PacketScan[™] GSM Protocol Analyzer for Wireless & IP Networks



Overview

The Global System for Mobile (GSM) communications standard in GSM network can be delivered over TDM transport networks as well as with IP or Ethernet transport services. GL's <u>GSM Protocol Analyzer</u> within PacketScan[™]-All IP Protocol Analyzer is an optional module (PKV103) available with additional licensing with PacketScan analyzer (PKV100).

With the support of additional license, the PacketScan[™] can be used to analyze the protocol exchanged between the MSC & BSC (Ainterface) and BSC & BTS (Abis-interface) nodes of GSM network over IP backhaul. GL's GSM analyzer offers powerful features to capture, monitor, decode, and collect statistics of GSM messages over IP.

For more details, refer <u>PacketScan[™]-All IP Protocol Analyzer</u> webpage.

Main Features

- Decode and analyze complete GSM protocol stack on A and Abis interface
- Supports BSSAP, DTAP, BSSMAP, and GSM MAP protocols
- 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
- 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
- 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
- Supported on Windows® 10 and above operating system

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Protocol Stack and Standards

Entire GSM IP stack supported by PacketScan[™].

CM MM RR SMS GCC BCC									
BSSMAP	BSSAP+								
SCCP									
M3UA	GTP								
SCTP		UDP							
IP	IP								
MAC									
GSM A over IP									

GSM A over IP Protocol Stack

CM MM RR SMS GCC BCC
BTSM
IPA
TCP
IP
MAC
GSM Abis over IP

GSM Abis over IP Protocol Stack

Supported Protocols	Standard / Specification Used
МТРЗ	Q.704, ITU-T Blue Book / ANSI T1.111-1996
SCCP	Q.713, CCITT (ITU-T) Blue Book / ANSI T1.112-1996
BSSMAP / DTAP	3GPP TS 08.08 V8.9.0
SMS	3GPP TS 03.40 V7.5.0 & 3GPP TS 04.11 V7.1.0 GSM 03.38 version 7.2.0 Release 1998
Test & Network Management Messages (ITU)	ITU-T Q.703, Q.704
Test & Network Management Messages (ANSI)	ANSI T1.111.4, ANSI T1.111.7
ММ	3GPP TS 04.08 V7.17.0
сс	3GPP TS 04.08 V7.17.0
RR	3GPP TS 04.18 V8.13.0
BSSAP+	3GPP TS 29.018 V6.0.0
GCC (Group Call Control)	3GPP TS 44.068 V9.0.0
BCC (Broadcast Call Control)	3GPP TS 44.069 V9.0.0
BTSM	3GPP TS 08.58 V8.6.0



Summary and Detail View of GSM A over IP

User can select a frame in Summary View to analyze and decode each GSM A over IP frame in the Detail View.

The detail view of GSM A over IP call displays the following:

- MAC Layer
- IP Layer
- SCTP Layer
- MTP3 Layer
- SCCP Layer
- GSM Phase 2+ (BSSMAP) Layer
- MM Layer
- CC Layer

				F	PacketSc	an (All-in	-One)			×
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Device	Frame#	TIME (Relative	e) Length (Byte	es) Error	Length/Pr M	otocol Type IAC	Packet Type MAC	Destination IP Addre IP	Source IP Address	^
V1	1	00:00:00.1190	132	98	Internet IF	P(IPv4)		192.168.1.84	192.168.1.165	
$\sqrt{1}$	2	00:00:00.1276	313 1	18	Internet IF	P(IPv4)		192.168.1.84	192.168.1.165	
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005B Fointer to Mandatory Parameter = ParmOffset x01 (1) Mandatory Variable Length Parameters = mandatory parameter 005C Parameter length = 22 005D SCCP user data = x0100130512000000000000000000000000000000								00		
<										>
Off-line	Viewing			C:\Progra	am Files (x	86)\GL Con	103 Frames			1

Detail View of GSM A over IP

Summary and Detail View of GSM Abis over IP

PA-

User can select a frame in Summary View to analyze and decode each GSM Abis over IP frame in the Detail View.

The detail view of GSM Abis over IP call displays the following:

- MAC Layer
- IP Layer
- TCP Layer
- IPA Layer
- BTSM Layer
- MM, CC, RR Layer

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File View Capture Statistics Database Call Detail Reco	rds <u>C</u> onfigure <u>H</u> elp				
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Device Frame# TIME (Relative) Length (Bytes) Erro	Length/Protocol Type MAC	Packet Type Source IP Address MAC IP	Destination IP Address IP	Protocol Message IPA BTS	e Type
0 3 00:00:00.013994 86	Internet IP(IPv4)	192.168.1.238	192.168.1.198	RSL IMMEDIATE ASSIG	N COMMAND
V 0 4 00:00:00.016677 81	Internet IP(IPv4)	192.168.1.198	192.168.1.238	RSL ESTablish INDicatio	n v
<					>
IPA Laver					
0036 Length	= 29 (x001D)				
0038 Protocol	= 00000000 RS	L			
Higher Layer Data	= x0D1601902E	172D063F0378E3670118630	000002B2B2B2B2B2B	2B2B2B2B2B2B	
COMMON CH MGMT MESG	-				
0039 T-bit	=1 Tr	asparent Messsage			
0039 Message Group	= 0000110. Co	mmon Channel Mgmt			
003A Message Type	= 00010110 IM	MEDIATE ASSIGN COMMAND			
Channel number	=				
0036 Time Slot #	= 00000001 Ch)			
003C Channel Type	= 10010 Do	wnlink CCCH (PCH + AGCH)		
Full Imm. Assign Info	=				
003D IE Identifier(FIAInfo)	= 00101011 Fu	ll Immediate Assign Inf	0		
003E Length of Full Immediate Assign In:	o = 23 (x17) =2D062E0220	F3670110620000002P2P2P2	סרסרסרסרסרס		
Abis RR Laver	= x2D063F0376	£367011063000002B2B2B2	DZDZDZDZDZDZDZD		
003F L2 Pseudo Length	= 001011 (1	1)			
0040 Protcol Discrim. Value	=0110 ra	dio resources managemen	t messages		
0040 Skip indicator	= 0000 (0)			
0041 Message Type 0042 T/D		signs a Temporary Block	FLOW (TBF)		
0042 Downlink	=1. as	signs a res. to MS iden	tified in IA re:	st octets	
0042 TMA	=0 No	meaning			
0042 Paging Mode	=00 No	rmal paging			
Packet Channel Description	- 15				
Timeslot number(TN)	= 15				
TSC	= 7				
Discriminator	= 0				
Discriminator	= 0				~
ARFCN	= 871				
	C.D. 571 (000) 01	a			
Off-line viewing	C:\Program Files (x86)\GL	Communications 166 Frames			

Detail View of GSM Abis over IP

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GSM Call Detail Records over IP

It displays the following fields - Call ID, Call status, Protocol, Call Originating (Number/Address), Call Destination (Number/Address), Call Start Date & Time, Call Duration, and Protocol Specific Information.

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Device	Frame#	TIME	(Relative)	Length (Bytes)	Error	Length/Pro MA	tocol Type C	Packet Type MAC	Destination	P Address	Source IP Address IP	SIF	2 CSeq 03261		^
$\sqrt{1}$	0	00.00	00.000000	126		Internet IP	IPv4)		192.168.1.1	165	192.168.1.84				
V1	1	00:00:	00.119032	98		Internet IP((IPv4) 192.168		192.168.1.8	34	192.168.1.165				
1	2	00:00:	00.127613	118		Internet IP(IPv4)		192.168.1.84		192.168.1.165				
1	3	00:00:	00.151308	102		Internet IP(IPv4)	192.168.1.165		165	192.168.1.84				~
<															>
Call ID	Call	Status	Protocol	Call Originating	(Numbe	er / Addre	Call Dest	ination (Number	/ Address)	С	all Start Date & Time	Call Duration	Proto	col Specif	fc Info
0	Com	pleted	GSM-A	40410	000000	00001-IMSI		9	341141001	2012-05-	09 16:56:41.968085	00:00:11.889279	<opc> 1.1.1 <dpc< td=""><td>>2.2.2 <</td><td>Rel</td></dpc<></opc>	>2.2.2 <	Rel
1	Corr	pleted	GSM-A	40410	000000	00000-IMSI				2012-05-	09 16:56:57.870964	00:00:00.056659	<opc> 1.1.1 <dpc< td=""><td>>2.2.2 <</td><td>Rel</td></dpc<></opc>	>2.2.2 <	Rel
2	Com	pleted	GSM-A	40410	000000	00000-IMSI		9	341141000	2012-05-	09 16:57:04.747933	00:00:12.378388	<opc> 1.1.1 <dpc< th=""><th>>2.2.2 <</th><th>Rel</th></dpc<></opc>	>2.2.2 <	Rel
3	Com	pleted	GSM-A			542542		9	341141001	2012-05-	09 16:57:42.904785	00:00:00.123304	<opc> 1.1.1 <dpc< th=""><th>>2.2.2 <</th><th>Rel</th></dpc<></opc>	>2.2.2 <	Rel
4	Com	pleted	GSM-A			43245		9	341141000	2012-05-	09 16:57:53.557513	00:00:00.081434	<opc> 1.1.1 <dpc< td=""><td>>2.2.2 <</td><td>Rel</td></dpc<></opc>	>2.2.2 <	Rel
	F					C:\	Program F	Files (x86)\GL (Communica	tion 103 Fra	imes		1		

CDR View

GSM Statistics

The Statistics are calculated based on the GSM protocol fields. The figure below depicts statistic data based on message types of GSM Phase2+ in PacketScan™.

*			PacketS	can (All-in-One)				- 🗆 🗙
File View Capture Statistics	Database Call Deta	il <u>R</u> ecords <u>C</u> onfigu	re <u>H</u> elp					
	2	99 14 14 3. 5	22		GoTo			
Device Frame# TIME (Relative)	Length (Bytes) Error	Length/Protocol Type MAC	Packet Type MAC	Destination IP Address IP	Source IP Address IP	Destination Port UDP	Source Port UDP	Destina A
V 1 0 00:00:00.000000	126	Internet IP(IPv4)		192.168.1.165	192.168.1.84			
1 1 00:00:00.119032	98	Internet IP(IPv4)		192.168.1.84	192.168.1.165			~
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E Message Type	Frame Coun.	. Frame	Byte Count(Byte %(Mes	Curr Fps(Curr Bps(Me.	MAX Fps(Me	MAX Bp
ASSIGNMENT REQUEST (1)	2	100 2	268	100	1	134	1	134
total ASSIGNMENT REQUEST (1)	2	100 2	268	100	1	134	1	134
ASSIGNMENT COMPLETE (2)	2	100 2	268	100	1	134	1	134
total ASSIGNMENT COMPLETE (2)	2	100 2	268	100	1	134	1	134
CLEAR COMMAND (32)	5	100 5	510	100	1	102	1	102
total CLEAR COMMAND (32)	5	100 5	510	100	1	102	1	102
CLEAR COMPLETE (33)	5	100 4	190	100	1	98	1	98
total CLEAR COMPLETE (33)	5	100 4	190	100	1	98	1	98
PAGING (82)	2	100 2	236	100	1	118	1	118
total PAGING (82)	2	100 2	236	100	1	118	1	118
CIPHER MODE COMMAND (83)	5	100 5	510	100	1	102	1	102
total CIPHER MODE COMMAND (83)	5	100 8	510	100	1	102	1	102
CIPHER MODE COMPLETE (85)	5	100 4	190	100	1	98	1	98
total CIPHER MODE COMPLETE (85)	5	100 4	190	100	1	98	1	98
COMPLETE LAYER 3 INF (87)	5	100 6	34	100	1	126	1	130
total COMPLETE LAYER 3 INF (87)	5	100 6	534	100	1	126	1	130
<								>
		C:\Program	Files (x86)\GL (Communication 103 Fr	ames			
1		,				and the second se		

Statistic View



GSM A Call Flow Analysis in PDA

Displays GSM A call graph with decode of the selected message displayed to the right of message sequence.

Rep						Traffic	Analyzei	- Summ	ary View	i -						×
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Call Sun	nmary Regist	traton Sum	mary Alert 9	Summary												
Call #	SSRC	Pay	load	Packet Received	Conversatio MOS/R-F	Listening MOS/R-Fa.	Packets Discard.	Missing Packets	Duplicate Packets	Out Of Sequen	Average Gap(ms)	Average Delay	Average Jitter	Average Inter Arri.	Cumulativ Packet	Max/Mi Gap
@Call#C	00001 Caller	91965535	9815 Callee:	d11111005 Ca	Ild:1 Call Sta	tTime:2012-1	2-07 18:36:	48.743 Call	Duration: 00	00:30.024						
301	393007104	11 GS	M/8000	1500	3.65 / 75	3.65 / 75	0/0.00	0/0.00	0/0.00	0/0.00	20.01	0.00	0.00	0	0	39.93
9C. 1	332773038	59 65	M/8000	1502	3.60775	3.60775	070.00	070.00	070.00	070.00	20.01	0.00	0.00	U	U	40.02
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TimeSta	mp	192.1	68.1.98		19	2.168.1.149	Ŷ	Versi	on Class	13UA Lay	er =====			= 000	000001 Re	leas
00.00.0	00 2	905	CN	I SERVICE R	EQUEST	-	906	Trans	fer Mess	age Typ	e			= 000	000001 Pa	ylo
			CON	INECTION C	OMPLETE			Messa	ge Lengt	h				= 73	(x000000	49)
00.00.0	00 2	905	•			2	906	Proto	col Data	h				= 528	(*0210)	
00.00.0	00 2	905	AUTH	ENTICATION	REQUEST	_ 2	906	Ler	gth					= 65	(x0041)	
			AUTH	ENTICATION	RESPONSE			Ori	ginating	Point	Code			=	1/ 001	
00.00.0	00 2	905		LITTICATION	HEST ONSE	- 2	906	Des	tination	Point	Code					000
00.00.0	00 2	905	CIP	HER MODE C	OMMAND		906	DI	C					= 2.2	2.2(010	000
00.00.0	00 2	505	-					Se	twork In	dicator					10 Na	CP
00.00.0	00 2	905	UP	1ER MODE C	UMPLETE	→ 2	906	Me	ssage Pr	iority				=	00 Pr	ior:
				DENTITY RE	QUEST			Si	gnalling	J Link S	election	1		=	0001 (1	2
00.00.0	00 2	905	•				306	Messa	ge Type	SCCP Lay	er			= 000	000001 CR	C01
00.00.0	00 2	905	TMSI R	EALLOCATIO	N COMMAND	2	906	Manda	tory Fis	ced Para	meters			-		
			TMSLB	FALLOCATIO				Sou	ce Local	l Refere	nce Para	imeter		= 5 ((x000005)	
00.00.0	00 2	905				2	906	Prot	ocol Cla	ass Para	meter			=		
00.00.0	00 2	905	C	M SERVICE A	CCEPT	2	906 🗸	< C14						=	.0010 (2	>
Activ	e Calls Graph	λ Ave	erage Jitter Di	istribution >	E-Model)	RTP Packe	ts Graph	λ T.38 An	alysis Ca	all Graph	Call Sun	nmary /				

GSM A Call Flow Ladder Diagram

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 GSM protocols, enter the minimum and maximum SCTP source and destination port values. Also, set the IuCS_GSMA_PROCESS_FLAG to 1 to decode GSM A over IP messages.

	PacketScanProt - Notepad	-	×
Eil	le <u>E</u> dit F <u>o</u> rmat <u>V</u> iew <u>H</u> elp		
;] Se [# Iu	To Process Iucs and GSMA Calls et IuCS_GSMA_PROCESS_FLAG to 1 else set it to 0 #PROCESS_IUCS_GSMA_CALLS] uCS_GSMA_CALLS_PROCESS_FLAG= 1;		^
; [# 50 50 50 50	SCTP Port values to select BSSMAP, RANAP and RNSAP. #SCTP_PORT_FLAG_INDEX] CTP_SRC_GSMAOIP_MIN = 2800 CTP_SRC_GSMAOIP_MAX = 3000 CTP_DST_GSMAOIP_MIN = 2800 CTP_DST_GSMAOIP_MAX = 3000		~

INI Decode Option for GSM

Network-Wide Monitoring of GSM Network

GL's NetSurveyorWeb[™] is a web-based client that can connect to UMTS protocol analyzer probe for monitoring the entire GSM network through a web server that facilitates display of call data records, protocol frames, and KPIs. This system allows you to deploy multiple GSM 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 <u>NetSurveyorWeb[™]</u> webpage.



Buyer's Guide

Item No	Product Description
<u>PKV103</u>	IP Based GSM and UMTS Analyzer, requires PKV100
<u>PKV109</u>	Offline GSM and UMTS Analyzer, requires PKV101
<u>PKV100</u>	PacketScan™ (Real-time and Offline)
<u>PKV101</u>	PacketScan™ - Offline
<u>PKV120</u>	PacketScan™ HD – High Density IP Traffic Analyzer w/ 4x1GigE - includes PKV100 – Online (not Offline) for temporary audio codec support
<u>PKV122</u>	PacketScan [™] HD – High Density IP Traffic Analyzer w/ 2x10GigE - includes PKV100 – Online (not Offline) for temporary audio codec support
<u>PKV170</u>	NetSurveyorWeb [™] (Network Surveillance Software) for IP Network

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

For more details, refer <u>PacketScan[™]-All IP Protocol Analyzer</u> webpage.



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