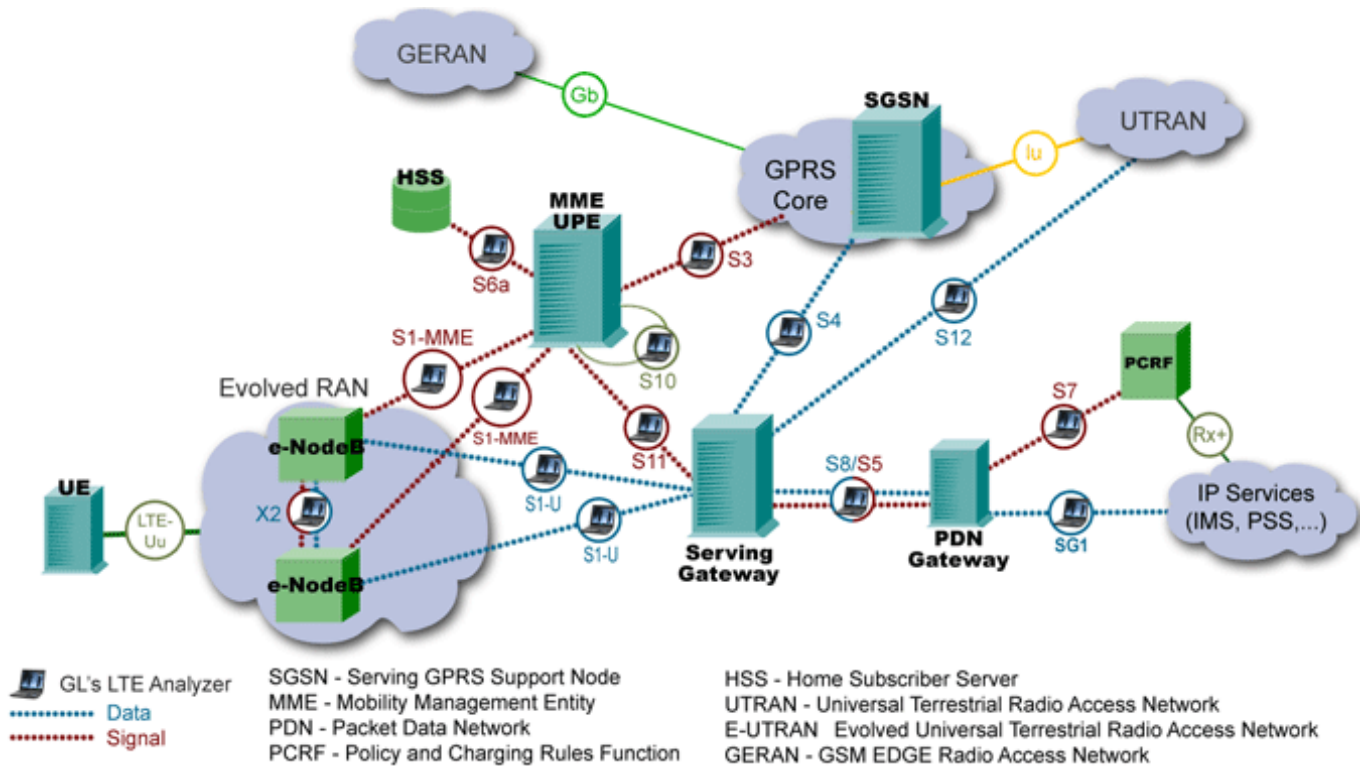


# PacketScan™ LTE Protocol Analyzer



## Overview

Long Term Evolution is the all packet architecture and provides significantly greater air interface bandwidth to the mobile handset. It was developed as an enhancement to the existing 3G UMTS System (Universal Mobile Telecommunications System) to provide users enhanced mobile radio and internet access.

GL's [LTE Protocol Analyzer](#) within [PacketScan™-All IP Protocol Analyzer](#) is an optional module (PKV107) available within PacketScan (PKV100) on purchase of additional licensing.

GL's LTE Protocol Analyzer offers powerful features to capture and monitor live signaling and traffic over LTE networks. It captures, segregates, monitors and collects statistics on all calls. Test eNodeB or UE over S1, S3, S4, S5 (or S8), S6a, S10, S11, S13 and X2 interfaces of the LTE network.

GL's PacketScan™-All IP Protocol Analyzer supports monitoring almost all of 2G, 3G and 4G protocols over IP network such as GSM, GPRS, UMTS, SIGTRAN, and LTE, in addition to SIP, MGCP, MEGACO, Skinny, SCCP, Diameter, and H.323.

For more details, visit [PacketScan™ - All-IP Analyzer](#) and [LTE \(Long Term Evolution\) Protocol Analyzer](#) webpages.

 **GL Communications Inc.**

818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A  
(Web) [www.gl.com](http://www.gl.com) - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) [info@gl.com](mailto:info@gl.com)

## Main Features

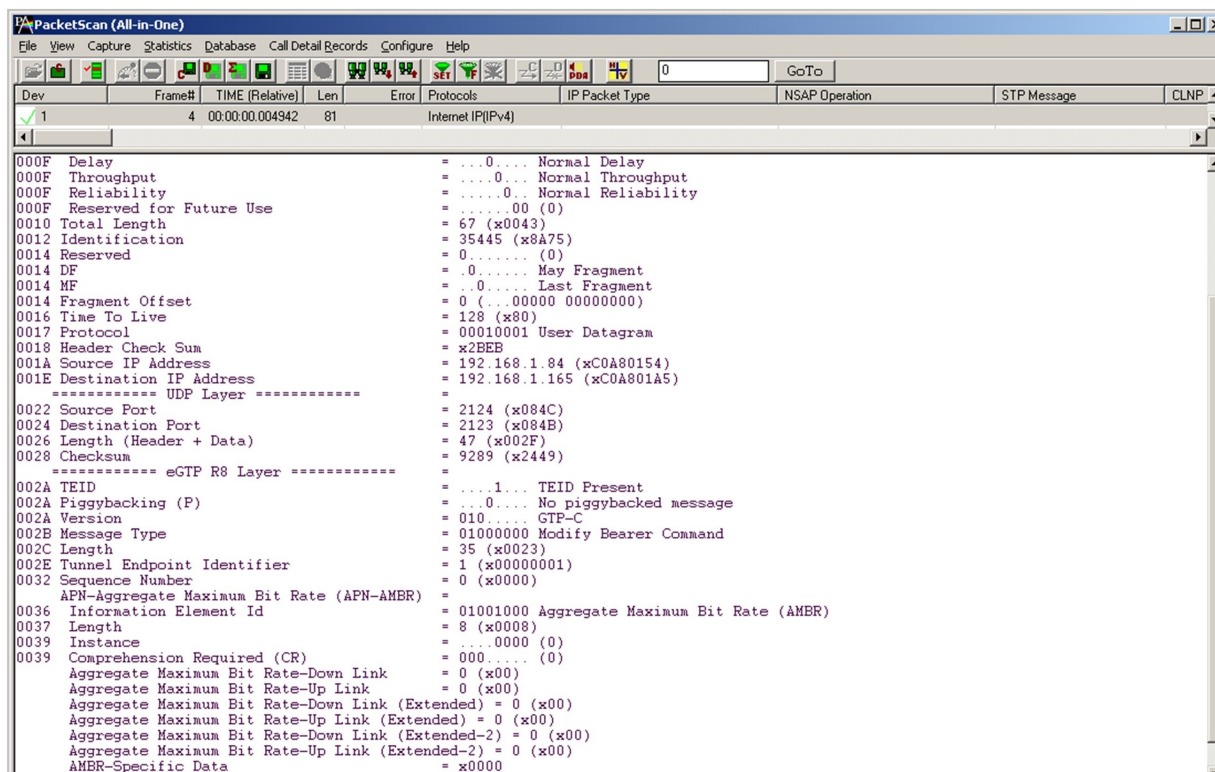
- Capture, Decode, and Analysis of Calls in LTE Network
- Supported protocols - NAS, S1AP, X2AP, eGTP, GTP-U, Diameter, SCTP, UDP, TCP, and IP
- Supported interfaces - LTE S1, S3, S4, S5 (or S8), S6a, S10, S11, S13 and X2 interfaces
- Advanced filtering and search based on any user selected protocol fields
- Any protocol field can be added to the summary view, filtering, and search features providing users more flexibility to monitor required protocol fields
- Trigger intelligent actions based on signaling and traffic conditions
- Support for Multi-technology, Multi-protocol data analysis
- Displays Summary, Detail, Hex dump, Statistics, and Call Detail Views
- 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
- Call Detail View displays called/ calling number, released calls, call status, & more
- 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
- Supported on Windows® 8 and above (32 bit and 64 bit) Operating System

## Summary and Detail View of LTE

User can select a frame in Summary View to analyze and decode each LTE frame in the Detail View.

The detail view of LTE call displays the following:

- MAC Layer
- IP Layer
- UDP Layer
- eGTP Layer



```

PacketScan (All-in-One)
File View Capture Statistics Database Call Detail Records Configure Help
0
GoTo
Dev Frame# TIME (Relative) Len Error Protocols IP Packet Type NSAP Operation STP Message CLNP
1 4 00:00:00.004942 81 Internet IP(IPv4)
000F Delay = ...0... Normal Delay
000F Throughput = ...0... Normal Throughput
000F Reliability = ...0... Normal Reliability
000F Reserved for Future Use = ...00 (0)
0010 Total Length = 67 (x0043)
0012 Identification = 35445 (x8A75)
0014 Reserved = 0... (0)
0014 DF = 0... Hay Fragment
0014 MF = 0... Last Fragment
0014 Fragment Offset = 0 (...00000 00000000)
0016 Time To Live = 128 (x80)
0017 Protocol = 00010001 User Datagram
0018 Header Check Sum = x2BEB
001A Source IP Address = 192.168.1.84 (xC0A80154)
001E Destination IP Address = 192.168.1.165 (xC0A801A5)
===== UDP Layer =====
0022 Source Port = 2124 (x084C)
0024 Destination Port = 2123 (x084B)
0026 Length (Header + Data) = 47 (x002F)
0028 Checksum = 9289 (x2449)
===== eGTP R8 Layer =====
002A TEID = ...1... TEID Present
002A Piggybacking (P) = ...0... No piggybacked message
002A Version = 010... GTP-C
002B Message Type = 01000000 Modify Bearer Command
002C Length = 35 (x0023)
002E Tunnel Endpoint Identifier = 1 (x00000001)
0032 Sequence Number = 0 (x0000)
0036 Information Element Id = 01001000 Aggregate Maximum Bit Rate (AMBR)
0037 Length = 8 (x0008)
0039 Instance = ...0000 (0)
0039 Comprehension Required (CR) = 000... (0)
Aggregate Maximum Bit Rate-Down Link = 0 (x00)
Aggregate Maximum Bit Rate-Up Link = 0 (x00)
Aggregate Maximum Bit Rate-Down Link (Extended) = 0 (x00)
Aggregate Maximum Bit Rate-Up Link (Extended) = 0 (x00)
Aggregate Maximum Bit Rate-Down Link (Extended-2) = 0 (x00)
Aggregate Maximum Bit Rate-Up Link (Extended-2) = 0 (x00)
AMBR-Specific Data = x0000

```

Detail View of LTE

## Summary and Detail View of LTE (Contd.)

The detail view of VoLTE call displays the following:

- MAC Layer
- IP Layer
- UDP Layer
- GTP IP Layer
- GTP UDP Layer
- SIP / RTP

The screenshot displays the PacketScan (All-in-One) interface. The main window shows a list of captured packets. The selected packet (Frame 1) is expanded to show its detailed structure. The layers visible are:

- Ethernet II:** Destination MAC, Source MAC, Length, Protocol.
- Internet Protocol Version 4:** Source IP Address, Destination IP Address, Length, Protocol.
- User Datagram Protocol:** Source Port, Destination Port, Length, Checksum.
- Session Initiation Protocol (SIP):** Version, Protocol Type, Message Type, Length of GTP Message, Tunnel Endpoint Identifier, Internet Header Length, Total Length, Identification, Reserved Bit, Don't fragment, More fragments, Fragment Offset, Time To Live, Header Checksum, Source IP Address, Destination IP Address, Source Port, Destination Port, Length (Header + Data).

The SIP layer details include:

- Version: 2.0
- Protocol Type: INVITE
- Message Type: INVITE
- Length of GTP Message: 829
- Tunnel Endpoint Identifier: 15
- Internet Header Length: 829
- Total Length: 829
- Identification: 43
- Reserved Bit: Not Set
- Don't fragment: Set
- More fragments: Not Set
- Fragment Offset: 0
- Time To Live: 128
- Header Checksum: x7951
- Source IP Address: 192.168.1.118
- Destination IP Address: 192.168.1.109
- Source Port: 5060
- Destination Port: 5060
- Length (Header + Data): 809

Detail View of VoLTE

## Call Detail Records

LTE call detail view displays Call ID, Call status, Protocol, Call Originating (Number/Address), Call Destination (Number/Address), Call Start Date & Time, Call Duration, and Protocol Specific Information.

The screenshot displays the Call Detail Records (CDR) view in PacketScan (All-in-One). The table below shows the call records:

Call ID	Call Status	Protocol	Call Originating (Number / Address)	Call Destination (Number / Address)	Call Start Date & Time	Call Duration	Protocol Specific Information
0	Completed	LTE	192.168.1.84	192.168.1.165	2012-04-23 15:35:52.581680	00:00:09.850198	<eNodeB S1AP Id
1	Completed	LTE	192.168.1.84	192.168.1.165	2012-04-23 15:36:06.657334	00:00:19.982239	<eNodeB S1AP Id
2	Completed	LTE	192.168.1.84	192.168.1.165	2012-04-23 15:36:32.347614	00:00:11.768413	<eNodeB S1AP Id

CDR View of LTE Calls over IP

## LTE Statistics

The Statistics are calculated based on the LTE protocol fields. Displays statistic data based on message types of LTE protocol decodes in PacketScan™.

Dev	Frame#	TIME (Relative)	Len	Error	Protocols	Source IP Address	Destination IP Address	SCTP Chunk Type	SCTP Source Port	SCTP Destination Port
✓ 1	15	00:00:13.511486	118		Internet IP(IPv4)	192.168.1.84	192.168.1.165	DATA Chunk	36412	36412
✓ 1	16	00:00:13.512753	62		Internet IP(IPv4)	192.168.1.165	192.168.1.84	SACK Chunk	36412	36412
✓ 1	17	00:00:13.521677	158		Internet IP(IPv4)	192.168.1.165	192.168.1.84	DATA Chunk	36412	36412
✓ 1	18	00:00:13.527104	62		Internet IP(IPv4)	192.168.1.84	192.168.1.165	SACK Chunk	36412	36412
✓ 1	19	00:00:13.680338	102		Internet IP(IPv4)	192.168.1.84	192.168.1.165	DATA Chunk	36412	36412

Call ID	Call Status	Protocol	Call Originating (Number / Add...)	Call Destination (Number / Add...)	Call Start Date & Time	Call Duration	Protocol Specific Info
0	Completed	LTE	192.168.1.84	192.168.1.165	2012-04-23 15:35:52.581680	00:00:09.850198	<eNodeB S1AP Id> 1 <MME S1AP ...
1	Completed	LTE	192.168.1.84	192.168.1.165	2012-04-23 15:36:06.657334	00:00:19.982239	<eNodeB S1AP Id> 2 <MME S1AP ...
2	Completed	LTE	192.168.1.84	192.168.1.165	2012-04-23 15:36:32.347614	00:00:11.768413	<eNodeB S1AP Id> 3 <MME S1AP ...

Statistic View

## INI Decode Options

The .ini file configuration enables the user to enter the required custom value for each protocol in the PacketScanProt.ini file (located in Program Files\GL Communication Inc) to get proper decodes. For LTE protocols, the following options can be edited to customize the way the PacketScan™ decodes LTE protocols.

- eGTP Version – Rel 8 / Rel 9
- SCTP protocol payload identifier for S1AP – Rel 98 / Rel 9
- SCTP protocol payload identifier for X2AP

```

[#eGTP_VERSION]
RELEASE_VERSION = 8 ; Set 8 to select eGTP Release 8. Set 9 for eGTP Release 9.

; S1AP Protocol Payload Identifier
[#SCTP_PPI_S1AP]
S1APMIN = 18
S1APMAX = 18

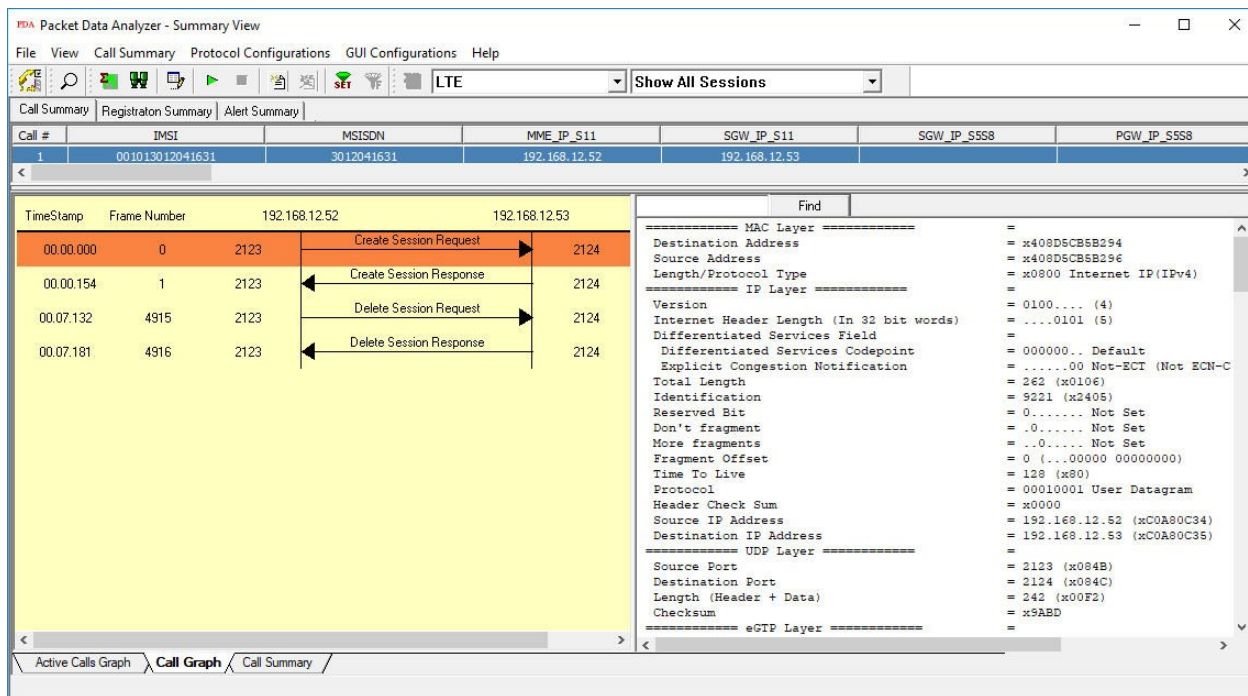
; X2AP Protocol Payload Identifier
[#SCTP_PPI_X2AP]
X2APMIN = 27
X2APMAX = 27

```

INI Decode Option for LTE

## VoLTE Call Analysis in PDA View

Displays a Voice over LTE call graph with decode of the selected message displayed to the right of message sequence.

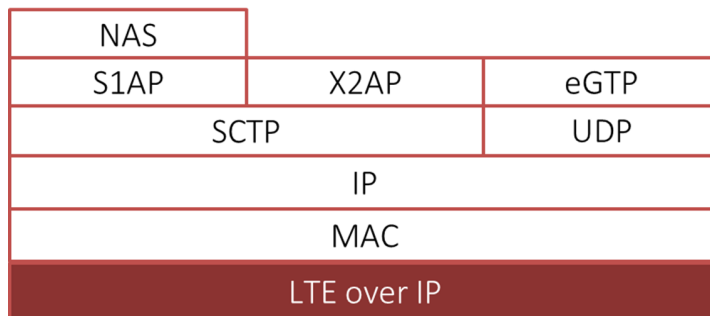


LTE Call Flow Ladder Diagram

## Supported Protocol Stack and Standards

LTE stack supported by PacketScan™.

Supported Protocols	Standard / Specification Used
SCTP	RFC 2960
S1AP	3GPP TS 36.413 V9.0.0
X2AP	3GPP TS 36.423 V9.0.0
eGTP	3GPP TS 29.274 V8.0.0
NAS	3GPP TS 24.301 V9.0.0
Evolved GTP (eGTP) for EPS	3GPP TS 29.274 V8.0.0 (2008-12)
Evolved GTP (eGTP) for EPS	3GPP TS 29.274 V9.2.0 (2010-03)



## Network-Wide Monitoring of LTE Network

GL's [NetSurveyorWeb™](#) is a web-based client that can connect to LTE protocol analyzer probe for monitoring the entire LTE network through a web server that facilitates display of call data records, protocol frames, and KPIs. This system allows you to deploy multiple LTE Analyzer probes to be deployed at strategic locations in a network, transmit and collect voice, data, protocol, statistics, and performance information, and relay this information to a central / distributed Network Management System (NMS).

For more details, visit [Network Monitoring over VoIP](#) webpage.

## Buyer's Guide

Item No	Product Description
<a href="#">PKV107</a>	LTE (Long Term Evolution) Analyzer, Optional with PacketScan™, requires PKV100
<a href="#">PKV108</a>	Offline LTE (Long Term Evolution) Analyzer (Optional with PacketScan™), requires PKV101
<a href="#">PKV100</a>	PacketScan™ (Real-time and Offline)
<a href="#">PKV101</a>	PacketScan™ - Offline
<a href="#">PKV120</a>	PacketScan™ HD – includes PKV100 – Online (not Offline) for temporary audio codec support
<a href="#">PKV121</a>	PacketScan™ FB - (Offline Analyzer)
PKV301	LAN Switch w/ Mirror Port
<a href="#">PKV104</a>	FaxScan™ - Decodes Fax images in TIFF format from PCAP files
<a href="#">PCD103</a>	AMR Codec for PacketScan™
<a href="#">PCD104</a>	EVRC Codec for PacketScan™
<a href="#">PCD105</a>	EVRC-B Codec for PacketScan™
<a href="#">PCD106</a>	EVRC-C Codec for PacketScan™
<a href="#">PKV170</a>	NetSurveyorWeb™ (Network Surveillance Software) for IP Network

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

For more details, visit [PacketScan™ - All-IP Analyzer](#) and [LTE \(Long Term Evolution\) Protocol Analyzer](#) webpages.



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 (Web) [www.gl.com](http://www.gl.com) - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) [info@gl.com](mailto:info@gl.com)