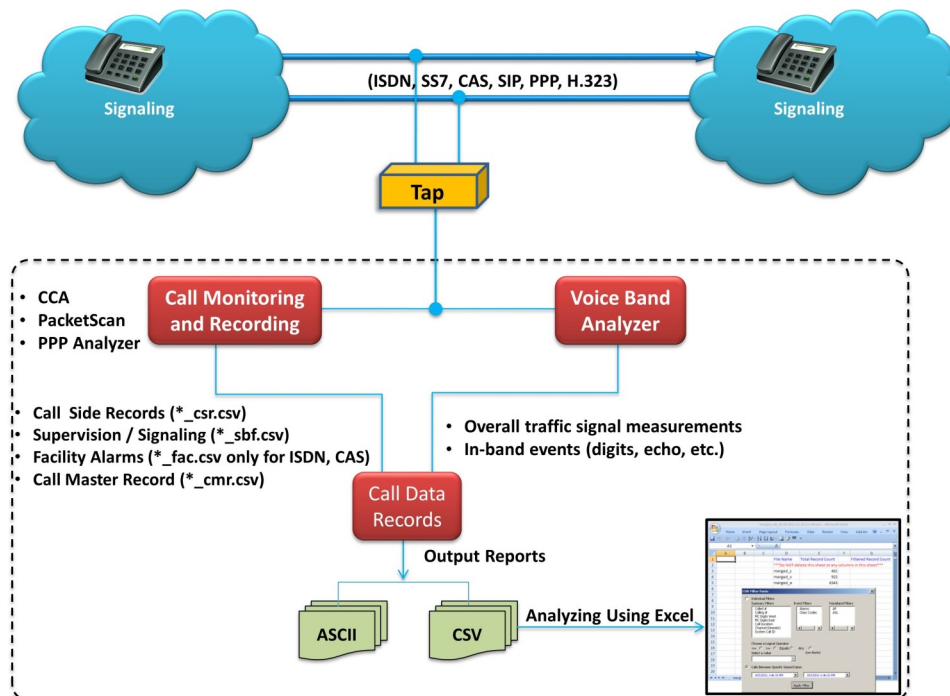


Call Detail Records



Overview

The telecommunication industries often face challenges in analyzing customer behavior from the large volumes of call records that are in the database over a period of time. Analyzing call records for failures, voice quality and proper signaling from a huge database is computationally intensive task and requires specialized call processing tools.

GL's **Call Data Records (CDR)** is the software based call-processing part of the GL's TDM Call Capture and Analysis ([CCA](#), [PacketScan™](#), [PPP Analyzer](#), [VBA](#)) solution. The CDR output centers around each 'call' and for each call, it reports comprehensive information occurring on T1 E1 lines and IP networks , such as:

- Voice capture for both directions
- supported codecs data rates are - a-law, μ -law, 16-bit PCM (Intel), 16-bit PCM (Motorola), MS Wave, G.726 (40 Kbps, 32 Kbps, 24 Kbps, and 16 Kbps) and 14-bit 16 KHz G.722 (64 kbps)
- Complete signaling information for each direction for CAS, ISDN, MFC-R2, SS7, SIP, MLPPP
- All alarms and errors occurring during the call including BPV, Frame Errors, CRC errors, Loss Of Sync, and more
- Detailed voiceband event information occurring during the call including dual tones (DTMF, MF, MFC-R2), fax tones, modem signals, and more
- Detailed analysis of the voiceband call including noise level, speech level, speech activity factor, echo measurements, and more
- Categorization of the call as voice, fax, modem, or data

The generated measurements along with the recorded voice files of a particular call are combined in the Excel® using a built-in tool allowing the users to do custom filtering based on any measurements (ASL, AF, % Digits, %Voice, Mid-call-digits) or signaling messages (ISDN signaling, CAS Signaling, Release Codes, Call Duration, Call Events etc.).

For more details, visit [Call Data Records](#) webpage.



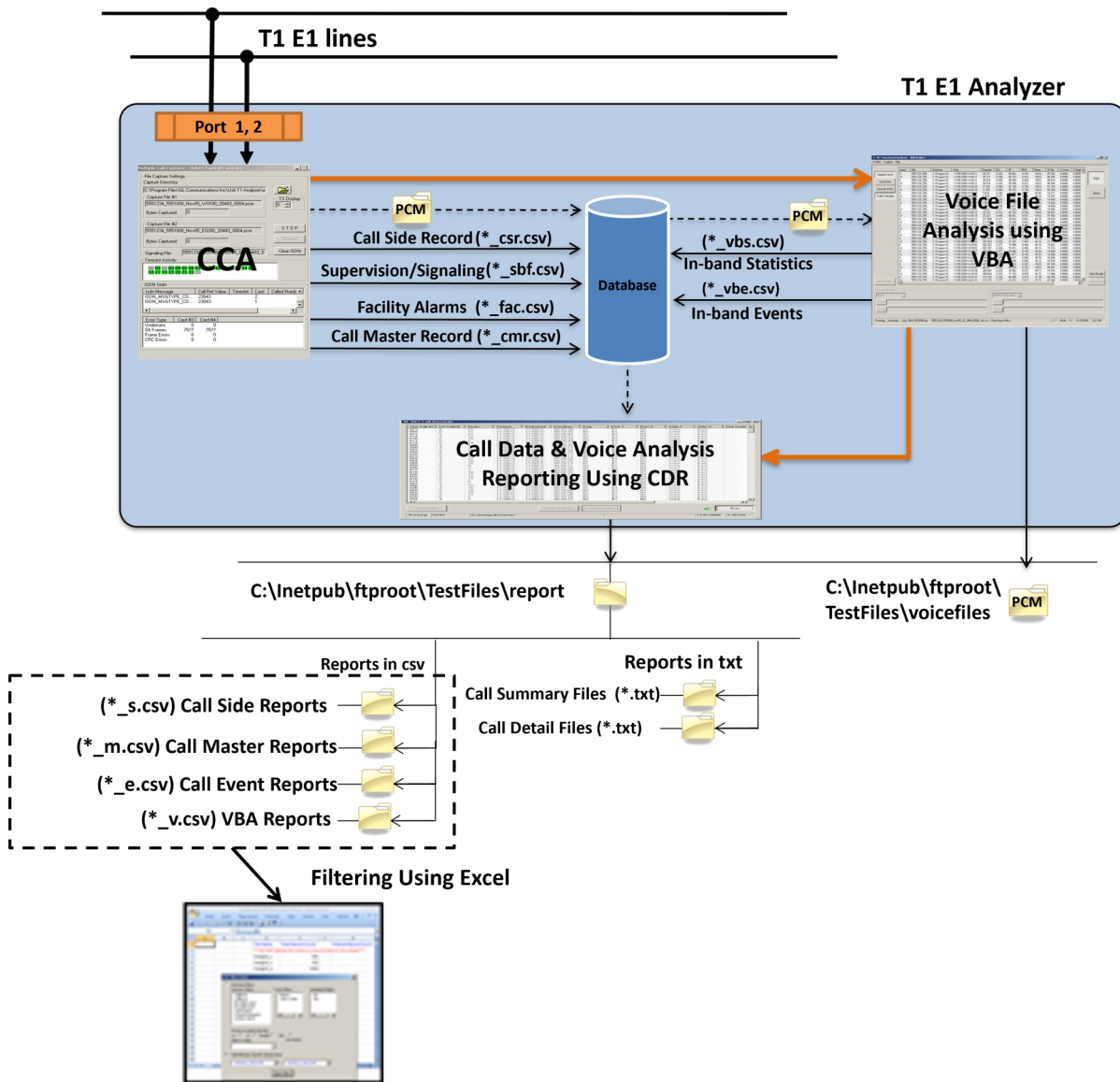
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Call Data Records (CDR) Relationship with GL's Call Capture Applications

Capture and Analysis (CCA), PPP Analyzer application monitors hundreds of call in real-time and captures bidirectional voice traffic to files, including logging of detailed analysis of selected voice band streams into *.csv files. Captures may be triggered by protocols such as signaling bits, ISDN, SS7, SIP, MLPPP and more. CCA also records signaling and alarm events.

PacketScan™ analyzer in real-time is used to capture and monitor live IP, VoIP, and IP based video traffic. It can be used as a stand-alone tool as well as a probe in a distributed system using a central database such as Oracle as implemented in GL's PacketScan™ application. Besides the SIP (H.323, MGCP, and MEGACO) messaging and RTP impairment reports, additional functions include reporting of Mean Opinion Score (MOS) / R-factor scores matched to the call as part of the Call Detail Record (CDR). It also has a powerful Trigger Action feature that can be used to select and save calls (audio or PCAP) based on parameters in the CDR. Also included is the ability to save the actual RTP of the call.

Voice-Band Analyzer (VBA) –operates in near-real-time, processing the signal files recorded by CCA, PacketScan™, PPP Analyzer, and produces voice-band measurements of the captured signals.



CDR with CCA, PPP Analyzer, PacketScan™ and VBA

Working Principle

- CDR application keeps busily looking for files to process till manually stopped
- Classifies the captured events from CCA, PPP Analyzer, PacketScan™ into Call summary information (CSR, CMR), Call events (Channel supervision (CAS, ISDN, etc.), Facility alarms) results
- Classifies the captured events from VBA into In-band events (digits, echo, etc.) results and overall traffic signal measurements.
- CDR can be configured to output its results to "comma-separated values" ("CSV") files or ASCII file for loading into a database or spreadsheet
- CDR processes file sets produced by all the captured calls as described in the below table.
- The generated call records can be processed in Excel® and analyzed comprehensively to get the calls of interest using a built-in add-in included with the Excel® application

File	Designation	Description	Source
Call Summary	"*_csr.csv"	Call Side Records (CSR)	CCA
	"*_cmr.csv"	Call Master Record (CMR)	CCA
Supervision	"*_sbf.csv"	Channel supervision (CAS, ISDN, etc.)	CCA
Alarms	"*_fac.csv"	Facility alarms	CCA
In-band Statistics	"*_vbs.csv"	Overall traffic signal measurements	VBA
In-band Events	"*_vbe.csv"	In-band events (digits, echo, etc.)	VBA

The screenshot shows the 'NRT Call Records' application window. It features a table with the following columns: Probe ID, Call ID, Orig, Calling, Called, Start, Released, Duration, and Rel Code. The table contains 20 rows of call records, all originating from 'New York' and having a 'Normal' status. Below the table are several control buttons: 'Configure', 'Clear Display', 'Enable Logging', and 'Run'. At the bottom, there is a status bar showing 'Running', 'CAS', 'Scanning directories...', and the current date and time '11/16/2011 11:17 AM'.

Probe ID	Call ID	Orig	Calling	Called	Start	Released	Duration	Rel Code
ATTCARD1	111116111506-1	New York(#2:0)	3016041111	3019241111	11/16/2011 11:15:24	11/16/2011 11:16:58	00:01:34	Normal
ATTCARD1	111116111506-3	New York(#2:2)	3016243333	3019243333	11/16/2011 11:15:24	11/16/2011 11:16:05	00:00:41	Normal
ATTCARD1	111116111506-24	New York(#2:22)	3017242222	3019242229	11/16/2011 11:15:29	11/16/2011 11:16:11	00:00:42	Normal
ATTCARD1	111116111506-2	New York(#2:1)	3016042222	3019242222	11/16/2011 11:15:24	11/16/2011 11:16:07	00:00:43	Normal
ATTCARD1	111116111506-21	New York(#2:20)	3012242220	3019242220	11/16/2011 11:15:25	11/16/2011 11:16:06	00:00:41	Normal
ATTCARD1	111116111506-19	New York(#2:18)	3017242218	3019242218	11/16/2011 11:15:25	11/16/2011 11:16:08	00:00:43	Normal
ATTCARD1	111116111506-18	New York(#2:17)	3015242217	3019242217	11/16/2011 11:15:25	11/16/2011 11:16:08	00:00:43	Normal
ATTCARD1	111116111506-17	New York(#2:16)	3016242216	3019242216	11/16/2011 11:15:24	11/16/2011 11:16:06	00:00:42	Normal
ATTCARD1	111116111506-16	New York(#2:15)	3016242215	3019242215	11/16/2011 11:15:24	11/16/2011 11:16:06	00:00:42	Normal
ATTCARD1	111116111506-15	New York(#2:14)	3016242214	3019242214	11/16/2011 11:15:24	11/16/2011 11:16:06	00:00:42	Normal
ATTCARD1	111116111506-14	New York(#2:13)	3016242213	3019242213	11/16/2011 11:15:24	11/16/2011 11:16:07	00:00:43	Normal
ATTCARD1	111116111506-13	New York(#2:12)	3016242212	3019242212	11/16/2011 11:15:24	11/16/2011 11:16:07	00:00:43	Normal
ATTCARD1	111116111506-12	New York(#2:11)	3016241011	3019242211	11/16/2011 11:15:24	11/16/2011 11:16:06	00:00:42	Normal
ATTCARD1	111116111506-11	New York(#2:10)	3016241010	3019241010	11/16/2011 11:15:24	11/16/2011 11:16:06	00:00:42	Normal
ATTCARD1	111116111506-10	New York(#2:9)	3019242289	3017242239	11/16/2011 11:15:24	11/16/2011 11:16:06	00:00:42	Normal
ATTCARD1	111116111506-9	New York(#2:8)	3019242288	3017242238	11/16/2011 11:15:24	11/16/2011 11:16:06	00:00:42	Normal
ATTCARD1	111116111506-8	New York(#2:7)	3019242237	3016242237	11/16/2011 11:15:24	11/16/2011 11:16:07	00:00:43	Normal
ATTCARD1	111116111506-7	New York(#2:6)	3019242236	3016242236	11/16/2011 11:15:24	11/16/2011 11:16:06	00:00:42	Normal
ATTCARD1	111116111506-6	New York(#2:5)	3019242235	3016242235	11/16/2011 11:15:24	11/16/2011 11:16:06	00:00:42	Normal
ATTCARD1	111116111506-5	New York(#2:4)	3019242234	3016242234	11/16/2011 11:15:24	11/16/2011 11:16:06	00:00:42	Normal
ATTCARD1	111116111506-4	New York(#2:3)	3019242233	3016242233	11/16/2011 11:15:24	11/16/2011 11:16:05	00:00:41	Normal
ATTCARD1	111116111506-22	New York(#2:21)	3019242221	3016242220	11/16/2011 11:15:25	11/16/2011 11:16:06	00:00:41	Normal
ATTCARD1	111116111506-20	New York(#2:19)	3014242219	3012242219	11/16/2011 11:15:25	11/16/2011 11:16:06	00:00:41	Normal

Call Data Records Main Window

Output Formats

Text and CSV Output

CDR output its results to text or Comma-Separated Values ("CSV") files. The CDR output in text format provides call summary report and call detail reports. Different types of Call Detail Report are -

- **Call Master Record** - gives an overall summary of the call, including the Probe ID, CALL ID, Side 1 and 2, Call Ref Value, Protocol, Data Rate, Release Code and so on
- **Call side Information** - gives Telephone number, Port and Timeslot number, Mid call digits, and Capture file name
- **Call events** - gives an event-by-event account of the call. Events include channel supervision events, sporadic echo, alarms, ISDN calls, and various traffic
- **In-band summary** – display depends on the VBA configurations

The example below depicts all the different sections of the Call Detail Report in *.txt format.

```

===== Call Summary =====
Probe ID: ATTCARD1
Call ID: 111115153238-3
Timeslot: 0
Call Ref Value: 2
Protocol: ISDN
Data Rate: 64K
Start Time: 11/15/2011 15:37:20
Release Time: 11/15/2011 15:39:14
Call Duration: 00:01:54
Originating side: New York (#2)
Terminating side: (#2)
Caller #: 555000
Called #: 554000
Release Code: REL_COMPLETE
Source Folder: C:\Program Files\GL Communications Inc\tProbe T1
Analyzer\ATT\device1capture111511532\
Archive Folder: C:\Inetpub\ftproot\TestFiles\voicefiles\device1capture111511532\

CALL SIDE INFORMATION
-----
Value           Washington           New York
-----
Telephone #:    554000              555000
#Port:Timeslot: #1:0              #2:0
Mid-Call Digits: 12345678
Capt File Name: 554000_555000_Nov15_Washington0100_2_2011_1115_153720.pcm
554000_555000_Nov15_New York0200_2_2011_1115_153720.pcm

CALL EVENTS
-----
Time of Day      Since Last Event      Since Last Supv      Direction      T      Event      Resulting Call Duration      Status
-----
15:37:20.000    0.000  0.000  New York      S      SETUP(on)
15:37:20.125    0.125  0.125  Washington   S      ALERTING(1)
15:37:22.594    2.469  2.469  Washington   S      CONNECT(255)
15:37:22.719    0.125  0.125  New York      S      CONN_ACK(15)
15:38:32.040    69.321 0.191  Washington   V      DTMF-1      0.088
15:38:32.231    0.191  0.191  Washington   V      DTMF-2      0.101
15:38:32.435    0.204  0.204  Washington   V      DTMF-3      0.101
15:38:32.639    0.204  0.204  Washington   V      DTMF-4      0.088
15:38:32.800    0.191  0.191  Washington   V      DTMF-5      0.101
15:38:33.034    0.204  0.204  Washington   V      DTMF-6      0.101
15:38:33.238    0.204  0.204  Washington   V      DTMF-7      0.088
15:38:33.429    0.191  0.191  Washington   V      DTMF-8      0.101
15:39:06.188    32.759 103.469 Washington   A      OOF Error(8)
15:39:06.219    0.031  0.031  Washington   A      Line Sync Loss
15:39:06.219    0.000  0.000  Washington   A      Frame Error(on
15:39:06.954    0.735  0.735  Washington   A      Frame Error(of
15:39:07.688    0.734  0.734  Washington   A      Bipolar Violat
15:39:07.704    0.016  0.016  Washington   A      Bipolar Violat
15:39:08.485    0.781  0.781  Washington   A      Line Sync Loss

IN-BAND SUMMARY
-----
Value           Washington           New York
-----
Probe Input      W1                    E1
Label            Washington            New York
Start            11/15/2011 15:37:20  11/15/2011 15:37:20
Elapsed          113.214
ASL              -10.701504
AF               30.008584
RMS              -15.929049
Noise            -37.269003
% Voice          31.797235
% Digits         1.612903
% Quiet          0.000000
% Idle           66.589862
    
```

Call Detail Text Report

Call ID	Chan CRV	Time Calling #	Time Called #	Seized	Released	Duration	Direction	Mid-Call Digits	Release Code
111115153238-1	6 1	555006	554006	15:32:42	15:32:52	00:00:10	New York	-/-	REL_COMPLETE
111115153238-2	1 1	555001	554001	15:36:10	15:36:39	00:00:29	Washington	-/-	REL_COMPLETE
111115153238-3	0 2	555000	554000	15:37:20	15:39:14	00:01:54	New York	12345678/-	REL_COMPLETE

ISDN Call Summary Text Report

Output Formats (Contd.)

CSV Output

The examples below depicts all the different Call Detail Report in *.CSV formats. All files are in "CSV" ("Comma-Separated Values") format, a widely used format in the Windows® world understood by popular data management applications such as Microsoft® Excel and Access.

Probe ID	Call ID	Side 1	Side 2	Protocol	Start	Released	Duration	Orig	Term	Rel Code	Src Dir	Arch Dir	CRV	Data Rate
ATTCARD1	111202152	Washington	New York	ISDN	12/2/2011 15:27	12/2/2011 15:27	0:00:47	Washington	New York	REL_COMI	C:\Program C:\Inetpu	512	256	64K
ATTCARD1	111202152	Washington	New York	ISDN	12/2/2011 15:27	12/2/2011 15:27	0:00:47	Washington	New York	REL_COMI	C:\Program C:\Inetpu	512	256	64K
ATTCARD1	111202152	Washington	New York	ISDN	12/2/2011 15:27	12/2/2011 15:27	0:00:47	New York	New York	REL_COMI	C:\Program C:\Inetpu	2816	2816	64K
ATTCARD1	111202152	Washington	New York	ISDN	12/2/2011 15:27	12/2/2011 15:28	0:00:48	New York	New York	REL_COMI	C:\Program C:\Inetpu	3584	3584	64K
ATTCARD2	111202152	San Franci	Los Ange	ISDN	12/2/2011 15:26	12/2/2011 15:28	0:01:56	Los Ange	Los Ange	REL_COMI	C:\Program C:\Inetpu	512	256	64K
ATTCARD2	111202152	San Franci	Los Ange	ISDN	12/2/2011 15:26	12/2/2011 15:28	0:01:56	Los Ange	Los Ange	REL_COMI	C:\Program C:\Inetpu	512	256	64K
ATTCARD2	111202152	San Franci	Los Ange	ISDN	12/2/2011 15:27	12/2/2011 15:28	0:01:56	Los Ange	Los Ange	REL_COMI	C:\Program C:\Inetpu	768	768	64K

Probe ID	Call ID	Side	Address	File Name	Port	TimeSlot	MC Digits
ATTCARD1	111202152329-4	Washington	8763096	5558485_8763096_Dec02_Washin	1	0	
ATTCARD1	111202152329-4	New York	5558485	5558485_8763096_Dec02_New Yo	2	0	
ATTCARD1	111202152329-5	Washington	8758004	5515213_8758004_Dec02_Washin	1	10	
ATTCARD1	111202152329-5	New York	5515213	5515213_8758004_Dec02_New Yo	2	10	
ATTCARD1	111202152329-16	Washington	5523997	5523997_8748072_Dec02_Washin	1	19	
ATTCARD1	111202152329-16	New York	8748072	5523997_8748072_Dec02_New Yo	2	19	
ATTCARD1	111202152329-20	Washington	5520208	5520208_8746578_Dec02_Washin	1	16	
ATTCARD1	111202152329-20	New York	8746578	5520208_8746578_Dec02_New Yo	2	16	

ISDN Call Master and Side Report

Probe ID	Call ID	Side	Class ID	Class	Code ID	Code	Data	Start	Dur
ATTCARD1	111202152329-4	Washington	4	ISDN	5	SETUP	on	0	0
ATTCARD1	111202152329-4	New York	4	ISDN	2	CALL_PROC	on	0.017125	0
ATTCARD1	111202152329-4	New York	4	ISDN	3	PROGRESS	15	0.040875	0
ATTCARD1	111202152329-4	New York	4	ISDN	7	CONNECT	15	0.0485	0
ATTCARD1	111202152329-4	Washington	4	ISDN	15	CONN_ACK	255	0.05525	0

Probe ID	Call ID	Input	Side	ASL	AF	RMS	Noise	% Voice	% Digits	% Quiet	% Idle
ATTCARD1	111202152329-4	E1	New York	-13.34086	28.9236	-18.72833	-42.56242	34.10405	0	0	65.895954
ATTCARD1	111202152329-4	W1	Washington	-12.84547	85.4308	-13.52932	-30.15544	94.21965	0	0	5.780347
ATTCARD1	111202152329-5	E1	New York	-13.35329	29.0275	-18.72519	-42.56908	34.10405	0	0	65.895954
ATTCARD1	111202152329-5	W1	Washington	-19.15365	93.9155	-19.42627	-32.09595	100	0	0	0
ATTCARD1	111202152329-1	E1	New York	-13.44842	28.2021	-18.9456	-42.75729	32.95455	0	0	67.045455
ATTCARD1	111202152329-1	W1	Washington	-19.49922	96.1119	-19.67144	-32.20077	100	0	0	0
ATTCARD1	111202152329-2	E1	New York	-13.42818	27.2097	-19.08094	-42.93841	31.81818	0	0	68.181818
ATTCARD1	111202152329-2	W1	Washington	-19.7428	97.6705	-19.84516	-32.30474	100	0	0	0

ISDN Call Event and Call Inband CSV Report

CDR Excel® Add-In

- **Excel® Add-in for Advanced Filtering:** The generated CSV call records can be processed in Excel® application and analyzed more comprehensively to get the calls of interest using a built-in tool included with the Excel® application.
- The generated measurements along with the recorded voice files of a particular call are combined in the Excel®. Also allows the users to do custom filtering based on any measurements (ASL, AF, % Digits, %Voice, Mid-call-digits, etc.) or signaling messages (ISDN Signaling, CAS Signaling, Release Codes, Call Duration, Call Events , etc.)
- **Retrieving Calls of Interest:** The details of a selected call from the filtered records in Excel® can be printed or stored as PDF files for further scrutiny.

The screenshot shows a Microsoft Excel spreadsheet with a table of call records. A 'Calls of Interest' dialog box is open, displaying a filtered list of calls. The dialog box includes a table with columns for Probe ID, Call ID, Side 1, Side 2, Protocol, Start, Released, and Duration. The selected call (Probe ID: VoIPProbe, Call ID: GLPG58764772850782) is highlighted in red. Below the table, there are tabs for 'Call Summary', 'Call Side Information', 'Call Events', and 'Voiceband Measurements'. The 'Call Summary' tab is active, showing details for the selected call, including Start Time, Release Time, Call Duration, Call Originating Side, Call Terminating Side, Release Code, Post Dial Delay (PDD), Session Delay (SD), and Archive Folder. On the right side of the dialog box, there are options to 'Play the Voice Files' (requires the voice file path to have write permissions) and 'Download and Play the Voice Files' (with a text input field for the folder name and a 'Print Selected Record' button).

Probe ID	Call ID	Side 1	Side 2	Protocol	Start	Released	Duration
<input type="radio"/>	VoIPProbe GLPG40068772850547	Left	Right	SIP	11/30/2011 10:07:24	11/30/2011 10:08:22	00:00:58
<input type="radio"/>	VoIPProbe GLPG45198872850596	Left	Right	SIP	11/30/2011 10:08:15	11/30/2011 10:09:13	00:00:58
<input checked="" type="radio"/>	VoIPProbe GLPG58764772850782	Left	Right	SIP	11/30/2011 10:10:31	11/30/2011 10:11:23	00:00:52
<input type="radio"/>	VoIPProbe GLPG62096972850822	Left	Right	SIP	11/30/2011 10:11:04	11/30/2011 10:12:04	00:01:00
<input type="radio"/>	VoIPProbe GLPG66819272850872	Left	Right	SIP	11/30/2011 10:11:51	11/30/2011 10:12:44	00:00:53
<input type="radio"/>	VoIPProbe GLPG73129972850950	Left	Right	SIP	11/30/2011 10:12:54	11/30/2011 10:13:50	00:00:56

Filtered Calls: 6 of 130 Total Calls ; Filtering Criteria: Duration > 00:00:50

Call Summary | Call Side Information | Call Events | Voiceband Measurements

3
 Probe ID: VoIPProbe
 Call ID: GLPG58764772850782
 Protocol: SIP
 Start Time: 11/30/2011 10:10:31
 Release Time: 11/30/2011 10:11:23
 Call Duration: 00:00:52
 Call Originating Side: Left
 Call Terminating Side: Left
 Release Code: Normal Call Clearing
 Post Dial Delay(PDD): 14
 Session Delay(SD): 0
 Archive Folder: C:\Program Files\GL Communications Inc\PacketScan\ATT\VoIPCaptures_2011_11_30_10\

Play the Voice Files
 (requires the voice file path to have write permissions)

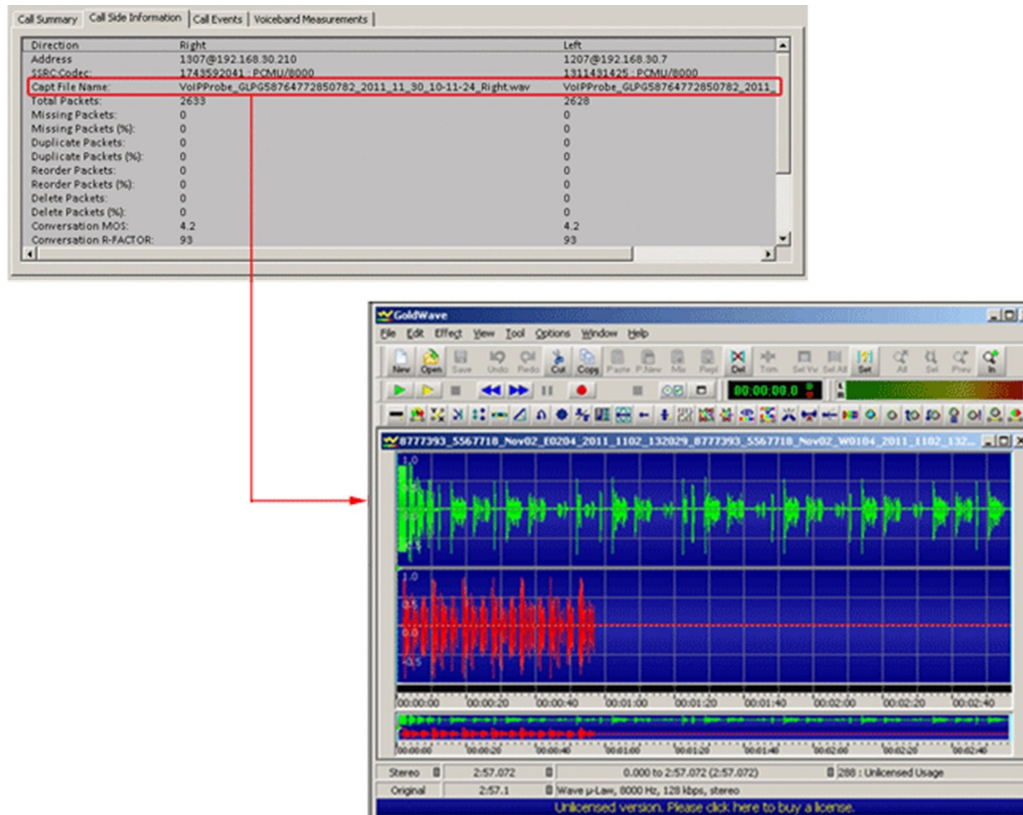
Download and Play the Voice Files
 C:\Test\
 (Enter the folder name only)

Print Selected Record

Filtering Required Calls from Large Set of Records

CDR Excel® Add-In (Contd.)

- **Easy Invocation of Voice Files:** The voice files of a particular call from the filtered records in Excel® can be downloaded or played back using third-party audio editing tools such as Goldwave®



Play/Download the Stereo Voice Files from Filtered Calls

Buyer's Guide

Item No	Product Description
CDR032	Call Data Records (CDR) Software

Item No	Related Software
XX031	Call Capture and Analysis
XX020	Record and Playback of Files
VBA032	Near Real-time Voice-band Analyzer
PKB070	Audio Processing Utility
XX680	T1 E1 Traffic Classifier

Item No	Related Hardware
PTE001	tProbe™ T1 E1 Base Unit
FTE001 , ETE001	Quad and Octal T1 E1 Analyzer Boards
XTE001	Dual Express (PCIe) T1 E1 Boards
TTE001	tScan16™ T1 E1 Boards

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

For more details, visit [Call Data Records](#) webpage.



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