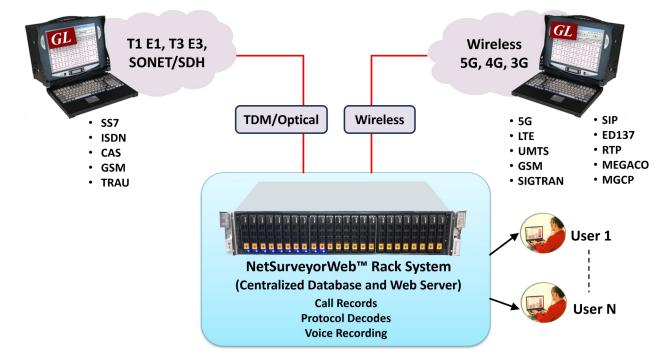
NetSurveyorWeb[™]

(Centralized network surveillance system for TDM / Wireless/ IP Networks)



Overview

Engineers and cyber security professionals must monitor the flow of voice and data traffic traversing a diverse range of networks including wireless, IP and TDM. GL offers a centralized web-based program (NetSurveyorWeb[™]) for capturing and analyzing traffic from multiple geographic regions. NetSurveyorWeb[™] works in tandem with GL's PacketScan[™] HD. <u>PacketScan[™] HD</u> can be deployed in the field, capture high speed traffic and send all data to the centralized NetSurveyorWeb[™]. NetSurveyorWeb[™] includes a web-based dashboard and a back-end database for long term storage.

NetSurveyorWeb[™] supports service providers to perform all of the above functions. NetSurveyorWeb[™] conducts real-time analysis, storage, retrieval, querying and display of Call Detail Records (CDR) by non-intrusively connecting to Analog, TDM, Optical, Wireless or IP networks. Supported protocols include <u>LTE</u>, <u>IMS</u>, <u>UMTS IuCS</u>, <u>UMTS IuPS</u>, VoIP (SIP, SIGTRAN, H.323, MAP, CAP, MGCP, MEGACO, ED -137), <u>SS7</u>, <u>ISDN</u>, <u>CAS</u>, <u>TRAU</u>, <u>GSM</u>, and Analog Systems.

NetSurveyorWeb[™] relies on protocol analysis probes placed at different physical sites. These probes capture, decode and organize traffic into calls and send CDR, signaling frame details, and other statistics to NetSurveyorWeb[™]. The probes capture data locally on high-speed networks and come equipped with protocol analysis software for convenient field analysis. The probes can be customized to capture on legacy interfaces (T1, E1, Analog) or Ethernet and SONET / SDH networks.

The central system comprises of a database engine, web server, and NetSurveyorWeb[™] (PKV170), a web-based application, to facilitate data storage and retrieval through web browser clients. The NetSurveyorWeb[™] client application remotely or locally facilitates to view database using a simple web browser application. It includes database to store real-time and/or historic data.

For more information, please visit <u>NetSurveyorWeb™</u> webpage.

Applications

- Comprehensive analysis from overall network health to detailed protocol monitoring
- Call Detail Records, fraud detection and location, remote protocol analysis and troubleshooting, real-time signaling monitor, traffic optimization engineering, and statistics



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Applications (Contd.)

- Determine actual call signaling routes to verify network functionality under all situations including congestion and loss of SS7 nodes
- Revenue and billing verification, alarm monitoring, intrusive testing
- Quality of service measurements, call trace and recording

Main Features

Web Based UI

- Access real-time and historic data remotely via browser based clients
- Interfaces with Oracle database
- Web administration features to monitor the connected probe status, database loader status, alarms, and perform database maintenance
- Multi-user support

Call Detail Records

- Customize column views with sorting capabilities for call detail records
- Provides End-to-End Call Flow analysis
- Easy navigation of records to display Previous or Next Hour, Day, Month, Year through navigation tool
- Export call detail records based on time filter or index as PDF and CSV files
- Send call flows or reports to specified email addresses
- Save and play back voice calls
- Download the selected Call Trace in *.hdl and *.pcap formats
- Decode SMS in different languages for GSM CDRs
- Provides options to view CDR, Ladder Diagram, and Protocol Decodes of a selected frame in a single view

Filter and Search Calls of Interest

- Drill-down to calls of interest with filter and/or search options
- Customize Filters (Date, Time, and other call control parameters
- Apply single or multiple filters for data analysis; use logical operators between filters

Key Performance Indicators (KPI's)

- Voice Quality (MOS, R-Factor)
- Voice Quality Analysis
- Signal level, Nosie Level, and Echo
- Delay Measurements
- Signaling Messages and Traffic Types
- Call Duration and Call Volume
- Call Status (Completed, Busy, Success, Failure)
- Export graphical and tabular reports as PDF and HTML file formats with an option to send emails as well

Physical Layer Monitoring

- Physical Layer Alarms (Link Status, Carries Loss, Sync Loss, and so on)
- Automatically alert users when "Calls of Interest" occur
- Set alarm conditions and generate alerts of different types such as email alert, visual alert, audible alert, or even log into tables for future analysis
- Provides database query methods to gather status, statistics, events, and results

Alerts and Indicators

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🚳 GL Communications Inc.

System Architecture

GL's NetSurveyorWeb[™] has a three tier architecture. The first layer consists of GL's **Protocol Analyzer Probes** which are capable of tapping into live call traffic and non-intrusively capture signaling message summary and build CDRs. The second layer is the **Data Layer** where the captured data is stored into a database. This layer consists of a listener, and a SQL DBMS (such as Oracle) components. Listener will listen to the connected probes, receives data, and feeds the data to DB. The last layer is the **Data Access Layer** controlled by Web Server and Client application where the data presentation logic is contained.

Users can log into the central system locally or remotely to view the collected real-time and historic data including call parameters, layer 1 **status** display, as well as layer 2 and 3 analysis. Also available is the ability to filter the call records using a variety of filtering mechanisms including time/date, signaling and traffic parameters.

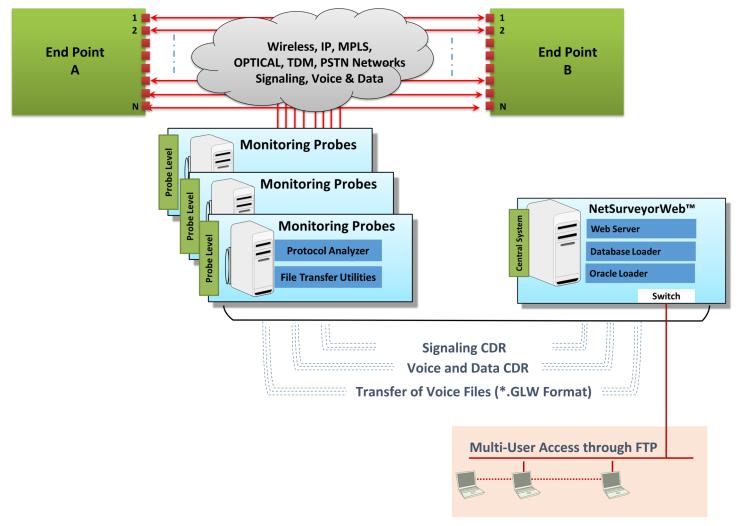


Figure: System Architecture



Call Data Records (CDR) View

GL NetSurveyorWeb		🚀 🧼 Refresh	Protocol VOIP (SIP & H323)	V Type CDR	~ 2 g.
Quick CDR	🔲 Data 🥼 Reports 🛛 💽 Alarms	System St & Users 2020-07-24	atus at 🔗		
All Calls Failed Calls Passed Calls Good Quality Calls	Quick CDR \ All Calls Date: 2020-07-24 a 2020-07-24 a Time: Today Yesterday Last 7 Days Last 30 Days) ok		
Poor Quality Calls Fair Quality Calls Longer Duration Calls Voice Calls	End to End Califlow Actions ▼ Quer Quick Search: TrafficSumID			Page Size: 20 💙 Sort C	rder : STARTTIME DESC
Custom CDR Y	-	r Called Number StartTim			y-R Failure Cause C_MOS-L C_MO
CDR		-	2-24 03:31:02.035 00:01:16.664 1 2-24 03:30:44.354 00:01:19.524 1	Good Good	0 4.20 4.20 0 4.20 4.20
Priority NOI Calls		-	-24 03:30:32.373 00:01:07.643 1	Good Good	0 4.20 4.20
High N01	Call Flow Coll 4 0052@10.10.:	6 0052@10.10.1.5 2020-07	/-24 03:30:31.873 00:01:28.525 1	Good Good	0 4.20 4.20
Medium N01	Call Flow CDD 5 0039@10.10.	6 0039@10.10.1.5 2020-07	2-24 03:30:25.663 00:01:44.456 1	Good Good	0 4.20 4.20
Low NOI	Call Flow Con 6 0024@10.10.	6 0024@10.10.1.5 2020-07	-24 03:30:20.962 00:01:25.764 1	Good Good	0 4.20 4.20
🏥 Default KPIs 👋 👋	Call Flow Con 7 0012@10.10.:	6 0012@10.10.1.5 2020-07	/-24 03:30:17.302 00:01:06.833 1	Good Good	0 4.20 4.20
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😎 Priority Setup		-	7-24 03:30:15.732 00:01:10.284 1 7-24 03:30:10.562 00:01:35.335 1	Good Good	0 4.20 4.20 0 4.20 4.20
🍈 MailBox 🔹 👌		-	-24 03:30:10.562 00:01:35.335 1	Good Good	0 4.20 4.20
Config >		6 0153@10.10.1.5 2020-07	-24 03:30:03.841 00:02:10.047 1	Good Good	0 4.20 4.20

Figure: Call Detail Records View

The real-time data view provides visibility into each individual call. Each call can be investigated based on call control, signaling and traffic parameters. Flexible filtering can help you organize and identify "Calls of Interest". The CDR view includes -

Frame Summary

Frame summary view provides summary of signaling data along with the decodes in the form of Hexdump.

Traffic Summary

This option is currently available only for IP calls. Each call can be expanded to reveal per stream RTP statistics. The RTP/audio parameters such as payload type, total packet count, missing / duplicate / reordered / discarded packet count or %, MOS/R-Factor, cumulative packet loss, delay, and jitter values are displayed.

Graph View for each call

This call flow graph allows easy verification of the messages exchanged and the status of the call.

Users can also select any messages and observe the corresponding decode message details in the decode view.

Merge View

This feature display Ladder diagram and Decodes of the selected message in a single view. Hide/Show any of these views in order to easily view the information properly.

Navigation and Search Tools

Navigate through records easily using Previous and Next Hour, Day, Month, and Year options as required. A particular call of interest can be searched using one or more parameters in the **Quick Search** option.

Whitelist

User can configure the list of interested calling/called number to mark them as Whitelist and perform the action such as saving the trace file on the probe. This information is sent to the database and can view the Whitelisted calls separately in the NetSurveyorWeb[™] and also download the trace file in *.hdl format.



Call Data Records (CDR) View (Contd.)

Quick View CDR

Quick CDR View is a combination of Custom Filters and Column View, user can create their own Quick View groups and add the required columns in the created group to be displayed on the Data View. Default Quick CDR View is provided for all the protocols such as All Calls, Failed Calls, Passed Calls, VoLTE Enabled Calls, CS Fallback, Poor LMOS, Good LMOS, Longer Duration Calls, and more.

Multi-protocol call flow

This feature is useful in testing inter-operability of different types of networks, say for example SIP-to-SS7. The Multi-protocol Call Flow provides the flow of messages exchanged between different nodes in the form of a ladder diagram along with the ability to display respective signaling decodes, thus providing visibility into complete end-to-end call flow.

End-to-End Call Flow

The stitched CDR data enables users to perform end-to-end analysis of communication sessions traversing the network. This analysis tracks the complete call flow, from its origination point to the destination, including any intermediate network devices along the path.

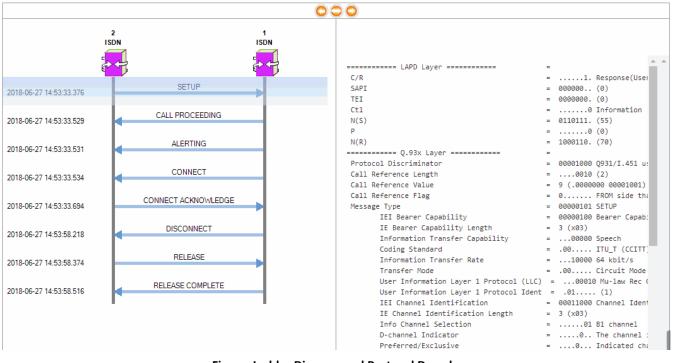


Figure: Ladder Diagram and Protocol Decodes



Call Flow

The call flow provides visibility into each individual call. The call flow is depicted through graphical and tabular view which allows verification of the status and the messages exchanged in a call between the Called and the Calling numbers.

GL NetSurveyorWeb		Protocol VOIP (SIP & H	1323)	V Type CDR V S gl
T Quick CDR	Call Graph View			
All Calls	Call Graph view			
Failed Calls				
Passed Calls			C	000
Good Quality Calls	192.168.12.51	192.168.1	2.190	
Poor Quality Calls	SIP	SIP		
Fair Quality Calls			2	
Longer Duration Calls				SIP Layer
Voice Calls		INVITE		INVITE sip:0008@192.168.12.190 SIP/2.0 Via: SIP/2.0/UDP 192.168.12.51:5060;branch=z9hG4bK-7422511-1652802887
HDL Trace	2021-08-11 11:05:14.201 5060		5060	Max-Forwards: 70
Custom CDR 🛛 👻	2021-08-11 11:05:14.211 5060	100 Trying	5060	Allow: INVITE,BYE,CANCEL,ACK,INFO,OPTIONS,SUBSCRIBE,NOTIFY,REFER,REGI From: 0008 <sip:0008@192.168.12.51>;tag=FromTag-7422508-1652802887-50</sip:0008@192.168.12.51>
CDR		I		To: 0008 <sip:0008@192.158.12.190></sip:0008@192.158.12.190>
Priority NOI Calls	2021-08-11 11:05:14.221 5060	180 Ringing	5060	Call-ID: GL-MAPS-7422510-1652802887-50769872-3164@192.168.12.51 CSeq: 1 INVITE
High NOI	2021-08-11 11:05:14.252 5060	200 OK	5060	Contact: 0008 <sip:0008@192.168.12.51> Supported: 100rel</sip:0008@192.168.12.51>
Medium NOI				Content-Type: application/sdp
Low NOI	2021-08-11 11:05:14.262 5060	ACK	5060	Content-Length: 239
🏥 Default KPIs				v=Ø
Basic KP Is	2021-08-11 11:05:44.302 5060	BYE	5060	o=0008 31188071 1 IN IP4 192.168.12.51 s=SIP Call
📀 Priority Setup		200 OK		c=IN IP4 192.168.12.51 t=0 Ø
🤌 Config 💦 👌	2021-08-11 11:05:44.312 5060		5060	m=audio 14858 RTP/AVP 8 Ø 101
-				a=rtpmap:8 PCHA/8000 a=rtpmap:0 PCHU/8000
Admin 🔷				a=rtpmap:101 telephone-event/8000
				a=fmtp:101 0-15
Utilization				a=ptime:20
<				a=sendrecv

Figure: SIP Call Flow

Selected Call Trace Download

The user can download the selected call trace in the *.hdl and *.pcap formats.

GL NetSurveyorWeb					💙 🌑 Refresh			COL VOIP (SIF	9 & H323)	🗸 тур	e CDR	~			gl
Quick CDR Y	🔳 Data	🚯 Reports		🞅 Alarms 🛛 🍂 Use	System Status 2021-08-12 12:	s at 🛛 🔴 26:03									
All Calls															
Failed Calls	Quick CDR \ HDL T	race													
Passed Calls	Date : 2021-08-0)(📷 2021	-08-1	2 Time : 00:00:00	\$ 23:59:59 \$	Ok									
Good Quality Calls	Today Yesterday	Last 7 De	ays L	ast 30 Days All											
Poor Quality Calls	Action			ion Time : 0.15624 Seco	ada and and and		0500								
Fair Quality Calls	¢" Actions	• Query	Execut	ion Time : 0.15624 Seco	nds Sort Order : :	STARTTIME	DESC								
Longer Duration Calls	Q Quick Sear			•	Apply Clear						Page Size	e: 20 🗸			
Voice Calls															
HDL Trace															
Custom CDR ×	Call Flow	eod 🗎	1	0001@192.168.12.51	0001@192.168.12.190	2021-08-10	21:18:53.9	35 00:00:30.02	21 1	Good	Fair	0	4.20	3.35	PCMU/8000 19
CDR	Call Flow		2	0001@192.168.12.51	0001@192.168.12.190	2021-08-10	21:18:53.9	35 00:00:30.02	21 1	Good	Fair	0	4.20	3.35	PCMU/8000 19
	Call Flow		3	0001@192.168.12.51	0001@192.168.12.190	2021-08-10	21:18:53.9	35 00:00:30.02	21 1	Good	Fair	0	4.20	3.35	PCMU/8000 19
Priority NOI Calls	Call Flow				0001@192.168.12.190					Good	Fair	0	4.20	3.35	PCMU/8000 19
High NOI	Call Flow														
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Low NOI	Call Flow			nload CallTrace 3.12.51	0001@192.168.12.190	2021-08-10	21:18:53.9	35 00:00:30.02	21 1	Good	Fair	0	4.20	3.35	PCMU/8000 19
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		010	1	259101927_000)pcap 🔨 🔨										

Figure: Download the Selected Call Trace

GL Communications Inc.

Alarm Settings

Users can trigger alarms whenever calls of interest occur, a network link failure is detected, or at scheduled intervals. NetSurveyorWeb[™] can send email alerts, generate visual alerts in the user interface, make audible alerts, SMS alerts, export or log data. Alarm severity types can be set as Minor, Major, or Critical.

Flexible options are provided to save alarm filters as profiles, add, edit or delete the existing alarms, selection of user KPIs, and selection of Custom filters. Schedule alarms and alerts for hourly, daily, monthly, or yearly.

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Complete List of Products VolP Analysis/Simulation Other Test Products	Alarm ID: 151 Alarm Condition: (((CIC = '1'))) Alarm Sevenity: Minor Alarm Status Details: Sampling Duration: Starttime: Now TO NoLimit ON All Days Sampling Duration: 5 Minute Last Run Date : 07-09-2015 10:59:53 Last Traversed Record: 829579,829577,829576,829575,829574,829573,829549,829524,829572, Result: 829579,829571,829571,829574,829573,829546,829520,829569,829545 Sepport Other Links Contact LIS Latest News at GL Download Software Call & Signaling Analpsix Niewsletter Archive Press Releases	

Figure: Alarm Settings and Email Alerts

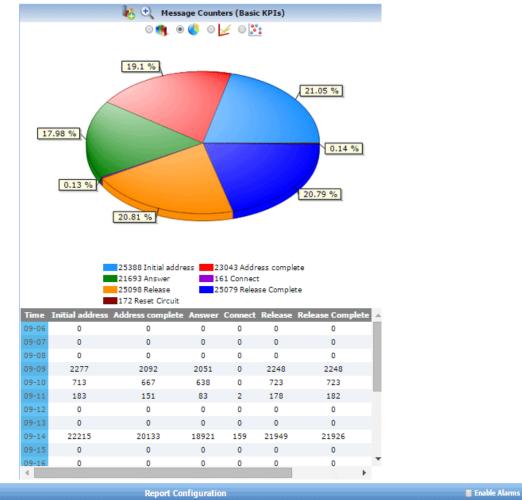
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Graphs and Reports

Report provide an overall summary of the captured signaling, and traffic over the entire network with the help of useful graphs. Graphs are available in the form of Bar Graph, Pie Chart, Dot Graph, along with the data in tabular format for each of the plotted graph. Reports can be generated for all calls or filtered records only. Customized graphs for various metrics such as Call Completion Ratio, Answer Call Ratio, Answer-Seizure Ratio, and Call Duration

Report Configuration

NetSurveyorWeb™ allows users to add new KPIs and customize the reports based on SQL Queries using Report Configuration feature. The Add / Import KPI feature allows user to Add / Import the required KPI to the existing KPI group. This will avoid the user from creating the new KPI if it is readily available. Also, with the add option, the KPI profiles will be automatically updates whenever the user who created this KPI does any modification. The import option will give full permission to the user to edit the KPIs as required.



My Profiles disp	🛛 🔲 Clear Previous 🔹 Load	Delete	Reset KPI Group	View Other Profiles Reset Basic KPIs

	Report KPI
KPI Name : Message Counters Chart Type : O 📢 O 🎸 O 📈 O 📰 Chart Size : O Half O Full Add KPI	Cuery SELECT count(case when lower(ISUPMESSAGETYPE)='initial address' then ISUPMESSAGETYPE end) as "Initial address", count(case when lower(ISUPMESSAGETYPE)='answer' then ISUPMESSAGETYPE end) as "Address complete", count(case when lower(ISUPMESSAGETYPE)='answer' then ISUPMESSAGETYPE end) as "Answer", count(case when lower(ISUPMESSAGETYPE)='connect' then ISUPMESSAGETYPE end) as "Connect", count(case when lower(ISUPMESSAGETYPE)='release' then ISUPMESSAGETYPE end) as "Release", count(case when lower(ISUPMESSAGETYPE)='release' then ISUPMESSAGETYPE end) as "Release", count(case when lower(ISUPMESSAGETYPE)='release' then ISUPMESSAGETYPE end) as "Release", count(case when lower(ISUPMESSAGETYPE)='release complete' then ISUPMESSAGETYPE end) as "Release Complete", count(case when lower(ISUPMESSAGETYPE)='reset circuit' then ISUPMESSAGETYPE end) as "Release Complete", count(case when lower(ISUPMESSAGETYPE)='reset circuit' then ISUPMESSAGETYPE end) as "Release Complete", count(case metric)="Release", count(case m

Figure: Report Configuration

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Supported KPIs

Protocol Type	Basic KPIs
VoIP SIP (SIP and H.323)	 Answer Call Call Duration Listening MOS Conversational MOS Session Request Delay (Successful Calls) Session Request Delay (Unsuccessful Calls) Session Disconnect Delay Failure Cause Average Packet Loss
SS7	 Call Completion Disposition Count Billing Duration Message Counters Link_MessageCounters
T1 E1 Layer 1	T1 E1 Events
ISDN	Call CompletionCall Types
GSM	 Mapped Vs UnMapped SMS Top 5 SMS Total CDRs on different links Total SMS on different links
GSM A	 Answer Call Call Duration Listening MOS Conversational MOS Failure Cause Average Packet Loss %
TRAU	Call Duration
luCS	 Answer Call Call Duration Listening MOS Conversational MOS Failure Cause Average Packet Loss
luPS	 Answer Call Call Duration Failure Cause Session Request Delay (Successful Calls) Session Request Delay (Unsuccessful Calls) Session Disconnect Delay
VoIP SIGTRAN	Call TypesBilling DurationMessage Counters

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Buyer's Guide

Item No	Product Description
<u>PKV170</u>	Network Surveillance Software with Centralized Database Engine and Client
<u>PKV175</u>	T1 E1 Physical Line Monitoring Option for Network Surveillance - requires PKV170
<u>PKV172</u>	ISDN/SIGTRAN Call Detail Record (CDR) Option for Network Surveillance - requires PKV170. requires OLV100 at the central site.
<u>PKV092</u>	CAS Call Detail Records (CDR) Option for Network Surveillance. requires OLV092 at the central site.
<u>PKV173</u>	SS7/SIGTRAN Call Detail Record (CDR) Option for Network Surveillance - requires OLV120 for SS7 and PKV106 for SIGTRAN at the central site.
<u>PKV174</u>	GSM (TDM or IP) and TRAU Call Detail Record (CDR) Option for Network Surveillance - requires OLV150 for GSM and OLV153 for TRAU at the central site.
<u>PKV176</u>	VoIP (SIP, MGCP, MEGACO etc.) Call Detail Record (CDR) Option for Network Surveillance - requires PKV101 at the central site.
Item No	Related Software
<u>PKV169</u>	Network Surveillance Lite Software.
<u>PKV171</u>	Network Surveillance Agent Toolkit
Item No	Related Hardware
<u>PKV100</u>	PacketScan™ - (Online and Offline)
<u>PKV120</u>	PacketScan HD™ w/4 x 1GigE
<u>PTE001</u>	tProbe™ Dual T1 E1 Laptop Analyzer
<u>XTE001</u>	Dual T1 E1 Express (PCIe) Boards
<u>TTE001</u>	tScan16™ T1 E1 Boards
FTE001	QuadXpress T1 E1 Main Board

For more information, please visit <u>NetSurveyorWeb™</u> webpage.

GL Communications Inc.

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