outband Events display RTP events as per RFC 2833 or 4733 with details such as Timestamp, Event, Power, and Duration.

Triggers and Action Settings

Triggers and Action Settings allow the users 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**.

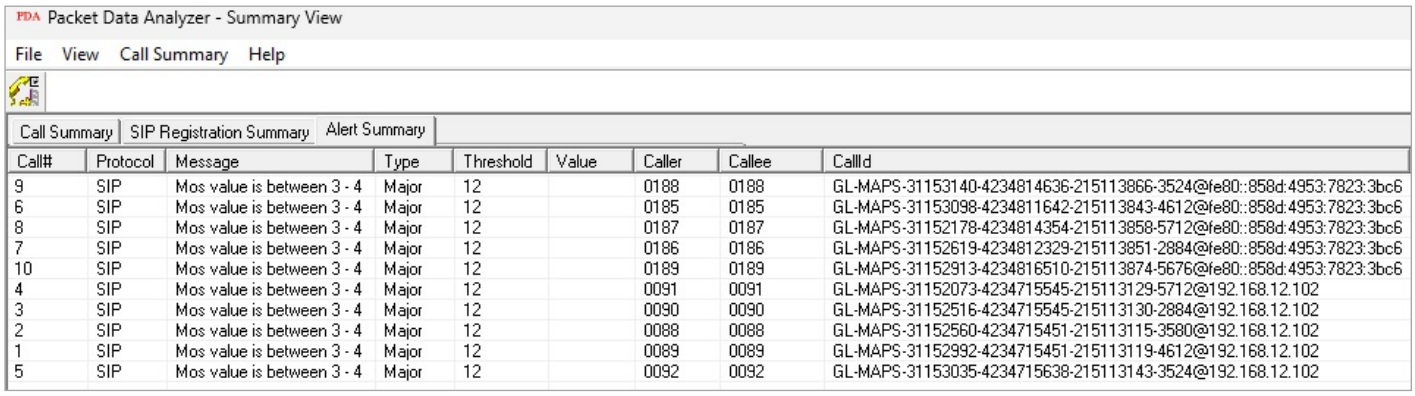


Trigger and Action Settings

Other Features (*Contd.*)

Alert Summary

Generates alerts when particular vital parameters go beyond a specified value and display in Alert Summary table. The users 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.

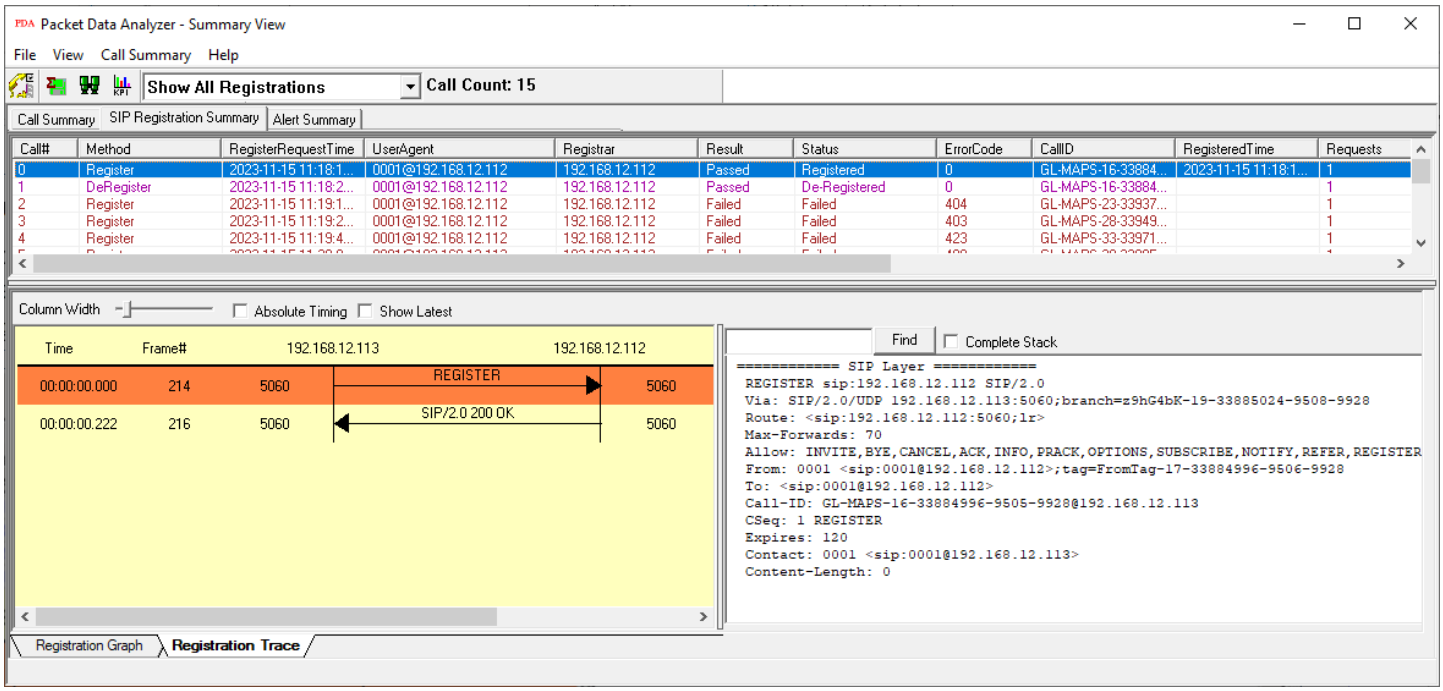


Call#	Protocol	Message	Type	Threshold	Value	Caller	Callee	CallId
9	SIP	Mos value is between 3 - 4	Major	12		0188	0188	GL-MAPS-31153140-4234814636-215113866-3524@fe80::858d:4953:7823:3bc6
6	SIP	Mos value is between 3 - 4	Major	12		0185	0185	GL-MAPS-31153098-4234811642-215113843-4612@fe80::858d:4953:7823:3bc6
8	SIP	Mos value is between 3 - 4	Major	12		0187	0187	GL-MAPS-31152178-4234814354-215113858-5712@fe80::858d:4953:7823:3bc6
7	SIP	Mos value is between 3 - 4	Major	12		0186	0186	GL-MAPS-31152619-4234812329-215113851-2884@fe80::858d:4953:7823:3bc6
10	SIP	Mos value is between 3 - 4	Major	12		0189	0189	GL-MAPS-31152913-4234816510-215113874-5676@fe80::858d:4953:7823:3bc6
4	SIP	Mos value is between 3 - 4	Major	12		0091	0091	GL-MAPS-31152073-4234715545-215113129-5712@192.168.12.102
3	SIP	Mos value is between 3 - 4	Major	12		0090	0090	GL-MAPS-31152516-4234715545-215113130-2884@192.168.12.102
2	SIP	Mos value is between 3 - 4	Major	12		0088	0088	GL-MAPS-31152560-4234715451-215113115-3580@192.168.12.102
1	SIP	Mos value is between 3 - 4	Major	12		0089	0089	GL-MAPS-31152992-4234715451-215113119-4612@192.168.12.102
5	SIP	Mos value is between 3 - 4	Major	12		0092	0092	GL-MAPS-31153035-4234715638-215113143-3524@192.168.12.102

Alert Summary View

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, registration request delay (RRD), and Re-registration attempts
- Provides graphical view of the active registrations and registration trace of each registration

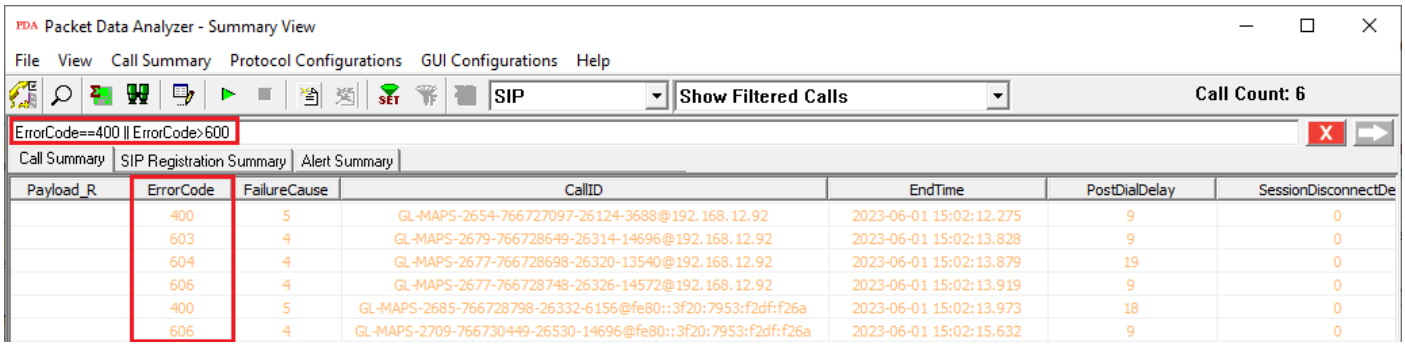


Registration Summary

Filtered Calls using Expressions

The PacketScan™ analyzer offers the option to filter call detail records based on parameters such as caller, time, and message count. The expression supports the following mathematical operators: ==, <=, >=, !=, <, >, &&, ||.

For example, the filter expression "'ErrorCode==400||ErrorCode>600" will display calls with ErrorCode equal to 400 and calls with ErrorCode greater than 600 as shown in the below screenshot.

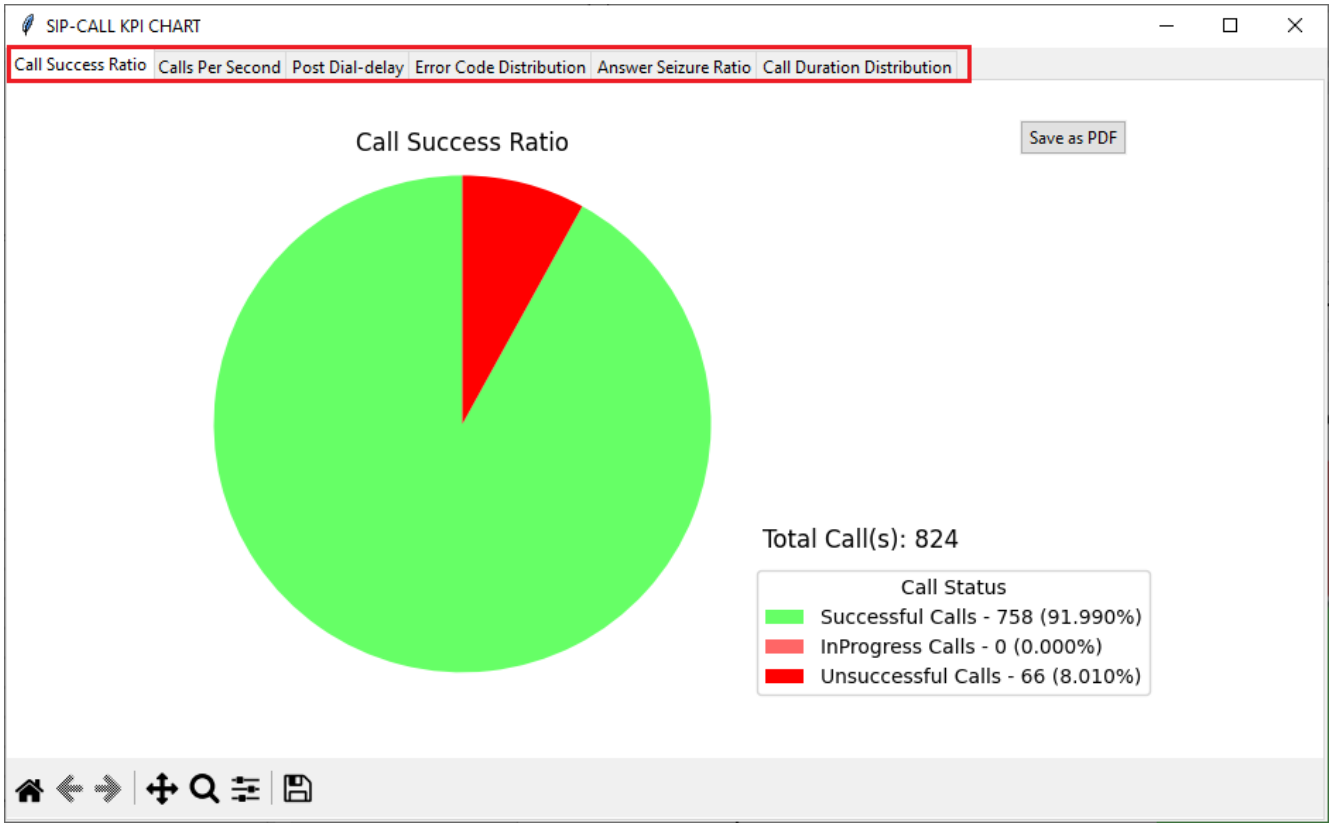


Displaying Filtered Calls using Expressions

KPI Report for SIP Calls

The SIP Call Summary KPI Report includes KPIs for the following:

- **Call Success Ratio**: Displays graph for "Successful" and "Unsuccessful Calls," including counts and percentages (%)
- **Calls Per Second**: Shows graph "Total," "Passed," and "Failed Calls per second."
- **Post Dial Delay**: Shows delay counts in milliseconds (0-250ms, 251-500ms, etc.)
- **Error Code Distribution**: Lists Top 10 Call Failure Causes with counts and percentages(%)
- **Answer Seizure Ratio**: Shows "Answered" and "Unanswered Calls," with counts and percentages(%)
- **Call Duration Distribution**: Provides call counts for different durations (0-1 sec, 1-10 sec, etc.)

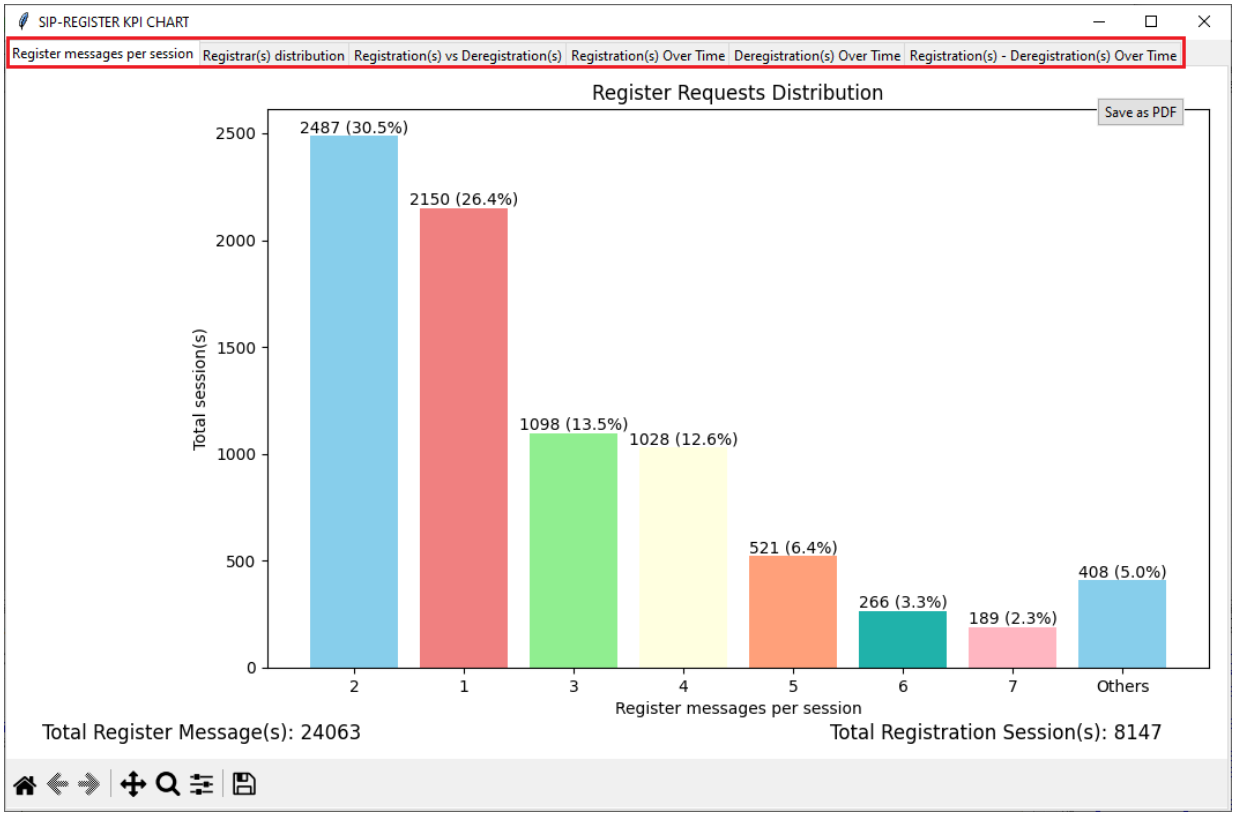


SIP Call KPI Chart

KPI Report for SIP Registration

The **SIP Registration Summary KPI Report** includes KPIs for the following:

- **Register Messages per Session**: Shows a graph for the distribution of Register Requests
- **Registrar(s) Distribution**: Displays a graph for the number of Registration sessions per Registrar
- **Registration(s) vs Deregistration(s)**: Illustrates a graph comparing the distribution of Register and Deregister counts with percentages (%)
- **Registration(s) Over Time**: Show the graphs for "Successful," "Failed," and "Total Attempts" per second
- **Deregistration(s) Over Time**: Displays a graph for "Successful" and "Total Attempts" per second
- **Registration(s) - Deregistration(s) Over Time**: Shows a graph for overall "Register & Deregister attempts," "Register & Deregister passed," and "Register & Deregister failed" attempts per second Register messages per session



SIP Registration KPI Chart

Buyer's Guide

Item No	Product Description
PKV120	PacketScan™ HD – High Density IP Traffic Analyzer w/ 4x1GigE - includes PKV100 – Online (not Offline) for temporary audio codec support
PKV120p	PacketScan™ HD w/4 x 1GigE - Portable
PKV122	PacketScan™ HD–High Density IP Traffic Analyzer w/ 2x10GigE includes PKV100 – Online (not Offline) for temporary audio codec support)
PKV122p	PacketScan™ HD w/2 x 10 GigE - Portable
PKV124	PacketScan™ HD – High Density IP Traffic Analyzer w/ 40/100 GigE
PKV124P	PacketScan™ HD – High Density IP Traffic Analyzer w/ 40/100 GigE - Portable

Item No	Related Software
PKV112	5G Analyzer (Optional with PacketScan™)
PKV113	Offline 5G Analyzer (Optional with PacketScan™ and NetSurveyorWeb™)
PKV105	SIGTRAN Analysis
PKV103	IP Based GSM and UMTS Analysis
PKV110	IMS Protocol Decodes (Optional with PacketScan™)
PKV107	LTE (Long Term Evolution) Analyzer, requires PKV100
PKV104	FaxScan™ – Decodes T.38 Fax images in TIFF format from captured PCAP files

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Buyer's Guide (*Contd.*)

Item No	Related Software
PCD103	AMR Narrowband Codec for PacketScan™
PCD107	Optional Codec – AMR Wideband
PCD104	EVRC Codec for PacketScan™
PCD105	EVRC-B Codec for PacketScan™
PCD106	EVRC-C Codec for PacketScan™
PKV170	NetSurveyorWeb™
PKV171	Network Surveillance Agent Toolkit
PKV172	Network Surveillance for GSM – GPRS Systems
PKS118	MAPS™ ED137 Radio
PKS119	MAPS™ ED137 Telephone (Includes PKS102)
PKS117	MAPS™ ED137 Recorder (Includes PKS102)
PKS107	RTP EUROCAE ED137
PKV123	FastRecorder™ and PacketExtractor™
PKV169	NetSurveyorWeb™ Lite
PKV 400	TCP Analytics

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

For more details, refer to PacketScan™ HD - Network Monitoring Appliance webpage.

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