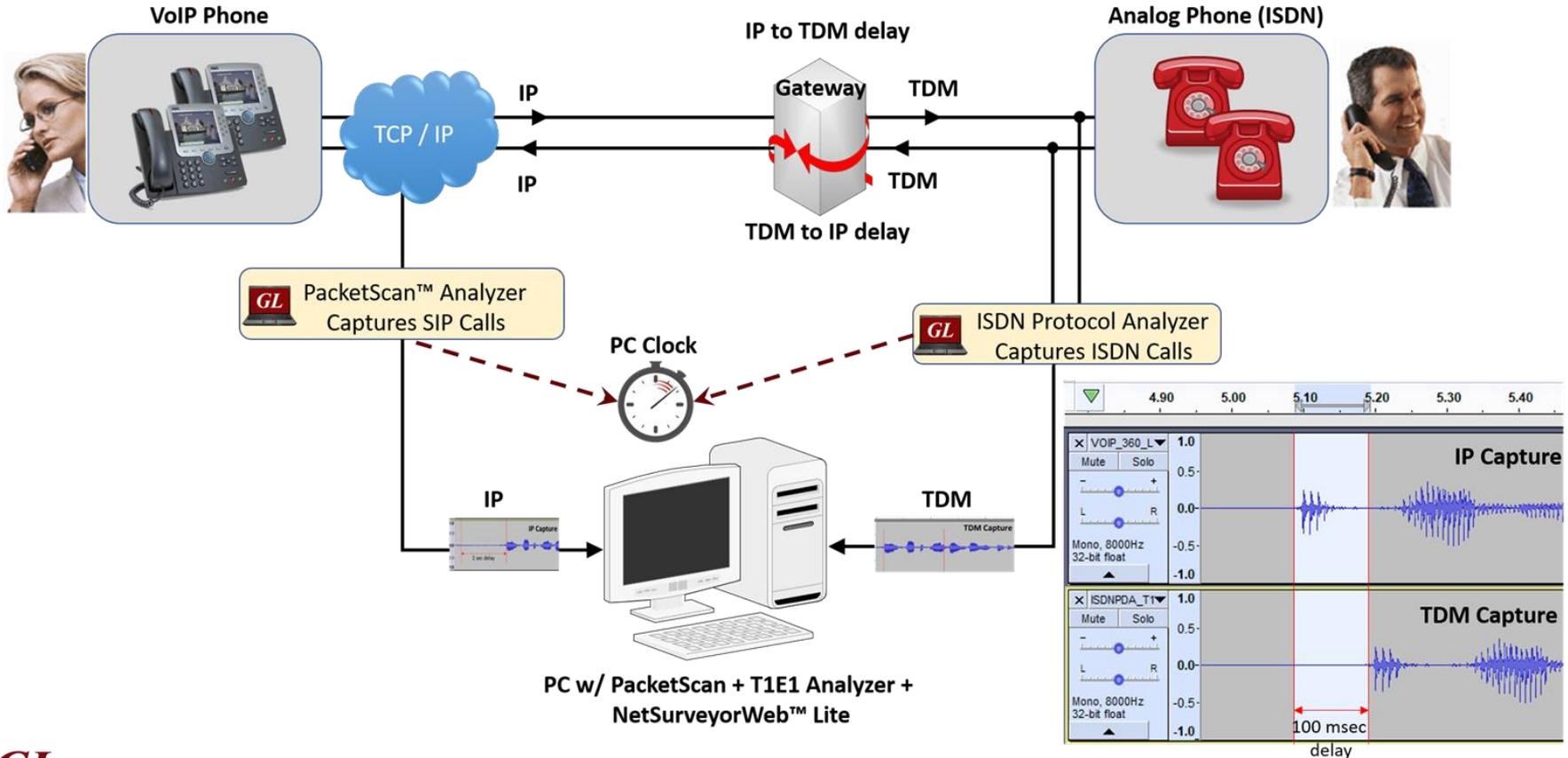

Gateway/Router Performance Measurements



818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878
Phone: (301) 670-4784 Fax: (301) 670-9187 Email: info@gl.com
Website: <https://www.gl.com>

Gateway Delay Measurement



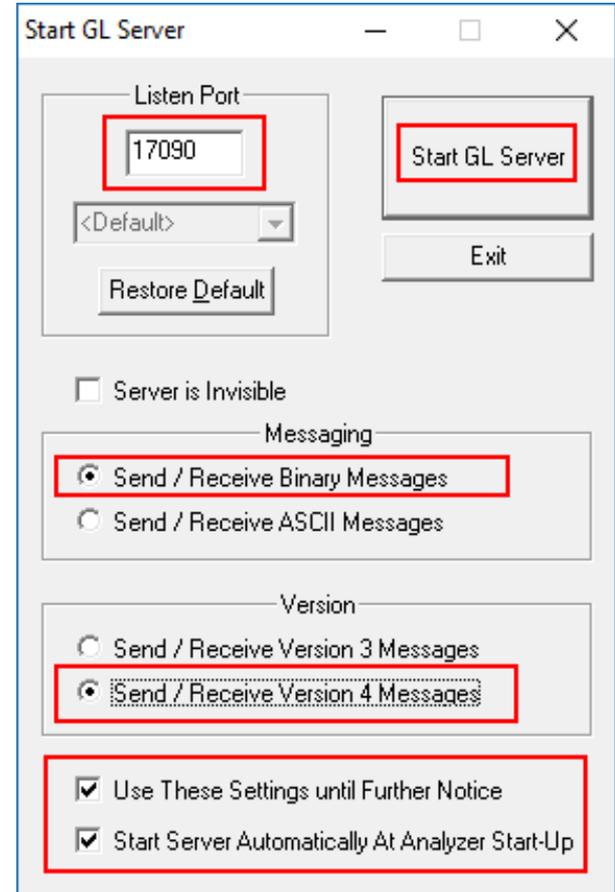
Folder Permissions

- Ensure that Read and Write permissions are provided for both T1 E1, PCMDelayMeasurement, and PacketScan installation directories.
- For example, for T1 E1, browse and select the 'C:\Program Files\GL Communications Inc\Octal Xpress E1 Analyzer\' directory.
- Share the selected folder with Read/Write permissions to access this folder through network
- Right-click on the directory and select **Properties** > **Security** tab.
- Click Edit from explorer menu. Click Add in the Permission window
- Type '**Everyone**' and click '**Check Names**'. Click **OK** to add this user group to Permissions Window.
- Provide full control to the users added and click on **Apply** and **OK**
- If any other path is used other than default path, user need to provide security permission as mentioned above.

Configuring ACF, Traffic Recording, Export CSV in T1 E1 Protocol Analyzer

Start GL Server

- In this example, we are configuring tProbe E1 Analyzer. Follow the below steps to enable call recording for tProbe applications.
- Now, double-click on the tProbe E1 Analyzer shortcut icon  created on the Desktop, the application should invoke without any errors.
- In tProbe E1 Analyzer, select **Special Applications > Windows Server Client > WCS Server**. Select the options as shown in the figure and click on **Start**.



Configuring ISDN Protocol Analyzer

- In tProbe E1 Analyzer , select **Special Applications > Protocol Analysis**. Select ISDN Analyzer, this will invoke ISDN Analyzer window.

The screenshot shows the E1 tProbe Analyzer 64-bit (Administrator) interface. The menu path **Special Applications > Protocol Analysis > ISDN Analysis** is highlighted with red boxes. The interface includes a table for port configurations, a T1/E1 Alarms section, and a detailed menu for protocol analysis options.

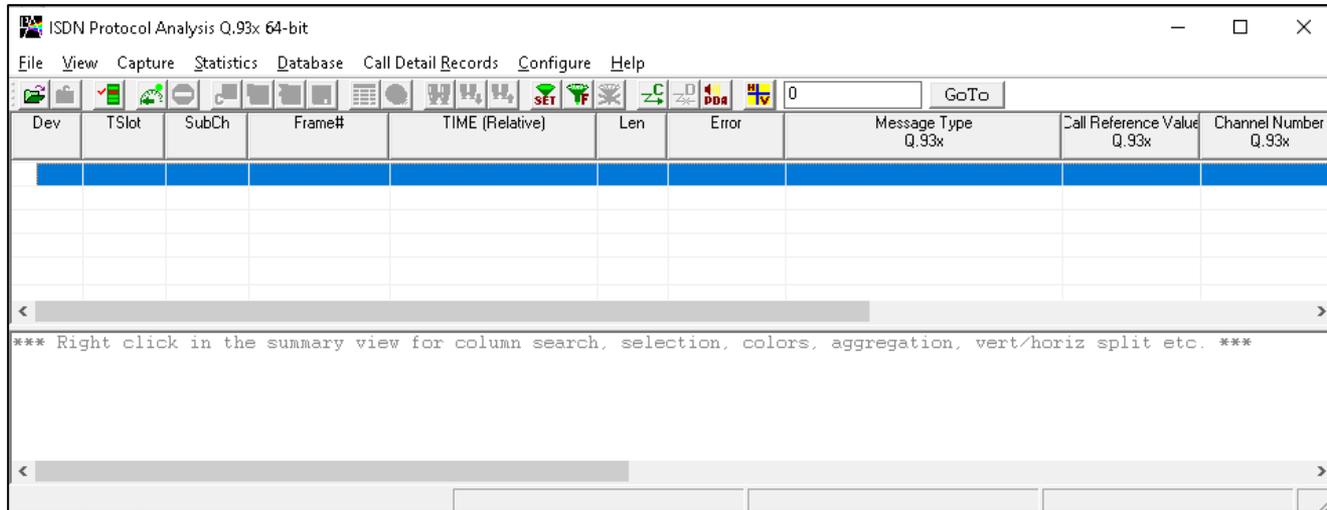
Port	Framing	Loopback
1	CCS & CRC	No Loopback
2	CCS & CRC	No Loopback

T1/E1 Alarms		
Reset	All Ports	#1
Sync Loss	✓	✓
HDB3 Violation	✓	✓
Carrier Loss	✓	✓
Frame Error	✓	✓
Remote	✓	✓
Distant MF	✓	✓
AIS	✓	✓

Special Applications	Sub-menu
Protocol Analysis	HDLC Analysis, HDLC Playback, Physical Layer Analysis, Protocol Identifier & Classifier
Protocol Emulation	
Windows Client Server (WCS)	
Record / Playback File	
Synchronous Trunk Record/Playback	ISDN Analysis, SS7 Analysis, GSM Analysis, GPRS (Gb) Analysis, UMTS Analysis, GR-303 Analysis, V5.x Analysis, CAS Analysis
Dial Digits	
Call Capture & Analysis	
Physical Layer Testing	
Echo Test Solutions	
MCBERT, HDLC, TRAU	
AudioBridge, StripChart	
DCME Analyzer	

Configuring ISDN Protocol Analyzer

- Now, In the protocol analyzer GUI, select **Configure > Load All Options** and select **ISDN-NetSurveyor.ACF** file from the following path **C:\Program Files\GL Communications Inc\Probe E1 Analyzer\PDA**.
- In the **ISDN** analyzer, click on **Stream/Interface** selection icon  and select signalling timeslot on all ports. Close the window after timeslot configuration. Now, on the right pane, select **Capture File Options** and change the path of **Temp.hdl** file to default T1 E1 installation directory.
- Now, on the **ISDN** analyzer, click on **PDA** icon  to invoke Packet Data Analyzer (PDA).



Configuring PDA

- In PDA, follow the below steps.
 - Select **GUI Configurations > Configure Frame**
Summary, browse and select required *.ACF file. For example, select ISDN-NetSurveyor.ACF file from the following path **C:\Program Files\GL Communications tProbe E1 Analyzer\PDA**.
 - Select **GUI Configurations > Data Link Group**, configure the **East** and **West** port as required. Configure the NFAS, Interface ID, Pri-D East, and Pri-D West. Close the window.

ISDN Data Link Group

File

Device Selection

East 1 West 2

NFAS

Interface ID Pri-D East 1 Pri-D West 2

East	West	NFAS	Interface ID	Pri-D East	Pri-D West
1	2	Disabled	0	1	2
3	4	Disabled	0	3	4
5	6	Disabled	0	5	6
7	8	Disabled	0	7	8

Add

Delete

Delete All

Close

Configuring PDA

- In PDA, follow the below steps.
 - Select **GUI Configurations > Traffic Recording Configurations**, check the Non-Segmented and Segmented option to enable recording audio file as required. Also, user can configure number of voice segments and segment durations as required for further analysis. Click on Activate and reinvoke PDA from the T1E1 Protocol Analyzer window to see the changes. Refer to the figure.
 - Default path for Non Segmented Traffic Recording: “C:\Program Files\GL Communications Inc\Octal Xpress E1 Analyzer\VoiceFiles”
 - Default path for Segmented Traffic Recording: “C:\Program Files\GL Communications Inc\Octal Xpress E1 Analyzer\Segmented VoiceFiles”

Traffic Recording Configuration

File

Traffic Recording

Recording (Non Segmented)

Directory C:\Program Files\GL Communications Inc\...

Record Duration 0 sec {0 to Record Entire Call Duration}

Include Absolute Path in CDR

Segmented Recording

Directory C:\Program Files\GL Communications Inc\...

No. of Segments 3 Segment Length 8 sec

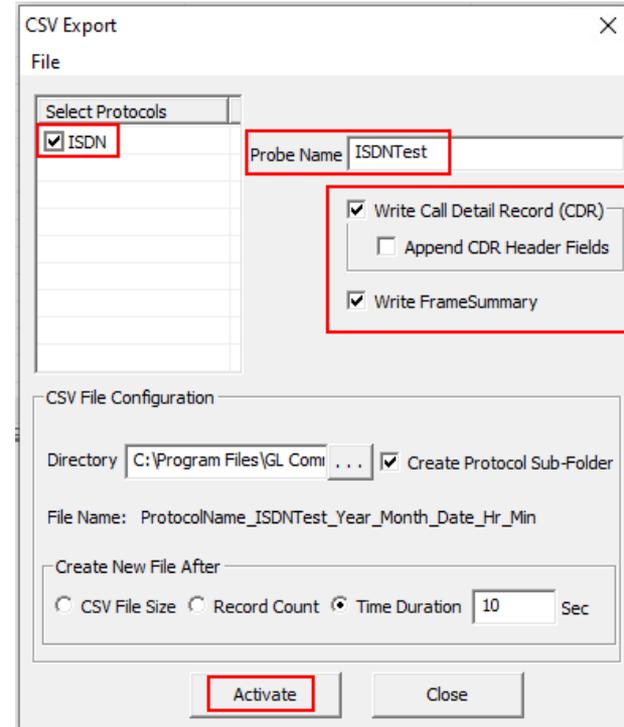
Max Simultaneous Recordings 200

Create Subfolder Every 1 min

Activate Close

Configuring PDA

- On PDA, select **File > Export CSV**, check the below options..
 - on the left pane, select required protocol
 - Provide Probe Name
 - Check the option Write Call Detail Record (CDR)
 - Check the option Write Frame Summary
 - Browse and specify CSV file saving path
 - Click on Activate to activate the selected options.
- From the ISDN analyzer main menu, select **File > Start Real-time**.



Configuring ACF File, Traffic Recording, CSV Export in PacketScan™

Configuration

- The below steps are one-time configuration only, if the application is configured for auto start, user need not to follow the below steps.
- User needs to enable precision delay timer option parameter in the IPcapt.ini file located in the PacketScan installation directory (C:\Program Files\GL Communications Inc\PacketScan). Search for the below parameter, set the value to '1' and save the file.

PRECISE_SYSTEM_TIME=1

- In case, Router/Gateway is not negotiated G.729B/G.729 codec then, user need to enforce G.729B/G.729 codec to negotiate the traffic. Now, edit IPprot.ini file located in the PacketScan installation directory (C:\Program Files\GL Communications Inc\PacketScan). Search for the below parameter, ensure that the value is set to '2' for G.729B and '1' for G.729.

FORCE_G729_CODEC=2

ACF file Configuration

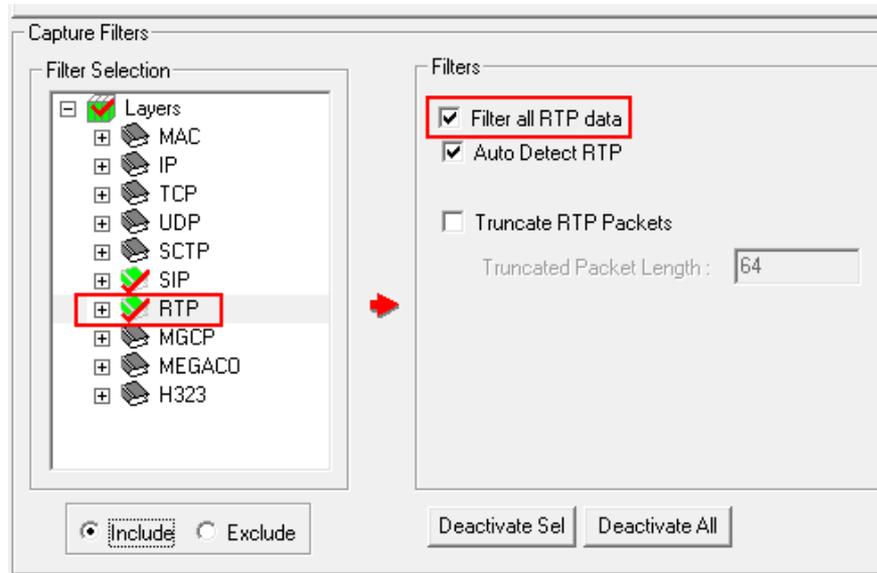
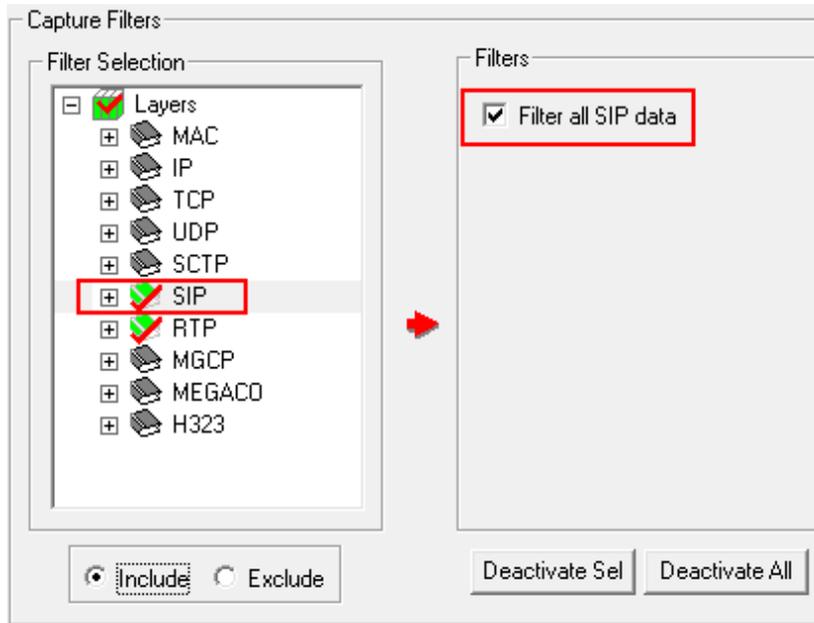


- Now, right click on the PacketScan icon created on the desktop and select "Run as Administrator" to launch the application. The application should invoke without any errors.
- In the protocol analyzer GUI, select **Configure** → Load **All Options** and select **SIP-NetSurveyor.ACF** file from the following path **C:\Program Files\GL Communications Inc\PacketScan**.
 - Select **Capture** → **Stream/Interface** Selection and select the Ethernet card on which packet needs to be captured.
 - On the left pane, select **Capture File Options** and verify that **Circular Capture Buffer** is checked.

IMAGE

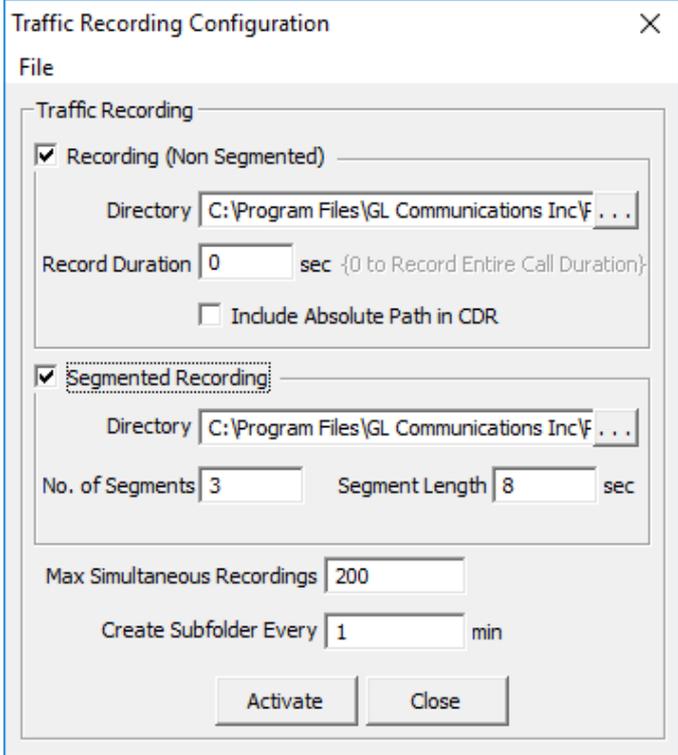
ACF file Configuration

- Now, on the left pane, select **Capture Filter** option, click on **SIP** in the Filter Selection and check **Filter all SIP data**. Similarly, click on **RTP** in the Filter Selection and check **Filter all RTP data**. Do not activate any other filters in the **Capture Filter**. Refer the figures. After Filter configuration, close the window.



Configuring PDA

- In PacketScan analyzer main GUI, click on PDA icon  to invoke PDA.
- Select **GUI Configurations** → **Configure Frame Summary**, select **SIP** protocol, browse and select required **SIP-NetSurveyor.ACF** file from the following path C:\Program Files\GL Communications Inc\PacketScan.
- Select **GUI Configurations** → **Traffic Recording Configurations**, check the **Non-Segmented** and **Segmented** option to enable recording audio file as required. Also, user can configure number of voice segments and segment durations as required for further analysis. Click on **Activate** to see the changes. Refer to the figure.
 - **Default path for Non Segmented Traffic Recording:** “C:\Program Files\GL Communications Inc\PacketScan\glwfiles”
 - **Default path for Segmented Traffic Recording:** “C:\Program Files\GL Communications Inc\PacketScan\Segmented glwfiles”



Traffic Recording Configuration

File

Traffic Recording

Recording (Non Segmented)

Directory C:\Program Files\GL Communications Inc\F...

Record Duration 0 sec {0 to Record Entire Call Duration}

Include Absolute Path in CDR

Segmented Recording

Directory C:\Program Files\GL Communications Inc\F...

No. of Segments 3 Segment Length 8 sec

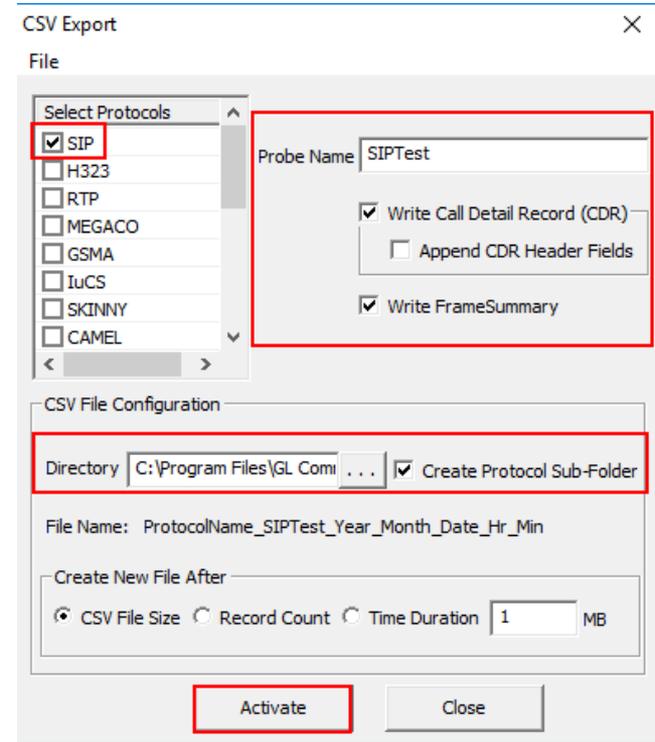
Max Simultaneous Recordings 200

Create Subfolder Every 1 min

Activate Close

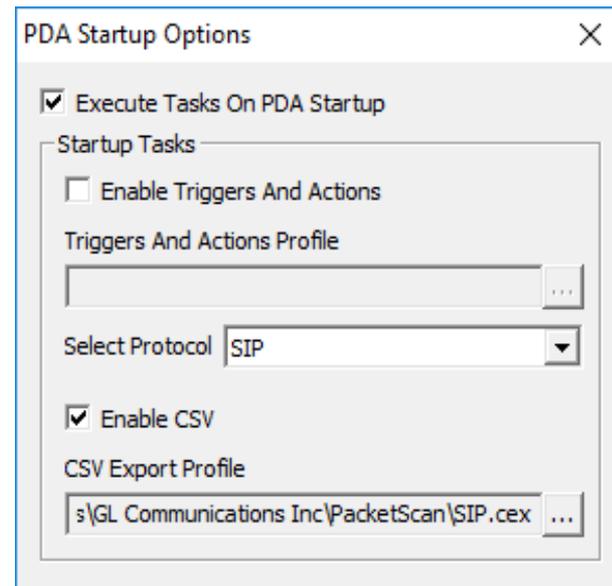
Configuring PDA

- On PDA, select **File** → **Export CSV**, check the below options.
 - on the left pane, select required protocol
 - Provide Probe Name
 - Check the option Write Call Detail Record (CDR)
 - Check the option Write Frame Summary
 - Browse and specify CSV file saving path
 - Click on **Activate** to activate the selected options
 - From the **PacketScan™** main menu, select File → **Start Real-time** or click **Start Real-time**  icon from the toolbar.



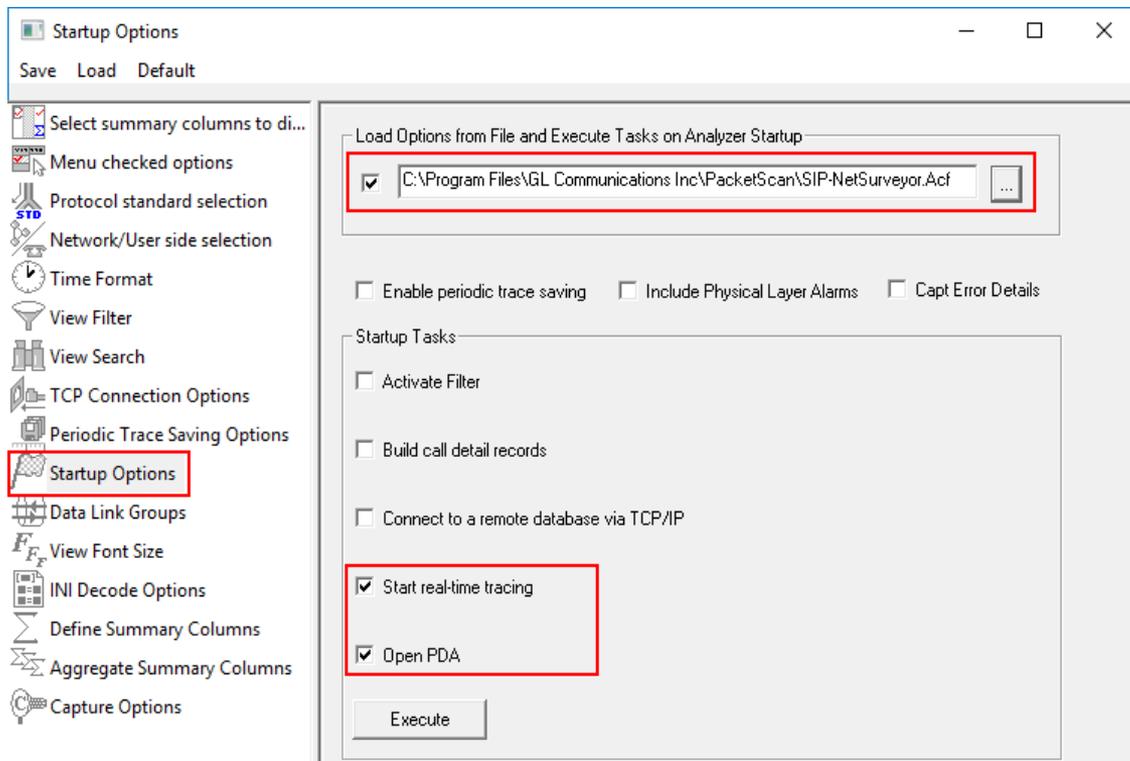
Auto Startup Configurations for PDA and ACF Files in PacketScan Analyzer

- The below steps are one-time configuration only, if the application is already enabled for auto start, user need not to follow the below steps.
- To auto start the protocol analyzer and PDA, follow the below steps.
 - On PDA, click on **File** → **Export CSV** this will invoke Export CSV window. Now, click on **File** → **Save Configuration As** to save the configuration in *.cex file format. This file when loaded, it will load all the previously configured options.
- In PDA, select GUI Configuration → **PDA Startup options** and verify the following options –
 - Check the option "**Execute Tasks on PDA Startup**"
 - Check the option "**Enable CSV**"
 - Select the same "*.cex" file saved previously from the installation directory (e.g., **C:\Program Files\GL Communications Inc\PacketScan Analyzer*.cex**).



Auto Startup Configurations for PDA and ACF Files in PacketScan Analyzer

- Now, on the protocol analyzer main GUI, click on  Startup Options from **Configure → Protocol and GUI Options** to configure the options as shown below. Click on browse button to select the *.ACF file. Check the option as highlighted in the below figure. Now, click on Save to over-write the selected *.ACF file. Close the application and invoke again.



Client Batch File Configuration for PCM Delay Measurement

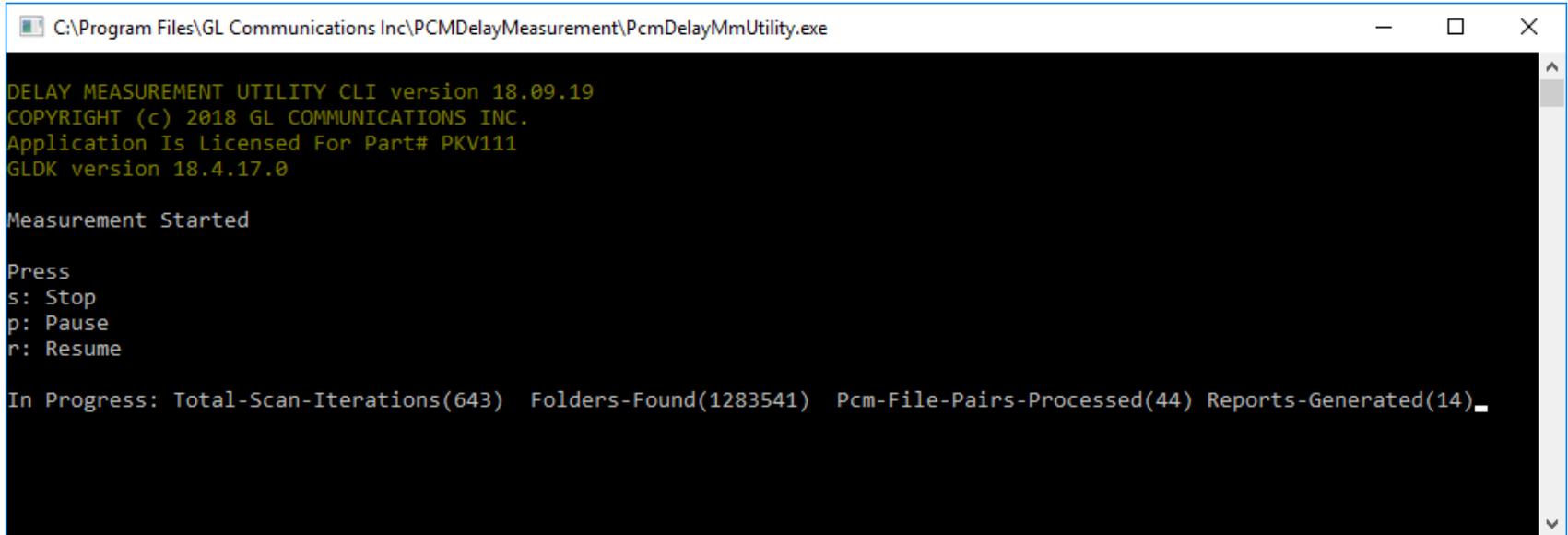
- Now, go to “**C:\Program Files\GL Communications Inc\PCMDelayMeasurement**” path and edit the **PcmDelayMm_FCUCLI_Run.bat** file in Notepad. Search for the string USAGE EXAMPLES and configure the parameters as required.
 - Enter the source folder path, destination folder path, source file type, source file codec, destination file codec as required. An example is shown below.
- For TDM, enter the source file directory path which was previously configured in the section **Configuring ACF, Traffic Recording, Export CSV in T1 E1 Protocol Analyzer.**
- Create **Destination** folder and provide security permission for this folder. Specify the same Destination folder path in the both TDM and IP scripts. For example, below TDM and PacketScan™ scripts contains destination folder as “C:\Program Files\GL Communications Inc\PCMDelayMeasurement\16 bit PCM”.
 - **start afcucli.exe AUTO** *SourceFolder "C:\Program Files\GL Communications Inc\Octal Xpress E1 Analyzer\SegmentedVoiceFiles" DestinationFolder "C:\Program Files\GL Communications Inc\PCMDelayMeasurement\16 bit PCM" SourceFileType pcm SourceFileCodec alaw DestinationFileType PCM DestinationFileCodec PCM deletesourceFiles 1 MoveSourceFiles 0.*

Client Batch File Configuration for PCM Delay Measurement

- For IP, enter the source file directory path which was previously configured in the section Configuring ACF File, Traffic Recording, CSV Export in PacketScan™. Here, user need to configure the path as mentioned in the Segmented Recordings.
 - **start afcucli.exe AUTO** *SourceFolder "C:\Program Files\GL Communications Inc\PacketScan\SegmentedGlvFiles" DestinationFolder "C:\Program Files\GL Communications Inc\PCMDelayMeasurement\16 bit PCM" SourceFileType glw SourceFileCodec alaw DestinationFileType PCM DestinationFileCodec PCM deletesourceFiles 1 MoveSourceFiles 0.*
- For more details on CLI Commands, refer to Delay-Measurement-UM.
- The destination folders configured in the above instances of afcucli.exe must be same. The same path should be provided for DELAYRECORDINGSFOLDER. The PCM Delay Measurement will fetch the files from this path.
- Now search for USAGE EXAMPLE again and enter the delay recordings folder path, left and right domain protocol, CSV write mode, CSV log path as required. An example is shown below.
 - **start PcmDelayMmUtility.exe** *DELAYRECORDINGSFOLDER "C:\Program Files\GL Communications Inc\PCMDelayMeasurement\16 bit PCM" leftDomainProtocol VOIP RightDomainProtocol ISUP CsvWriteMode 0 CsvWriteDuration 255 CsvLogPath "C:\Program Files\GL Communications Inc\PCMDelayMeasurement\DelayMeasurementLog" EnableDebugLogs 1 DebugFolderPath "C:\Program Files\GL Communications Inc\PCMDelayMeasurement\DelayMeasurementLog\DebugLogs" EnableVQScores 0 VQTServerIp "192.168.1.58" RemoteVqtFolderPath "" KeepPcmFiles 0 CsvLogPath "" CsvWriteMode 1 CsvWriteDuration 3000*

Client Batch File Configuration for PCM Delay Measurement

- Double click on PcmDelayMm_FCUCLI_Run.bat file from the following path “C:\Program Files\GL Communications Inc\PCMDelayMeasurement” to invoke Audio File Conversion Utility (AFCU) and PCM Delay Measurement Utility.
- Observe that PCM Delay measurement is started in the console window.



```
C:\Program Files\GL Communications Inc\PCMDelayMeasurement\PcmDelayMmUtility.exe

DELAY MEASUREMENT UTILITY CLI version 18.09.19
COPYRIGHT (c) 2018 GL COMMUNICATIONS INC.
Application Is Licensed For Part# PKV111
GLDK version 18.4.17.0

Measurement Started

Press
s: Stop
p: Pause
r: Resume

In Progress: Total-Scan-Iterations(643)  Folders-Found(1283541)  Pcm-File-Pairs-Processed(44)  Reports-Generated(14)_
```

NetSurveyorWeb CSV Loader Configuration

NetSurveyorWeb CSV Loader Configuration

- If the CSV Loader is already configured, user need not to follow the below steps.
 - To verify the web server installation, double click on NetSurveyorWeb™ internet explorer shortcut on the desktop, or type in the URL as '<http://localhost/NetSurveyorWeb/>' in the Internet Explorer address bar to view the web page
 - Provide the **User Name** and **Password** to login to the portal. **Note:** Default User Name and Password = 'gl'
 - Click on the Loader Configuration button option available on the main screen. This prompts the loader configuration screen as shown below. If this Loader Configuration option is not displayed on the screen by default, then from the left pane select **Admin** → **CSV Loader Status** option to view the loader configuration screen.
- **Path:** Provide CSV file path location of CDR, Summary, and Delay measurement log files as configured in **TDM** and **IP** sections. CSV files are in the following default path:
- C:\Program Files\GL Communications Inc\PacketScan\CSVFiles\SIP\CDR**
 - C:\Program Files\GL Communications Inc\PacketScan\CSVFiles\SIP\Frame Summary**
 - C:\Program Files\GL Communications Inc\Octal Xpress E1 Analyzer\CSVFiles\ISUP\CDR**
 - C:\Program Files\GL Communications Inc\Octal Xpress E1 Analyzer\CSVFiles\ISUP\Frame Summary**
 - C:\Program Files\GL Communications Inc\PCMDelayMeasurement\DelayMeasurementLog**

NetSurveyorWeb CSV Loader Configuration

- **Domain Name:** Enter system domain name
- **User Name:** Enter the system user name
- **Password:** Enter the system password
- **Type of Records:** Select the type of records as required. It can be CDR/Summary, VBA, or Delay.
- **Enable Backup:** Check this option to enable CSV file backup
- **Add:** Click on **Add** to add the loader configuration. Refer to the below figure.
- Close the Loader Configuration window and **Start** the CSV Loader.

Loader Configuration

CSV File Path

Path	<input type="text" value="C:\Program Files\GL Commr"/>
Domain Name	<input type="text" value="GLIROOT"/>
User Name	<input type="text" value="GLITTEAM"/>
Password	<input type="password" value="*****"/>
Type of Records	<input checked="" type="radio"/> CDR or Summary <input type="radio"/> VBA <input type="radio"/> Delay
Enable Backup	<input checked="" type="checkbox"/>
Backup Path	<input type="text" value="D:\CSVFiles"/>

Path	Domain	Username	Password		
C:\Program Files\GL Communications Inc\Octal Xpress E1 Analyzer\CSVFiles\ISUP\CDR	GLIROOT	GLITTEAM	*****	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
C:\Program Files\GL Communications Inc\Octal Xpress E1 Analyzer\CSVFiles\ISUP\Frame Summary	GLIROOT	GLITTEAM	*****	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
C:\Program Files\GL Communications Inc\PacketScan\CSVFiles\SIP\CDR	GLIROOT	GLITTEAM	*****	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
C:\Program Files\GL Communications Inc\PacketScan\CSVFiles\SIP\Frame Summary	GLIROOT	GLITTEAM	*****	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
C:\Program Files\GL Communications Inc\PCMDelayMeasurement\DelayMeasurementLog	GLIROOT	GLITTEAM	*****	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>

NetSurveyorWeb CSV Loader Configuration

- Now, observe that **Loader Status** is UP indicating Green LED. Also, observe that CDR and Frame Summary count is getting updated. It confirms that error free data is being received..

Admin \ Loader Status

Loader Status

Loader Configuration Stop

Loader Status: UP 

Loader Statistics Reset

	Total Records	Error Records	Insertion Rate	Remaining CSV Files
CDR	26568	0		
Summary	173292	0		

Probe Statistics

Probe Name	Probe Status	CDR Records	Summary Records	CDR Error Count	Summary Error Count	Delete
ISUPTest	DOWN	13334	80636	0	0	
SIPTest	DOWN	13234	92656	0	0	

Show Errors

NetSurveyorWeb CSV Loader Configuration

- To play the voice file in **NetSureyorWeb™** application follow the below steps
- On the left pane, click on **Config → Play Config** to configure PCM/GLW and WAV file path.
- Select the required protocol.
- Enter the Probe Name as configured in PDA.
- Specify the PCM/GLW and WAV file path in the below format.
- VoiceFile Path;WavFile Path;0
- The default Play File path for VoIP protocol is
- C:\Program Files\GL Communications Inc\PacketScan;C:\WavFiles;0
- The default Play File path for ISUP protocol is
- C:\Program Files\GL Communications Inc\Octal Xpress E1 Analyzer;C:\WavFiles;0
- Provide the login credentials of the system where PCM/GLW files are located.
- After configuration, click on **Save Details**.

NetSurveyorWeb CSV Loader Configuration

GL NetSurveyorWeb Refresh Protocol VOIP (SIP & H323)

VOICE% > 90
IDLE% < 20
Delay Calls

Custom CDR >
CDR

Default KPIs >
Basic KPIs
Voice Analysis(VBA)
Delay Measurements

MailBox >

Config v

Data QuickView
Reports QuickView
Column View
Filter View
Alarm Config
Play Config
Protocol Config

Data Reports Alarms Users System Status at 2020-02-07 16:01:05

Play Configuration

Protocol(s) VOIP

ProbeName SIPTest

Playfile Path C:\Program Files\GL Communications Inc\PacketScan;D:\Wav
Ex. \\127.0.0.1;F:\WaveFiles;0

Play Login Details GLIN112;glcomm;GLIN-112
Ex. username;password;127.0.0.1

Save Details

Protocol	ProbeName	PlayfilePath	PlayLoginDetails	
VOIP	SIPTest	C:\Program Files\GL Communications Inc\PacketScan;D:\WavFiles;0	GLIN112;glcomm;GLIN-112	Edit Delete

Verification

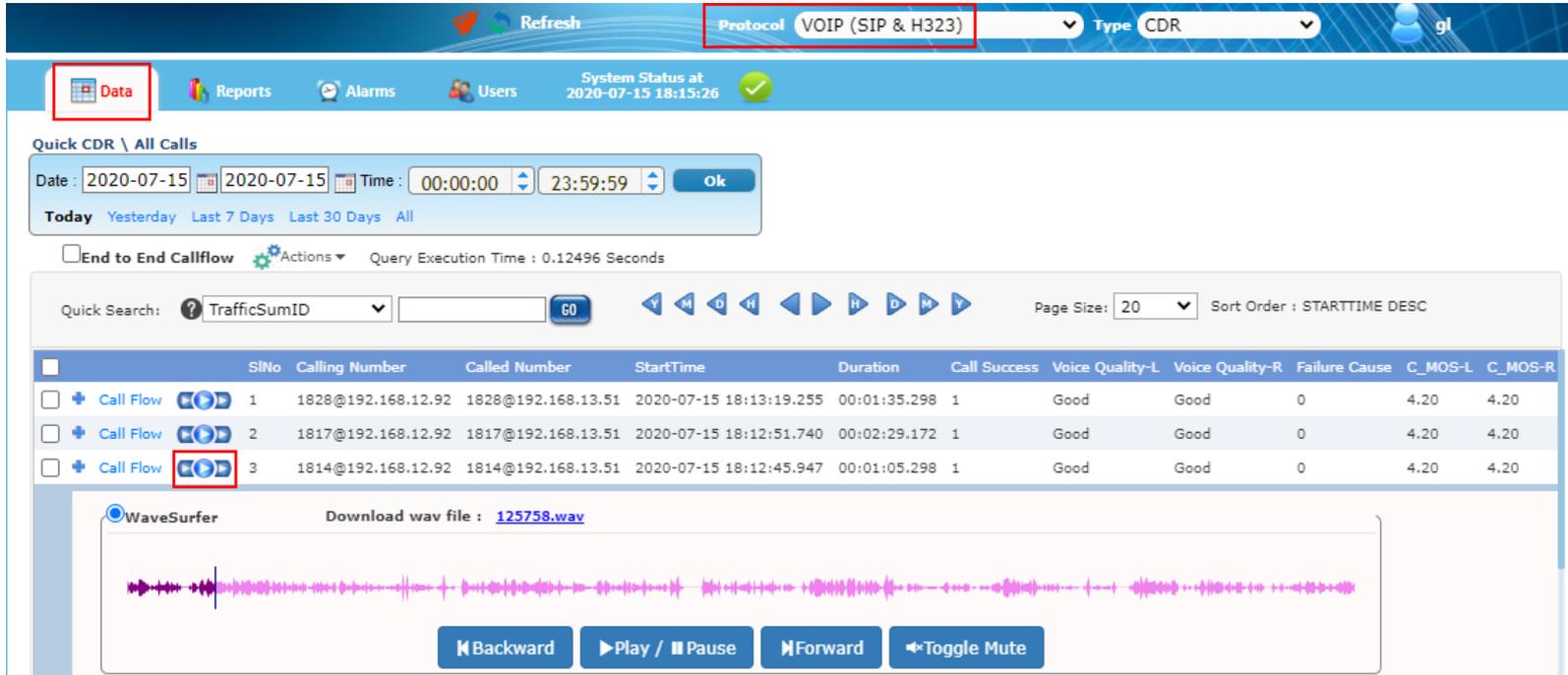
- Now, go to **NetSurveyorWeb™** application, on the left pane, under **Quick CDR** click on **Delay Calls** and observe the Average Delay IN/OUT results as shown in the below figure.

The screenshot displays the NetSurveyorWeb application interface. The left sidebar shows the navigation menu with 'Delay Calls' highlighted. The main content area shows a report titled 'Quick CDR \ Delay Calls' for the date 2019-01-14. The report includes a table of call records with columns for SIN#, CALL ID, START TIME, CALLER, CALLEE, MinDelay_OUT, MaxDelay_OUT, AvgDelay_OUT, MinDelay_IN, MaxDelay_IN, AvgDelay_IN, and EASTFILE. The 'AvgDelay_OUT' and 'AvgDelay_IN' columns are highlighted with red boxes.

SIN#	CALL ID	START TIME	CALLER	CALLEE	MinDelay_OUT	MaxDelay_OUT	AvgDelay_OUT	MinDelay_IN	MaxDelay_IN	AvgDelay_IN	EASTFILE
1	5157	2019-01-14 08:35:48.535	1008	4008	85	88	85	93	104	98	VoiceFiles\ISDM\2019-01\14\08\35\ISDNPDA_T1_2885
2	5156	2019-01-14 08:35:47.820	1010	4010	85	89	86	113	125	117	VoiceFiles\ISDM\2019-01\14\08\35\ISDNPDA_T1_2884
3	5155	2019-01-14 08:35:47.634	1009	4009	87	90	88	103	108	105	VoiceFiles\ISDM\2019-01\14\08\35\ISDNPDA_T1_2883
4	5154	2019-01-14 08:35:47.482	1006	4006	77	86	83	97	103	99	VoiceFiles\ISDM\2019-01\14\08\35\ISDNPDA_T1_2882
5	5153	2019-01-14 08:35:47.164	1007	4007	85	86	85	94	99	96	VoiceFiles\ISDM\2019-01\14\08\35\ISDNPDA_T1_2881
6	5152	2019-01-14 08:35:46.759	1004	4004	84	85	84	102	107	103	VoiceFiles\ISDM\2019-01\14\08\35\ISDNPDA_T1_2880
7	5151	2019-01-14 08:35:46.279	1003	4003	84	85	84	98	100	98	VoiceFiles\ISDM\2019-01\14\08\35\ISDNPDA_T1_2879
8	5150	2019-01-14 08:35:45.816	1002	4002	84	88	87	111	114	113	VoiceFiles\ISDM\2019-01\14\08\35\ISDNPDA_T1_2878
9	5149	2019-01-14 08:35:45.474	1000	4000	85	93	88	98	99	98	VoiceFiles\ISDM\2019-01\14\08\35\ISDNPDA_T1_2877
10	5148	2019-01-14 08:35:44.698	1005	4005	85	85	85	104	109	107	VoiceFiles\ISDM\2019-01\14\08\35\ISDNPDA_T1_2876
11	5147	2019-01-14 08:35:43.821	1001	4001	88	91	89	103	111	108	VoiceFiles\ISDM\2019-01\14\08\35\ISDNPDA_T1_2875
12	5146	2019-01-14 08:34:46.033	1008	4008	85	88	87	93	97	95	VoiceFiles\ISDM\2019-01\14\08\34\ISDNPDA_T1_2874

Verification

- Click on **play**  icon available for each call in the log to play the CDR call files directly as shown below.



The screenshot displays a web-based interface for managing Call Detail Records (CDR). At the top, there is a navigation bar with a 'Refresh' button, a 'Protocol' dropdown menu set to 'VOIP (SIP & H323)', and a 'Type' dropdown menu set to 'CDR'. Below this is a secondary navigation bar with icons for 'Data', 'Reports', 'Alarms', and 'Users', along with a 'System Status at 2020-07-15 18:15:26' indicator.

The main content area is titled 'Quick CDR \ All Calls' and includes a search filter for 'TrafficSumID'. Below the search bar is a table of call records. The table has columns for 'SI No', 'Calling Number', 'Called Number', 'StartTime', 'Duration', 'Call Success', 'Voice Quality-L', 'Voice Quality-R', 'Failure Cause', 'C_MOS-L', and 'C_MOS-R'. Three call records are visible, each with a 'Call Flow' icon and a play button icon. The play button icon for the third call record is highlighted with a red box.

Below the table is a 'WaveSurfer' audio player. It shows a waveform of the selected call and includes controls for 'Backward', 'Play / Pause', 'Forward', and 'Toggle Mute'. The download link for the wav file is '125758.wav'.

SI No	Calling Number	Called Number	StartTime	Duration	Call Success	Voice Quality-L	Voice Quality-R	Failure Cause	C_MOS-L	C_MOS-R
1	1828@192.168.12.92	1828@192.168.13.51	2020-07-15 18:13:19.255	00:01:35.298	1	Good	Good	0	4.20	4.20
2	1817@192.168.12.92	1817@192.168.13.51	2020-07-15 18:12:51.740	00:02:29.172	1	Good	Good	0	4.20	4.20
3	1814@192.168.12.92	1814@192.168.13.51	2020-07-15 18:12:45.947	00:01:05.298	1	Good	Good	0	4.20	4.20

Verification

- From the top menu list click **Reports** tab to view the call related KPIs for the selected protocol type as shown in the figure below.



Filtering Calls

- To create custom filter profiles, perform the following steps:
- On the left pane, select **Config → Filter View**.
- Click on **'Add Filter'** to add the filter and select the column to be filtered from the drop-down list. For example, select **Called Number** column to filter the data. If the filter is already existed, then user can click on delete icon and can able to add the required filter.
- Ensure that **EqualTo** expression is selected, user can change the expression as required, to change the expression mouse over on **EqualTo** link and change the logical expression.
- Check the 'Yes' option.
- Mouse over on **'And'** link to select 'And'/ 'OR' logical operators between two filters. In this example **'And'** operator is selected.
- Enter the name as required for the created filter profile in the **New Profile Name** and click **Save**. Refer to the figure.

Filtering Calls

Filters

New Profile Name

Basic Expression

[Add Filter](#) [Clear All](#) [Show Expression](#)

Filter1 **AND**

<input type="text" value="Called Number"/> <input type="button" value="v"/>	EqualTo	<input type="text" value="0487@192.168.13.51"/> <small>Ex: user2@gl.com (or) 9454471117@192.168.10.2;user=phone</small>	And	<input type="button" value="Add Condition"/> <input type="button" value="X"/>
---	-------------------------	--	---------------------	---

Apply Custom Filter Profile

The Saved custom filter can be applied on the data to view the data as customized. To view the customized data, do the following:

- On the left pane, click on **Custom CDR** → **CDR**, select the required filter. For example, select **Called Number** filter. Refer to the below figure.

The screenshot displays the GL NetSurveyorWeb interface. The left sidebar shows a menu with 'Custom CDR' expanded, and 'CDR' selected. The main area shows the 'Custom CDR \ CDR' configuration. The 'Date' range is set to 2020-07-15 to 2020-07-27, and the 'Time' range is 00:00:00 to 23:59:59. The 'Filter' dropdown is set to 'Called Number'. The 'Quick Search' field contains 'TrafficSumID'. The table below shows call records with columns for SIno, Calling Number, Called Number, StartTime, Duration, and Call Success.

	SIno	Calling Number	Called Number	StartTime	Duration	Call Success
<input type="checkbox"/>	1	0487@192.168.12.92	0487@192.168.13.51	2020-07-16 19:08:18.229	00:01:19.847	1
<input type="checkbox"/>	2	0485@192.168.12.92	0485@192.168.13.51	2020-07-16 19:08:17.707	00:01:11.645	1
<input type="checkbox"/>	3	0474@192.168.12.92	0474@192.168.13.51	2020-07-16 19:08:14.585	00:01:12.351	1

Apply Custom Filter Profile

- The data as per the applied filter profile is displayed in the CDR view. The applied filter conditions are displayed in the below figure.

The screenshot displays a web-based interface for viewing Call Detail Records (CDR). The top navigation bar includes 'Data', 'Reports', 'Alarms', and 'Users', along with a 'System Status' indicator showing '2020-07-27 10:39:38'. The main section is titled 'Custom CDR \ CDR' and features a date range selector set to '2020-07-15' to '2020-07-27' and a time range from '00:00:00' to '23:59:59'. A dropdown menu for filter profiles is open, showing 'All' and 'Called Number', with 'Called Number' selected and highlighted by a red box. Below the filter menu, there are options for 'End to End Callflow', 'Actions', and 'Query Execution Time : 0.38578 Seconds'. A search bar contains 'TrafficSumID' and a 'GO' button. The table below shows a list of call records with columns: SI No, Calling Number, Called Number, StartTime, Duration, Call Success, Voice Quality-L, Voice Quality-R, Failure Cause, C_MOS-L, and C_MOS-R. The 'Called Number' column is highlighted with a red box, and all entries in this column are '0487@192.168.13.51'. The table also includes a 'Page Size' of 20 and a 'Sort Order' of STARTTIME DESC.

SI No	Calling Number	Called Number	StartTime	Duration	Call Success	Voice Quality-L	Voice Quality-R	Failure Cause	C_MOS-L	C_MOS-R
1	0487@192.168.12.92	0487@192.168.13.51	2020-07-16 19:08:18.229	00:01:19.847	1	Good	Good	0	4.20	4.20
2	0487@192.168.12.92	0487@192.168.13.51	2020-07-16 18:57:08.670	00:07:12.733	1	Good	Good	0	4.20	4.20
3	0487@192.168.12.92	0487@192.168.13.51	2020-07-16 18:46:20.628	00:07:23.367	1	Good	Good	0	4.20	4.09
4	0487@192.168.12.92	0487@192.168.13.51	2020-07-16 18:35:14.207	00:04:46.713	1	Good	Good	0	4.20	4.20
5	0487@192.168.12.92	0487@192.168.13.51	2020-07-16 18:24:03.585	00:01:16.987	1	Good	Good	0	4.20	4.20
6	0487@192.168.12.92	0487@192.168.13.51	2020-07-16 18:13:00.405	00:09:37.995	1	Good	Good	0	4.20	4.20
7	0487@192.168.12.92	0487@192.168.13.51	2020-07-16 18:01:58.527	00:04:28.729	1	Good	Good	0	4.20	4.20
8	0487@192.168.12.92	0487@192.168.13.51	2020-07-16 17:50:54.423	00:05:54.551	1	Good	Good	0	4.20	4.20
9	0487@192.168.12.92	0487@192.168.13.51	2020-07-16 17:39:43.999	00:05:58.709	1	Good	Good	0	4.20	4.18

Delay Measurement

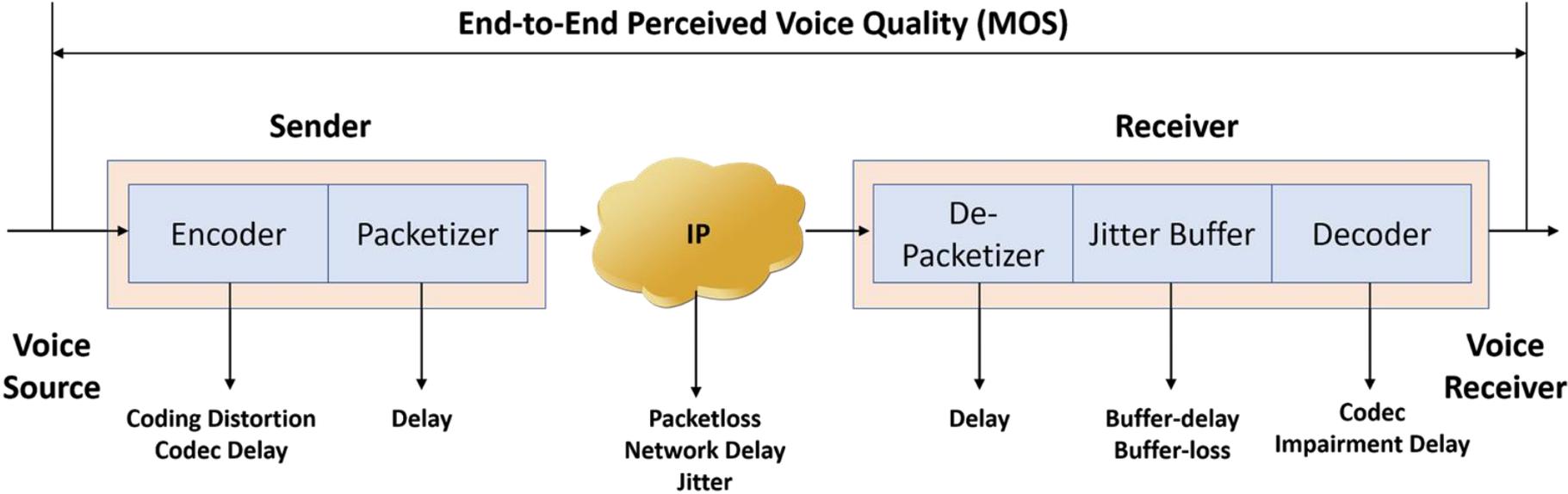
Networks in Transition

- Transition to All IP may be Slow at the Edge but Fast at the Core
- Carriers transitioning faster than enterprises
- Technology pressuring transitioning faster
- Enterprises reluctant to transition until ROI is met
- Gateways provide the bridge for economical transition

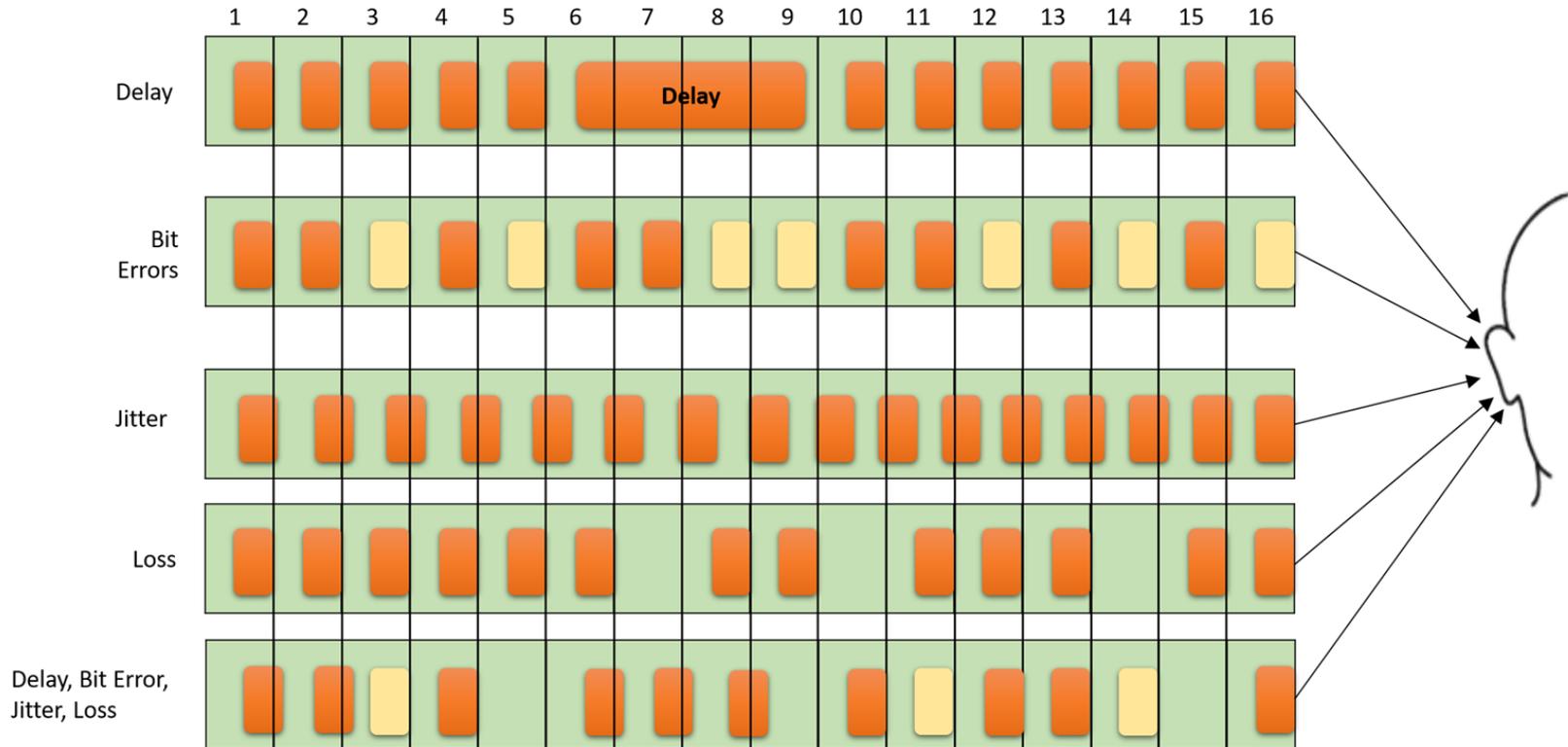
What is a Gateway?

- Interworking between different networks, communication protocols, codecs, physical connections
- Conversion from one technology to another
 - Wired to/from Wireless, Analog to/from TDM, TDM to/from IP
- Conversion of signaling and/or media,
 - CAS to/from ISDN, ISDN to/from SS7, SIGTRAN to/from SS7
 - TDM (Alaw, uLaw) to/from Packet (G.729, G.722, AMR, etc)
- Impairments - Delay, Bit Errors, Jitter, Loss, Out of Sequence

Factors Affecting Voice Quality



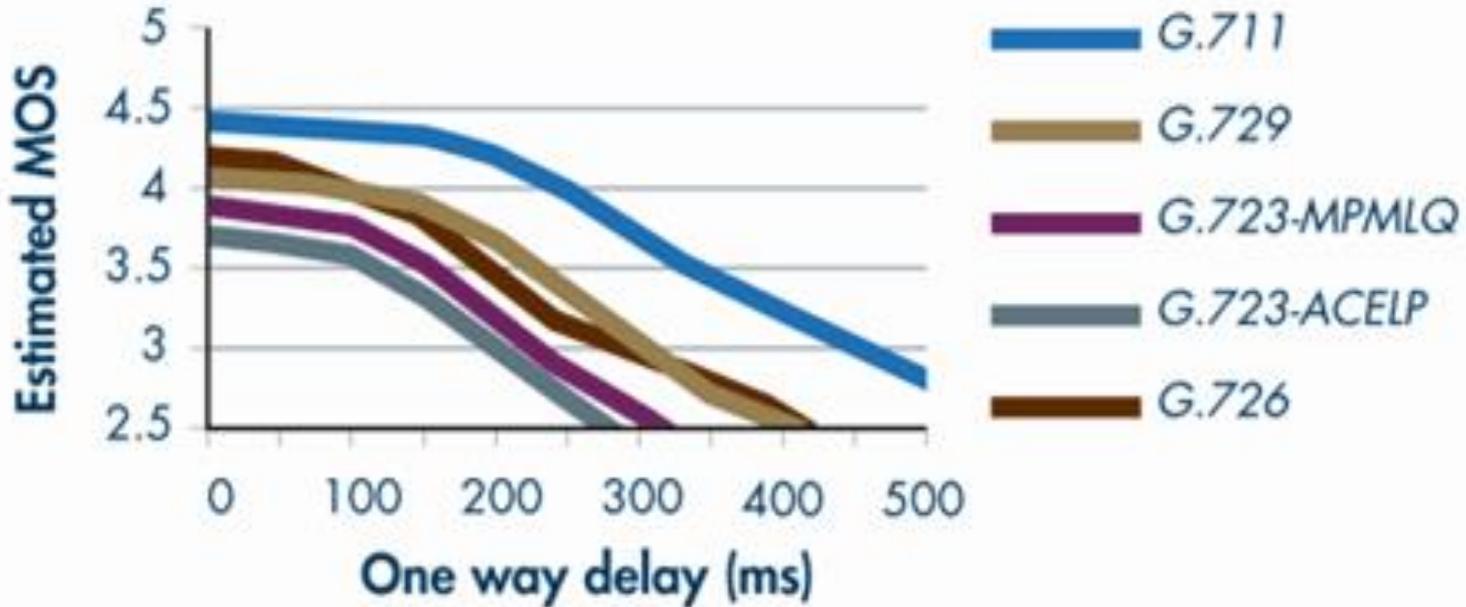
Network & Gateway Impact on Listening Quality



One Way Delay

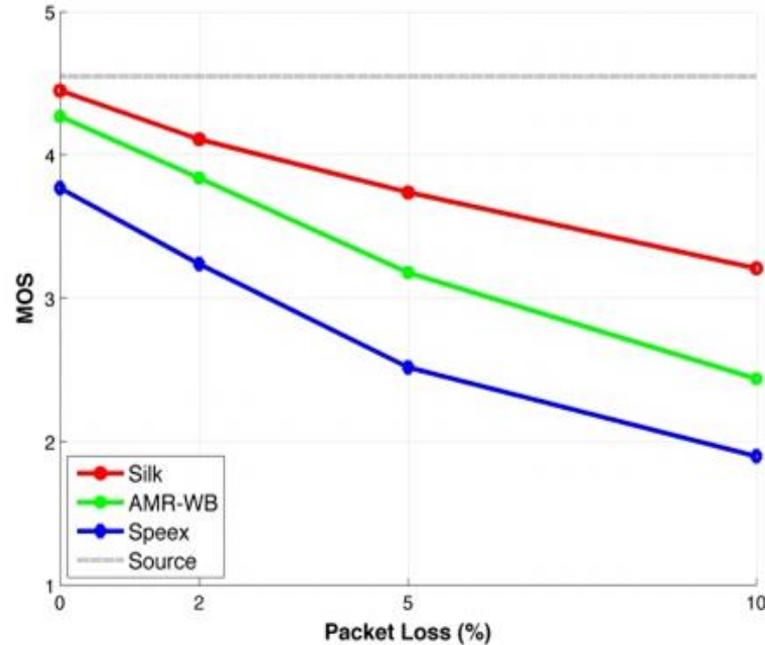
One Way Delay (msec)	Perceived Quality
0-100	Acceptable for most users
100-150	Acceptable but perceptible
150-250	Typical of Satellites; annoying
250+	Unacceptable for general

Codec Comparison - No Packet Loss



From Robert Pepper - Cloud Communications Advisor

Robust to Jitter and Packet Loss



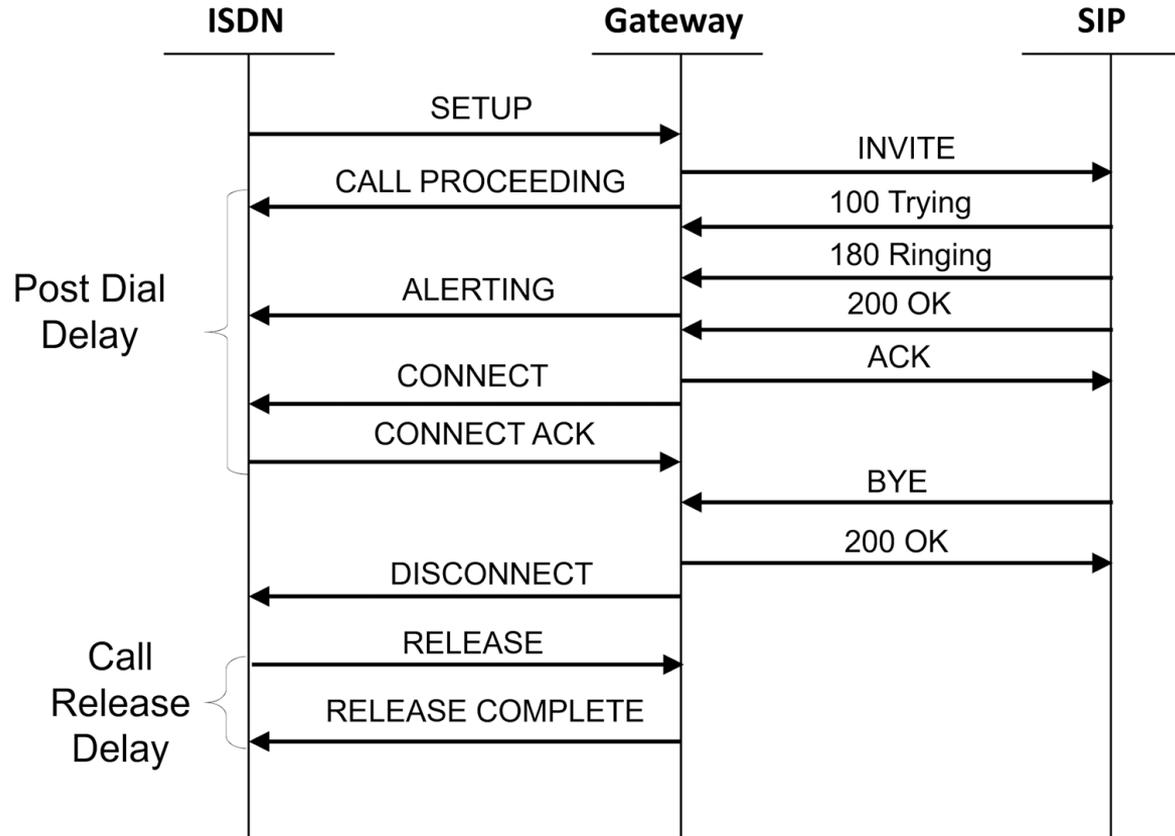
MOS scores for Wideband speech signals at different packet loss rates. All codecs were operated at a bitrate of 18.25 kbps.

From Jonathan Christensen, eComm 2009

Other Impairments

- Echo Cancellation - Line echo and Acoustic echo
- Digit transmission
 - Inband - DTMF, MF, MFC-R2
 - Out-of-band - DTMF, MF, MFC-R2
- Fax transmission
 - Pass thru
 - T.38
- Background noise - (C-message)

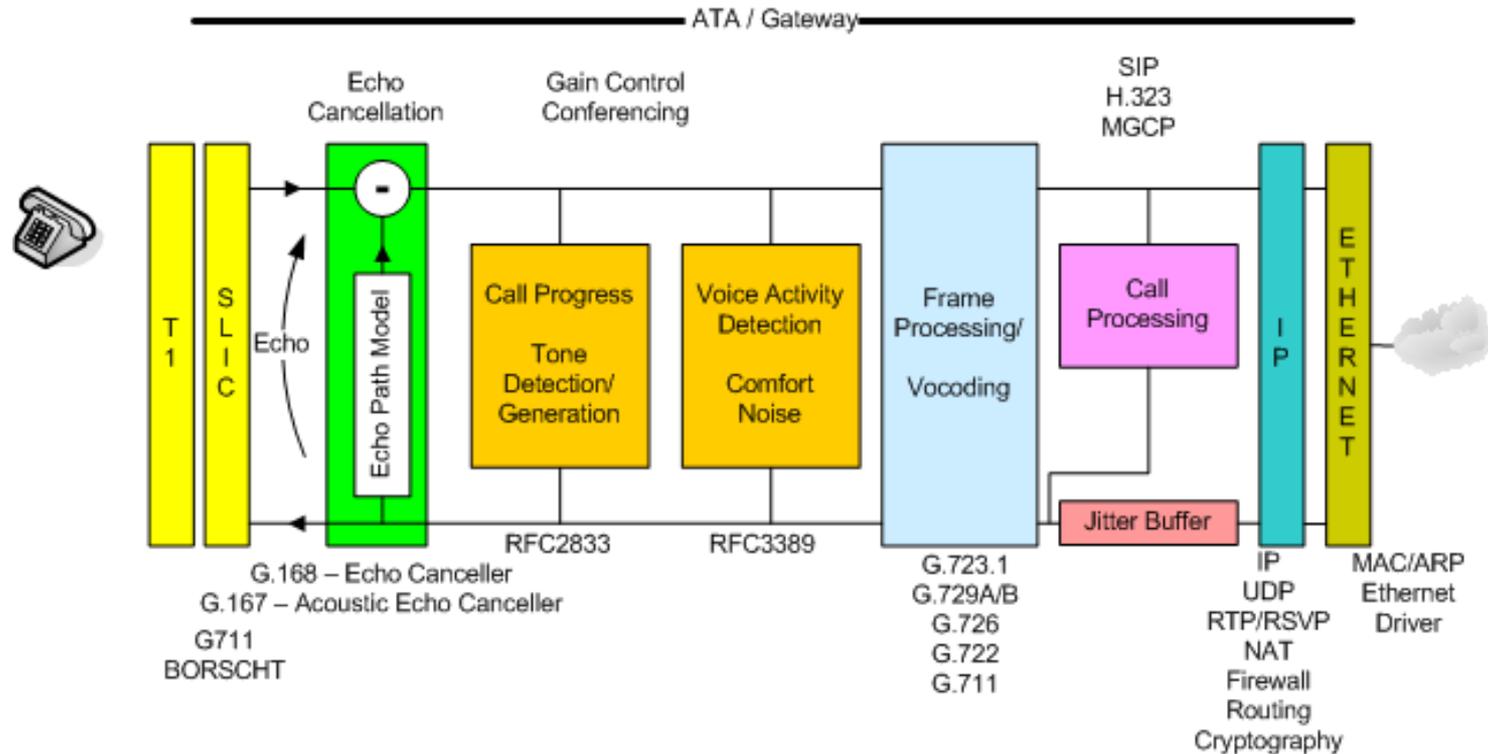
Signaling Gateway



Various Signaling Metrics

- Dial tone delay - off hook to dial tone
- Post dial delay - last digit to ringback
- Answer signal delay - answer indication delay
- Call setup delay - last digit to far end ring
- Dial to ring delay - same as above
- Call release delay - on hook to on hook
- Successive call delay - minimum intercall delay
- Simultaneous sustained calls
- Maximum call rate - in calls/sec

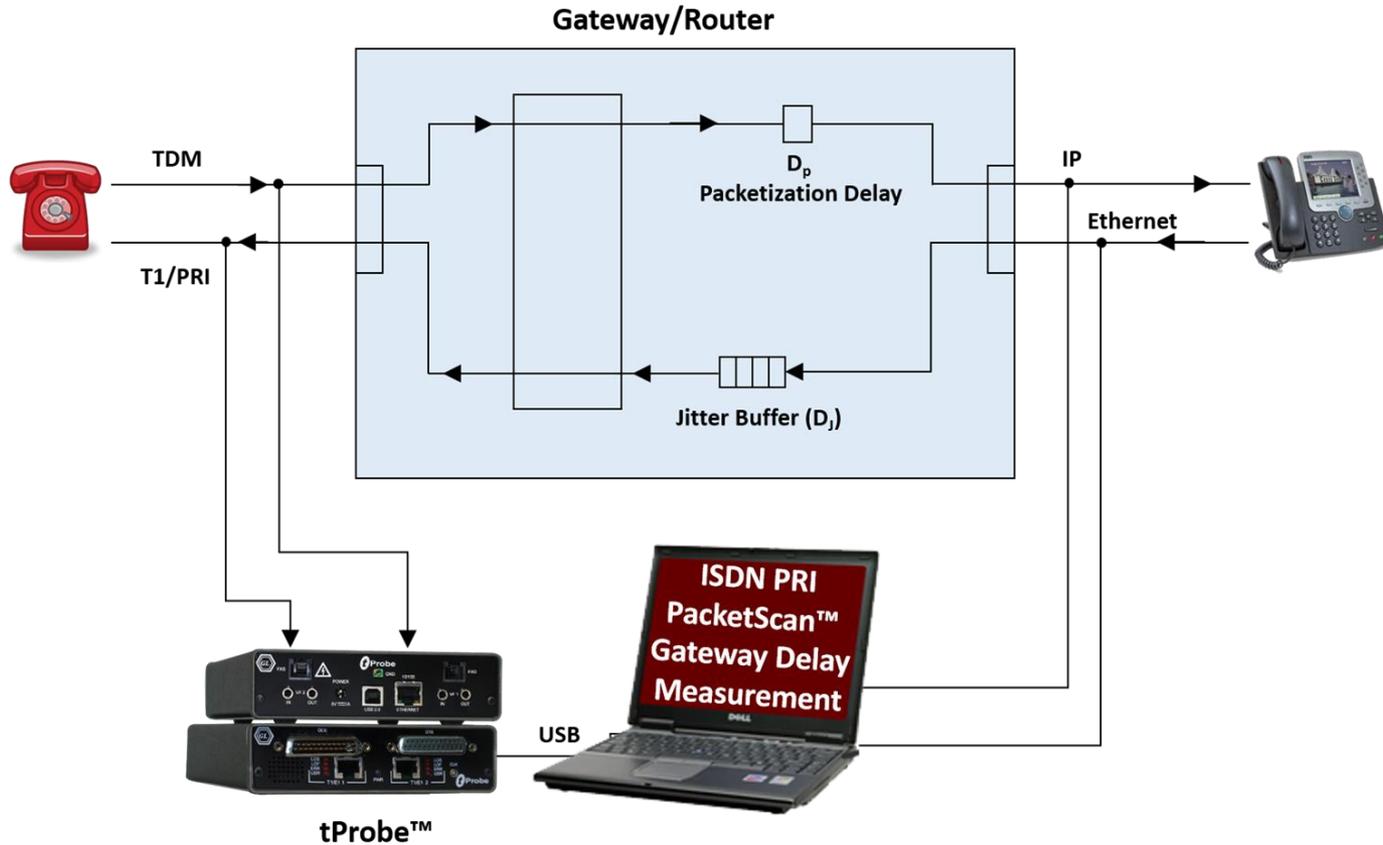
ATA, Gateway Architecture



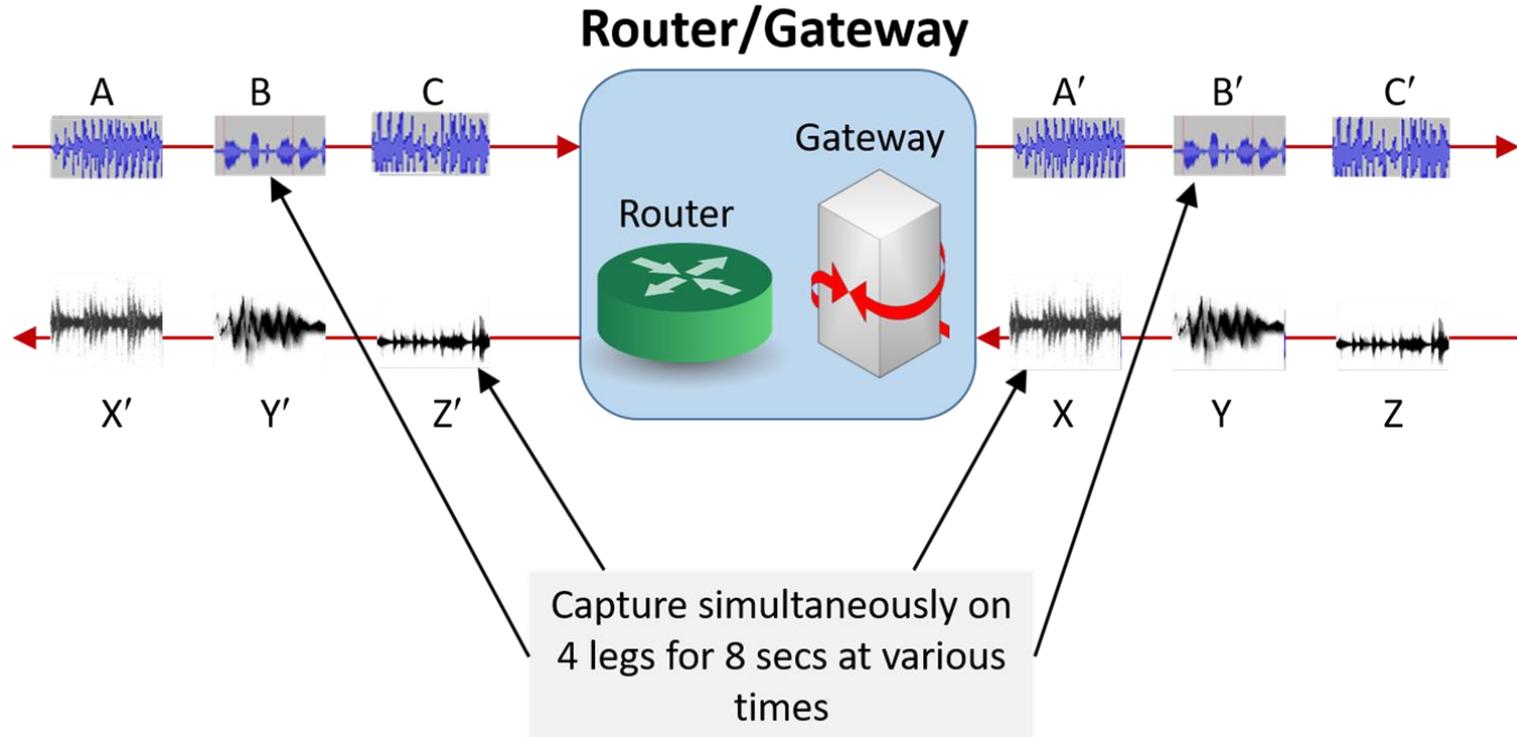
Basic Test Tools for Gateway Performance Measurements

- Call Emulation - MAPS™ ISDN, MAPS™ SS7, MAPS™ SIP, etc
- Protocol Analysis - PacketScan, SS7 and ISDN Protocol Analyzer, etc.
- Detailed Analysis and Call Capture companion software
- NetSurveyorWeb™ Lite - tens of thousands of calls to fifty thousand calls
- NetSurveyorWeb™ - hundreds of thousands of calls to millions of calls

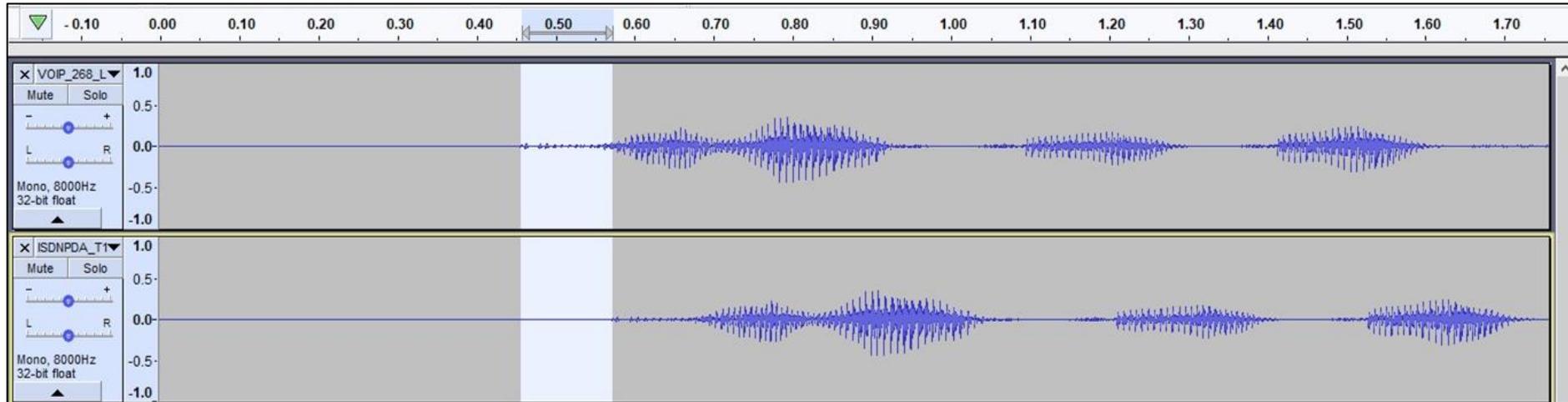
Gateway Delay Internals



Gateway Delay Measurement (cont.)

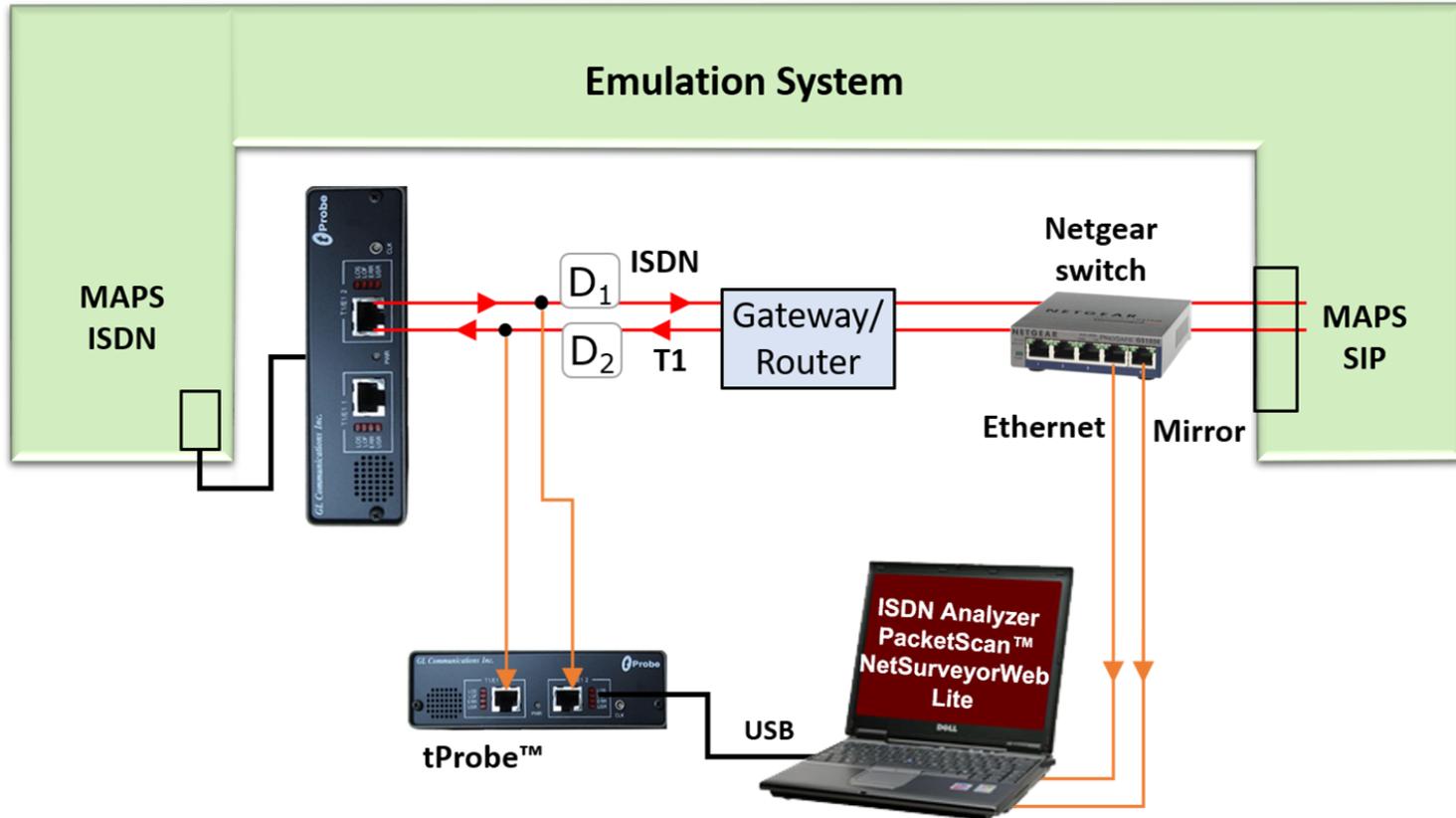


Manual Verification



Confirm VoIP to TDM Delay (116 msec)

One Way Delay Measurement Setup



MAPS™ ISDN Call Generation

MAPS (Message Automation Protocol Simulation) Switch (ISDN ITU) - [Call Generation - CallGenDefault]

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events Pr...	Result	Total Iterations	Completed Iterations
1	Placecall.gls	Card1TS00	1.0	Stop	Transmitting File	DisconnectCall		Pass	1	0
2	Placecall.gls	Card1TS01	1.1	Stop	Transmitting File	DisconnectCall		Pass	1	0
3	Placecall.gls	Card1TS02	1.2	Stop	Transmitting File	DisconnectCall		Pass	1	0
4	Placecall.gls	Card1TS03	1.3	Stop	Transmitting File	DisconnectCall		Pass	1	0
5	Placecall.gls	Card1TS04	1.4	Stop	Transmitting File	DisconnectCall		Pass	1	0
6	Placecall.gls	Card1TS05	1.5	Stop	Transmitting File	DisconnectCall		Pass	1	0
7	Placecall.gls	Card1TS06	1.6	Stop	Transmitting File	DisconnectCall		Pass	1	0
8	Placecall.gls	Card1TS07	1.7	Stop	Transmitting File	DisconnectCall		Pass	1	0
9	Placecall.gls	Card1TS08	1.8	Stop	Transmitting File	DisconnectCall		Pass	1	0
10	Placecall.gls	Card1TS09	1.9	Stop	Transmitting File	DisconnectCall		Pass	1	0
11	Placecall.gls	Card1TS10	1.10	Stop	Transmitting File	DisconnectCall		Pass	1	0

Add Delete Insert Refresh Start Start All Stop Stop All Abort Abort All

Save Column Width Show Latest

MAPS DUT

```

SETUP → 14:19:42.210.6961
SETUP ACKNOWLEDGE ← 14:19:42.159.3894
INFORMATION → 14:19:42.159.6953
CALL PROCEEDING ← 14:19:43.13.6301
ALERTING ← 14:19:43.103.713
CONNECT ← 14:19:43.149.4237
CONNECT ACKNOWLEDGE → 14:19:43.149.4928
        
```

Find

```

===== 0.93x Layer 3 Layer ===== =
0000 Protocol Discriminator = 00001000 0.931/I.451 user-network call control messages
0001 Call Reference Length = ... 0010 2 Bytes
0002 Call Reference Value = 73 (.0000000 01001001)
0002 Call Reference Flag = 0..... FROM side that originated callref
0004 Message Type = 00000101 SETUP
Bearer capability =
0005 IE Bearer Capability = 00000100 Bearer Capability IE Identifier
0006 IE Bearer Capability Length = 3 (x03)
0007 Information Transfer Capability = ...00000 Speech
0007 Coding Standard = .00..... ITU_T (CCITT) standardized coding
0007 Oct 3 Extension Bit (Oct 3) = 1..... Next Octet Not Present
0008 Information Transfer Rate = ...10000 64 kbit/s
0008 Transfer Mode = .00..... Circuit Mode
0008 Oct 4 Extension Bit (Oct 4) = 1..... Next Octet Not Present
0009 Layer 1 Indent Choice = .01..... Layer 1 Identifier
        
```

Scripts Message Sequence Event Config Script Flow

● Initialisation Errors ● Error Events ● Captured Errors ● Link Status Up=1 Down=0

MAPS™ SIP Call Reception

GL MAPS (Message Automation Protocol Simulation) (SIP) - [Call Reception]

Configurations Emulator Reports Editor Debug Tools Windows Help

Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events	Events...	Results
1	SipCallControl.gls	Profile0001	19018399707320001344@192.168.12.178	Stop	PCMU Send_File-Started	SIP_TerminateCall		Pass
2	SipCallControl.gls	Profile0002	19019809917320001344@192.168.12.178	Stop	PCMU Send_File-Started	SIP_TerminateCall		Pass
3	SipCallControl.gls	Profile0003	19021498127320001344@192.168.12.178	Stop	PCMU Send_File-Started	SIP_TerminateCall		Pass
4	SipCallControl.gls	Profile0004	19022581247320001344@192.168.12.178	Stop	PCMU Send_File-Started	SIP_TerminateCall		Pass
5	SipCallControl.gls	Profile0005	19025941207320001344@192.168.12.178	Stop	PCMU Send_File-Started	SIP_TerminateCall		Pass
6	SipCallControl.gls	Profile0006	19027678737320001344@192.168.12.178	Stop	PCMU Send_File-Started	SIP_TerminateCall		Pass
7	SipCallControl.gls	Profile0007	19029462447320001344@192.168.12.178	Stop	PCMU Send_File-Started	SIP_TerminateCall		Pass
8	SipCallControl.gls	Profile0008	19031314017320001344@192.168.12.178	Stop	PCMU Send_File-Started	SIP_TerminateCall		Pass
9	SipCallControl.gls	Profile0009	19035317827320001344@192.168.12.178	Stop	PCMU Send_File-Started	SIP_TerminateCall		Pass
10	SipCallControl.gls	Profile0010	19037096027320001344@192.168.12.178	Stop	PCMU Send_File-Started	SIP_TerminateCall		Pass

Show Records
 Select Active Call
 Auto Trash

Column Width
 Show Latest

DUT	MAPS
	INVITE → 14:19:42.248.4171
← 100 Trying	14:19:42.250.9589
← 180 Ringing	14:19:42.253.3638
← 200 OK	14:19:42.295.582
→ ACK	14:19:42.307.4665

```

INVITE sip:0001@192.168.12.89;user=phone SIP/2.0
Via: SIP/2.0/UDP 192.168.12.178;branch=z9hG4bKac1901848574
Max-Forwards: 70
From: <sip:1001@audiocodes.com>;tag=1c1901840556
To: <sip:0001@192.168.12.89;user=phone>
Call-ID: 19018399707320001344@192.168.12.178
CSeq: 1 INVITE
Contact: <sip:1001@192.168.12.178>
Supported: em,timer,replaces,path,resource-priority
Allow: REGISTER,OPTIONS,INVITE,ACK,CANCEL,BYE,NOTIFY,PRACK,REFER,INFO,SUBSCRIBE,UPDATE
User-Agent: Audiocodes-Sip-Gateway-Mediant 1000/v.5.00A.024
Content-Type: application/sdp
Content-Length: 272

v=0
o=AudiocodesGW 1901818946 1901818674 IN IP4 192.168.12.178
s=Phone-Call
c=IN IP4 192.168.12.178
t=0 0
m=audio 6300 RTP/AVP 0 101
a=rtpmap:0 PCMU/8000
    
```

Initialisation Errors
 Error Events
 Captured Errors
 Link Status Up=0 Down=0

ISDN Protocol Analyzer

ISDN Protocol Analysis Q.93x 64-bit

File View Capture Statistics Database Call Detail Records Configure Help

GoTo

Dev	TSlot	SubCh	Frame#	TIME (System)	Len	rc	Modifier Function LAPD	Supervisory Function LAPD	TEI LAPD	Call Reference Value Q.93x	Called Number Digits Q.93x	Calling Number Digits Q.93x	Cause Value Q.93x	Channel Number Q.93x	Message Type Q.93x
✓	1	23	0	14:31:51.657125	46				0	75	0001	1001		1	SETUP
✓	1	23	1	14:31:51.663000	46				0	76	0002	1002		2	SETUP
✓	2	23	2	14:31:51.667750	11				0	75					SETUP ACKNOWLEDGE
✓	2	23	3	14:31:51.674000	11				0	76					SETUP ACKNOWLEDGE
✓	1	23	4	14:31:51.678875	46				0	77	0003	1003		3	SETUP
✓	1	23	5	14:31:51.684875	46				0	78	0004	1004		4	SETUP
✓	2	23	6	14:31:51.687875	16				0	75				1	CALL PROCEEDING

Card1 TimeSlot=23 Frame=1 at 14:31:51.663000 OK Len=46 *** Right click to SHOW/HIDE layer details or copy ***

HDLC Frame Data + FCS

```

***** LAPD Layer *****
0000 C/R = .....1. Response(User) Command(Network)
0000 SAPI = 0000000.. (0)
0001 TEI = 0000000.. (0)
0002 Ctl = .....0 Information
0002 N(S) = 1011111.. (95)
0003 P = .....0 (0)
0003 N(R) = 1011011.. (91)
***** Q.93x Layer *****
  
```

Hex Dump of the Frame Data

```

+-----+-----+-----+-----+-----+-----+-----+-----+
02 01 BE B6 08 02 00 4C 05 04 03 80 90 A2 18 03      %M L cc
A1 83 82 6C 05 90 31 30 30 32 70 05 80 30 30 30      !!! 1002p e000
32 78 05 80 31 32 33 34 7D 02 91 81 50 95          2x e1234} `P!
  
```

Call ID	Call Status	Calling Num	Called Num	Call Start Date & Time	Call Duration	Release Complete Cause	DevNo	TS	CRV	Interface Id	Bearer Channel
A13	active	1014	00140	2018-12-13 14:31:51.743750	00:00:02.005500	x00	1	23	88	0	14
A14	active	1015	00150	2018-12-13 14:31:51.749625	00:00:01.999625	x00	1	23	89	0	15
A15	active	1016	00160	2018-12-13 14:31:51.755500	00:00:01.993750	x00	1	23	90	0	16
A16	active	1017	00170	2018-12-13 14:31:51.761375	00:00:01.987875	x00	1	23	91	0	17
A17	active	1018	00180	2018-12-13 14:31:51.767375	00:00:01.981875	x00	1	23	92	0	18
A18	active	1019	00190	2018-12-13 14:31:51.773250	00:00:01.976000	x00	1	23	93	0	19
A19	active	1020	00200	2018-12-13 14:31:51.779125	00:00:01.970125	x00	1	23	94	0	20
A20	active	1021	00210	2018-12-13 14:31:51.785000	00:00:01.964250	x00	1	23	95	0	21
A21	active	1022	00220	2018-12-13 14:31:51.790875	00:00:01.958375	x00	1	23	96	0	22
A22	active	1023	00230	2018-12-13 14:31:51.796750	00:00:01.952500	x00	1	23	97	0	23

Running: Utilization 0.16%

C:\Program Files\GL Communications Inc\Probe T1 Ani\Captured 161 frames

Summary View

Detail View

Hex Dump View

CDR View

ISDN Packet Data Analyzer

PDA Packet Data Analyzer - Summary View

File View Call Summary GUI Configurations Help

ISDN Show All Calls

Call Summary Alert Summary

Call #	StartTime	Caller	Callee	CallReference	SourcePort	DestinationPort	TimeSlot	BearerChannel	InterfaceType	InterfaceId	Result	ReleaseCause
1	2018-12-13 14:31:51.657	1001	00010	75	2	1	23	0	Primary Rate Interface	0	Pass	
2	2018-12-13 14:31:51.663	1002	00020	76	2	1	23	1	Primary Rate Interface	0	Pass	
3	2018-12-13 14:31:51.678	1003	00030	77	2	1	23	2	Primary Rate Interface	0	Pass	
4	2018-12-13 14:31:51.684	1004	00040	78	2	1	23	3	Primary Rate Interface	0	Pass	
5	2018-12-13 14:31:51.690	1005	00050	79	2	1	23	4	Primary Rate Interface	0	Pass	
6	2018-12-13 14:31:51.696	1006	00060	80	2	1	23	5	Primary Rate Interface	0	Pass	
7	2018-12-13 14:31:51.702	1007	00070	81	2	1	23	6	Primary Rate Interface	0	Pass	
8	2018-12-13 14:31:51.708	1008	00080	82	2	1	23	7	Primary Rate Interface	0	Pass	
9	2018-12-13 14:31:51.714	1009	00090	83	2	1	23	8	Primary Rate Interface	0	Pass	
10	2018-12-13 14:31:51.720	1010	00100	84	2	1	23	0	Primary Rate Interface	0	Pass	

Column Width

TimeStamp	Frame Number	2	1
00.00.000	0	2.23	1:23
00.00.010	2	2.23	1:23
00.00.030	6	2.23	1:23
00.00.163	31	2.23	1:23
00.00.188	38	2.23	1:23
00.01.067	96	2.23	1:23
00.01.222	106	2.23	1:23

Find

```

===== LAPD Layer =====
C/R = .....1. Response(User) Command(Network)
SAPI = 000000.. (0)
TEI = 0000000.. (0)
Cnl = .....0 Information
N(S) = 1011110.. (94)
P = .....0 (0)
N(R) = 1011011.. (91)

===== Q.93x Layer =====
Protocol Discriminator = 00001000 Q931/I.451 user-network call control
Call Reference Length = ...0010 (2)
Call Reference Value = 75 (.00000000 01001011)
Call Reference Flag = 0..... FROM side that originated callref
Message Type = 00000101 SETUP
IEI Bearer Capability = 00000100 Bearer Capability IE Identifier
IE Bearer Capability Length = 3 (x03)
Information Transfer Capability = ...00000 Speech
Coding Standard = .00..... ITU_T (CCITT) standardized coding
Information Transfer Rate = ...10000 64 kbit/s
Transfer Mode = .00..... Circuit Mode
User Information Layer 1 Protocol (UIP) = 0010 Message Req C 211
    
```

Active Calls Graph Call Graph Call Summary

PacketScan™ Protocol Analyzer

PacketScan (IpProt) 64-bit

File View Capture Statistics Database Call Detail Records Configure Help

0 GoTo

Device	Frame#	TIME (Date)	Length (Bytes)	Error	Length/Protocol Type MAC	Packet Type MAC	Destination IP Address IP	Source IP Address IP	Destination Port TCP	Source Port TCP	Destination Port UDP	Source Port UDP	SIP CSeq SIP	SIP Call SIP
✓	2	2018-12-13 14:31:51.939996	888		Internet IP(IIPv4)	SIP	192.168.12.89	192.168.12.178			5060	5060	1 INVITE	10556061787320001155
✓	2	2018-12-13 14:31:51.940853	214		Internet IP(IIPv4)	RTP	192.168.12.89	192.168.12.178		1030		6300		
✓	2	2018-12-13 14:31:51.940853	214		Internet IP(IIPv4)	RTP	192.168.12.178	192.168.12.89		6300		1030		
✓	2	2018-12-13 14:31:51.943916	594		Internet IP(IIPv4)	SIP	192.168.12.89	192.168.12.178		5060		5060	1 ACK	10518798657320001155
✓	2	2018-12-13 14:31:51.943916	683		Internet IP(IIPv4)	SIP	192.168.12.178	192.168.12.89		5060		5060	1 INVITE	10534238507320001155
✓	2	2018-12-13 14:31:51.950871	214		Internet IP(IIPv4)	RTP	192.168.12.89	192.168.12.178		1026		6310		
✓	2	2018-12-13 14:31:51.950871	214		Internet IP(IIPv4)	RTP	192.168.12.89	192.168.12.178		1024		6300		

Device2 Frame#99 at 2018-12-13 14:31:51.939996 OK Len=888 *** Right click to SHOW/HIDE layer details or copy ***

Ethernet Frame Data

```

===== MAC Layer =====
0000 Destination Address = xFCAA1492AAEB
0006 Source Address      = x00908F124D56
000C Length/Protocol Type = x0800 Internet IP(IIPv4)
===== IP Layer =====
000E Version              = 0100... (4)
000E Internet Header Length (In 32 bit words) = ...0101 (5)
000F Differentiated Services Codepoint = 101000.. Class Selector 5
    
```

Hex Dump of the Frame Data

```

+-----+-----+
FC AA 14 92 AA EB 00 90 8F 12 4D 56 08 00 45 A0      |i? 3e MV E|
03 6A D3 7E 00 00 40 11 09 09 C0 A8 0C B2 C0 A8      |j0~ @ 'A' A'|
0C 59 13 C4 13 C4 03 56 2F D5 49 4E 56 49 54 45      |Y A A V/OINVITE|
20 73 69 70 3A 30 30 32 30 40 31 39 32 2E 31 36      |sip:0020@192.16|
38 2E 31 32 2E 38 39 3B 75 73 65 72 3D 70 68 6F      |8.12.89;user=pho|
6E 65 20 53 49 50 2F 32 2E 30 0D 0A 56 69 61 3A      |ne SIP/2.0 Via:|
20 53 49 50 2F 32 2E 30 2F 55 44 50 20 31 39 32      |SIP/2.0/UDP 192|
2E 31 36 38 2E 31 32 2E 31 37 38 3B 62 72 61 6E      |.168.12.178;bran|
63 68 3D 7A 39 68 47 34 62 4B 61 63 31 30 35 35      |ch=z9hG4kKac1055|
    
```

Call ID	Call Status	Protocol	Call Originating (Number / Address)	Call Destination (Number / Address)	Call Start Date & Time	Call Duration	Protocol Specific Info
0	Active	SIP	1001@audiocodes.com	0001@192.168.12.89;user=phone	2018-12-13 14:31:51.678927	00:00:00.856468	<SIPCallID> 10512947817...
1	Active	SIP	1002@audiocodes.com	0002@192.168.12.89;user=phone	2018-12-13 14:31:51.684865	00:00:00.850529	<SIPCallID> 10513918527...
2	Active	SIP	1003@audiocodes.com	0003@192.168.12.89;user=phone	2018-12-13 14:31:51.694138	00:00:00.841257	<SIPCallID> 10515426587...
3	Active	SIP	1004@audiocodes.com	0004@192.168.12.89;user=phone	2018-12-13 14:31:51.703024	00:00:00.832371	<SIPCallID> 10516927287...
4	Active	SIP	1005@audiocodes.com	0005@192.168.12.89;user=phone	2018-12-13 14:31:51.714412	00:00:00.820983	<SIPCallID> 10518798657...
5	Active	SIP	1006@audiocodes.com	0006@192.168.12.89;user=phone	2018-12-13 14:31:51.726370	00:00:00.809025	<SIPCallID> 10520617447

Capture Rate: 4.09 Mbps C:\Program Files\GL Communications Inc\PacketScan\T_Captured 801 577 frames Missed Frames : 0

Summary View

Detail View

Hex Dump View

CDR View

PacketScan™ Packet Data Analyzer

Packet Data Analyzer - Summary View

File View Call Summary Protocol Configurations GUI Configurations Help

Search SIP Show All Calls

Call Summary | Registrar Summary | Alert Summary

Call #	SSRC	Payload	Packet Received	Conversion MOS/R...	Listening MOS/R...	Packets Discard...	Missing Packets...	Duplicate Packets...	Out Of Sequence	Average Gap(ms)	Average Delay	Average Jitter	Average Inter	Cumulative Packet	Max/Min Gap	Max/Min Delay	Max/Min Jitter	Max/Min RTDela...	Average RTDela...	luopHdr CRC	luopPaylo CRC
Call#0000001 Caller:1001@audiocodes.com Callee:0001@192.168.12.89,user=phone CallId:11853437557320005219@192.168.12.178 Call StartTime:2018-12-13 18:37:04.344 Call Duration: 00:00:40.357																					
1	17453...	PCMU/8000	2023	4.20 / ...	4.20 / ...	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	20.00	0.00	0.00	0	0	31.82 ...	11 / -11	1.48 / ...	0.589 ...	0.392	0 / 0	0 / 0
1	15003...	PCMU/8000	2015	4.20 / ...	4.20 / ...	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	20.02	0.00	0.00	0	0	32.72 ...	12 / -12	1.64 / ...	5.286 ...	4.657	0 / 0	0 / 0
Call#0000002 Caller:1002@audiocodes.com Callee:0002@192.168.12.89,user=phone CallId:11854492917320005219@192.168.12.178 Call StartTime:2018-12-13 18:37:04.352 Call Duration: 00:00:40.361																					
2	13144...	PCMU/8000	2023	4.20 / ...	4.20 / ...	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	20.00	0.00	0.00	0	0	32.06 ...	12 / -11	3.17 / ...	0.281 ...	0.237	0 / 0	0 / 0
2	15020...	PCMU/8000	2015	4.20 / ...	4.20 / ...	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	20.02	0.00	0.00	0	0	37.12 ...	17 / -16	2.18 / ...	5.515 ...	5.227	0 / 0	0 / 0
Call#0000003 Caller:1003@audiocodes.com Callee:0003@192.168.12.89,user=phone CallId:11856475987320005219@192.168.12.178 Call StartTime:2018-12-13 18:37:04.360 Call Duration: 00:00:40.336																					
3	58308...	PCMU/8000	2022	4.20 / ...	4.20 / ...	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	20.00	0.00	0.00	0	0	26.80 ...	6 / -6	3.10 / ...	0.298 ...	0.153	0 / 0	0 / 0
3	14961...	PCMU/8000	2014	4.20 / ...	4.20 / ...	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	20.02	0.00	0.00	0	0	32.72 ...	12 / -12	1.64 / ...	5.909 ...	4.966	0 / 0	0 / 0
Call#0000004 Caller:1004@audiocodes.com Callee:0004@192.168.12.89,user=phone CallId:11857604797320005219@192.168.12.178 Call StartTime:2018-12-13 18:37:04.369 Call Duration: 00:00:40.339																					
4	15404...	PCMU/8000	2023	4.20 / ...	4.20 / ...	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	20.00	0.00	0.00	0	0	32.06 ...	12 / -11	1.54 / ...	0.308 ...	0.244	0 / 0	0 / 0
4	15025...	PCMU/8000	2014	4.20 / ...	4.20 / ...	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	20.02	0.00	0.00	0	0	27.67 ...	7 / -7	1.26 / ...	5.585 ...	4.881	0 / 0	0 / 0
Call#0000005 Caller:1005@audiocodes.com Callee:0005@192.168.12.89,user=phone CallId:11858671827320005219@192.168.12.178 Call StartTime:2018-12-13 18:37:04.376 Call Duration: 00:00:40.343																					
5	13229...	PCMU/8000	2021	4.20 / ...	4.20 / ...	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	20.00	0.00	0.00	0	0	37.14 ...	17 / -16	2.23 / ...	0.275 ...	0.275	0 / 0	0 / 0
5	15022...	PCMU/8000	2013	4.20 / ...	4.20 / ...	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	20.02	0.00	0.00	0	0	32.72 ...	12 / -12	1.64 / ...	5.607 ...	5.226	0 / 0	0 / 0
Call#0000006 Caller:1006@audiocodes.com Callee:0006@192.168.12.89,user=phone CallId:11861533237320005219@192.168.12.178 Call StartTime:2018-12-13 18:37:04.393 Call Duration: 00:00:40.328																					
6	15420...	PCMU/8000	2021	4.20 / ...	4.20 / ...	0 / 0.00	0 / 0.00	0 / 0.00	0 / 0.00	20.00	0.00	0.00	0	0	32.06 ...	12 / -11	1.54 / ...	0.515 ...	0.515	0 / 0	0 / 0

Column Width

TimeStamp	Frame Number	192.168.12.178	192.168.12.89
00.00.000	0	5060	5060
00.00.135	32	5060	5060
00.00.172	44	5060	5060
00.00.195	52	6300	1024
00.00.199	55	6300	1024

Find

```

===== SIP Layer =====
= INVITE sip:0001@192.168.12.89;user=phone ;
= Via: SIP/2.0/UDP 192.168.12.178;branch=z9h1r2
= Max-Forwards: 70
= From: <sip:1001@audiocodes.com>;tag=1c1181
= To: <sip:0001@192.168.12.89;user=phone>
= Call-ID: 11853437557320005219@192.168.12.178
= CSeq: 1 INVITE
= Contact: <sip:1001@192.168.12.178>
= Supported: em, timer, replaces, path, resource
= Allow: REGISTER, OPTIONS, INVITE, ACK, CANCEL
= User-Agent: Audiocodes-Sip-Gateway-Mediant
= Content-Type: application/sdp
    
```

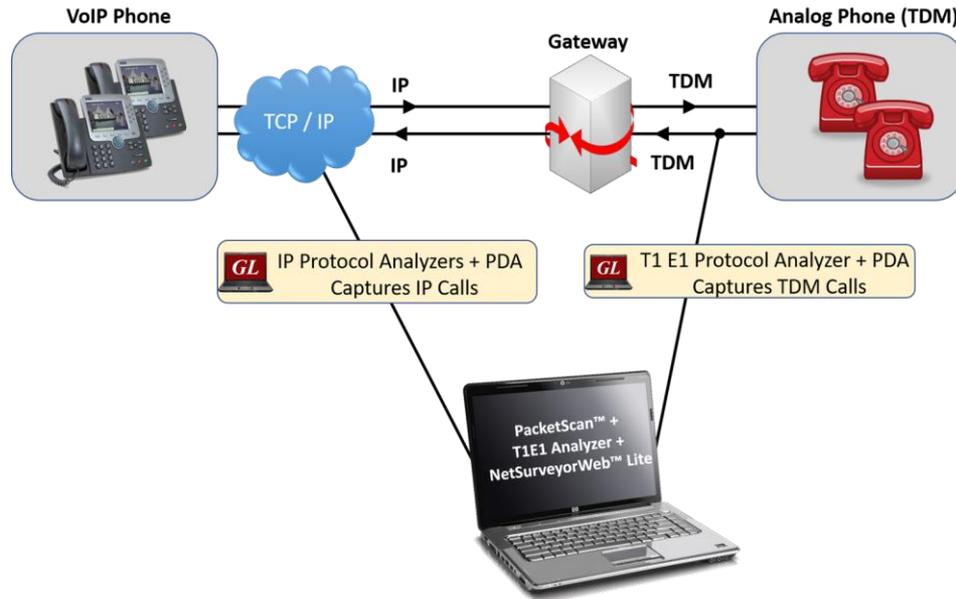
RTP Packets Graph | Average Jitter Distribution | E-Model | T.38 Analysis | Call Graph | Call Summary

NetSurveyorWeb™ Lite Monitoring System



- The NetSurveyorWeb™ Lite system comprises of three tier distributed architecture driven by non-intrusive hardware probes, web server, intelligent software, and a database engine.
- All components of the system reside at the PROBE-PC. The architecture allows the user to simply deploy it at multiple locations in the network and perform critical measurements.

Delay Measurement in NetSurveyorWeb™ Lite



- NetSurveyorWeb™ Lite works with Delay Measurement tools to analyse captured voice traffic and provide precise one-way delay metrics.
- For a given call which traverse through Gateway, traffic is sampled at both TDM and IP analyzer at the same point of time running in the same server.
- These captured segments of SIP and ISDN calls will be saved in *.pcm formats. These samples will be given to delay measurement module which compares the time differences between matching burst from the two samples and provides the delay metrics.

NetSurveyorWeb™ Lite - Data view

System Status at 2018-09-25 15:02:32

Data Reports Alarms Users

Quick CDR \ All Calls

Date: 2018-09-03 2018-09-25 Time: 00:00:00 23:59:59 Ok

Today Yesterday Last 7 Days Last 30 Days All

Actions Query Execution Time : 0.29283 Seconds

Quick Search: CALL ID GO Page Size: 20 Sort Order : STARTTIME DESC

SINo	CALL ID	PROBE NAME	START TIME	CALLER	CALLEE	CRV	TX PORT	RX PORT	TIMESLOT	BEARER CHANNEL	INTERFACE TYPE				
1	1215	ISDN-E1	2018-09-04 19:31:51.340	8556782104	7685612904	12	1	2	16	4	Primary Rate Interface				
<p>WaveSurfer Download wav file : 1215.wav</p>  <p>◀ Backward ▶ Play / ⏸ Pause ▶ Forward ⏏ Toggle Mute</p>															
2	1214	ISDN-E1	2018-09-04 19:31:41.240	8556782102	7685612902	11	1	2	16	2	Primary Rate Interface				
	Input Start Time	Elapsed	ASL	AF	RMS	Noise	MaxP (dB)	MaxN (dB)	DC (dB)	% Fax	% Voice	% Digits	% Idle	Stat	Modem(i)
	E1 09/19/2018 19:32:59	119.535	-12.9471	26.60075	-18.6981	-100	-0.505209	-100	-27.9102	5.88235	16.122	9.80392	68.1917	Success	V.17 @ 12000
	W1 09/19/2018 19:32:59	119.535	-12.8743	56.10072	-15.3846	-100	-0.505209	-100	-27.9304	33.1155	15.9041	10.0218	40.9586		
3	1213	ISDN-E1	2018-09-04 16:56:18.799	8556782103	7685612903	10	1	2	16	3	Primary Rate Interface				
4	1212	ISDN-E1	2018-09-04 16:55:57.515	8556782102	7685612902	9	1	2	16	2	Primary Rate Interface				

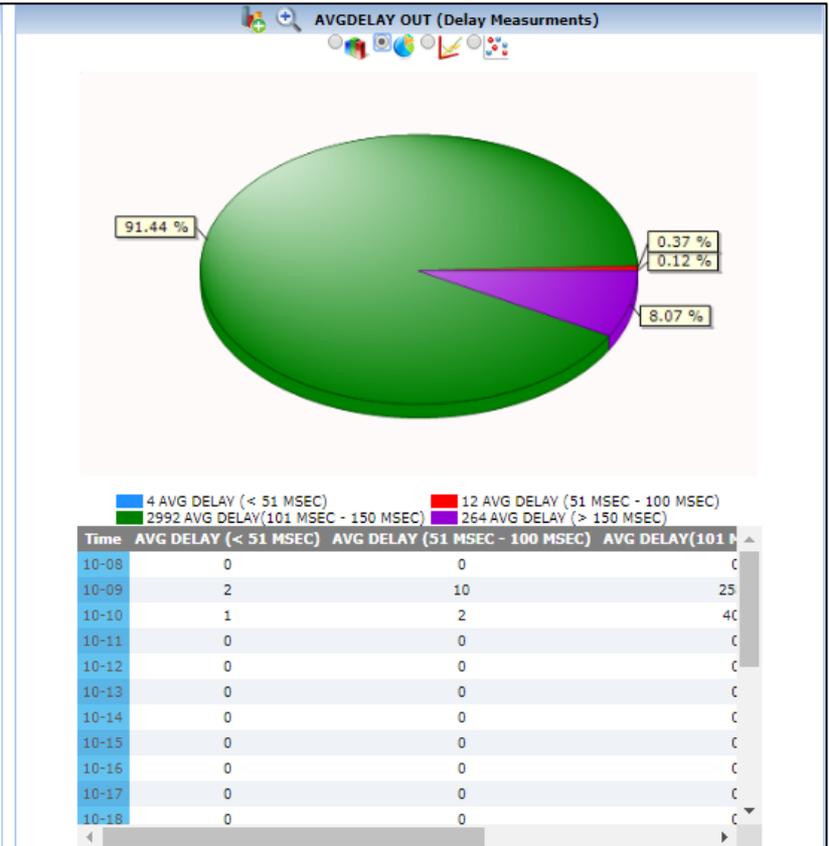
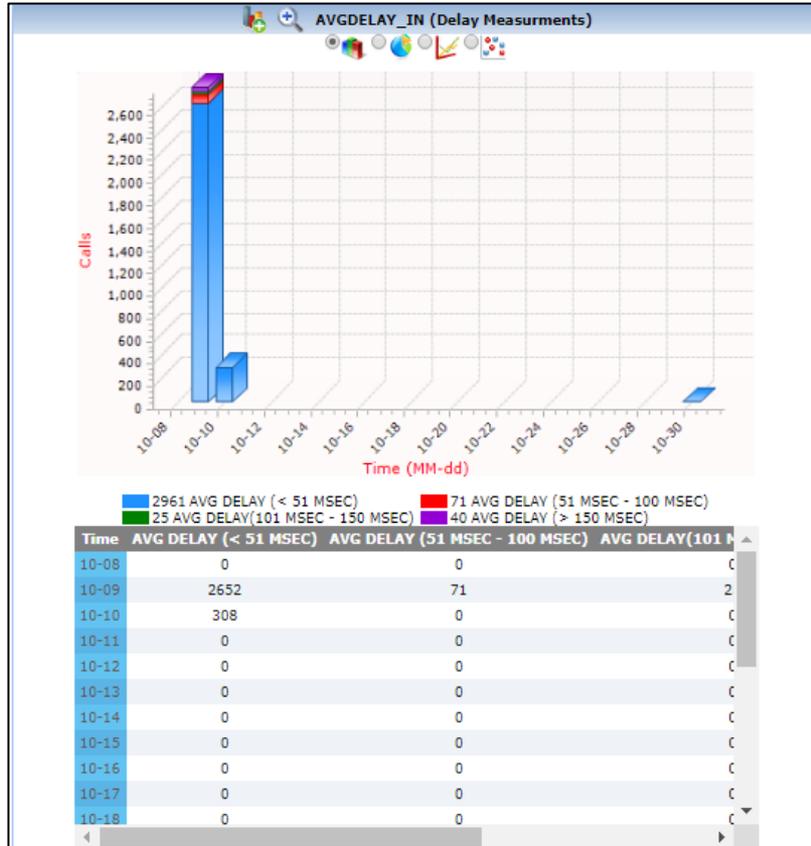
One-Way Delay Metrics in NetSurveyorWeb™ Lite

The screenshot displays the NetSurveyorWeb Lite interface. The top navigation bar includes 'GL NetSurveyorWeb', a 'Refresh' button, a 'Protocol Type' dropdown set to 'ISDN (PDA)', and a 'My Account' link. The main header shows 'Data', 'Reports', 'Alarms', and 'Users' tabs, along with 'System Status at 2018-12-13 14:15:59'. The left sidebar contains navigation options for 'Quick CDR', 'Speech Metric', and 'Custom CDR'. The main content area is titled 'Delay and vqt Calls \ Delay + vqt' and features a date and time filter set to '2018-12-13' and '00:00:00' to '23:59:59'. Below the filter is a 'Query Execution Time : 0.07500 Seconds' indicator and a 'Quick Search' field for 'CALL ID'. The data is presented in a table with columns for 'SINo', 'CALL ID', 'CALLER', 'CALLEE', 'START TIME', and delay metrics: 'MinDelay_OUT', 'MaxDelay_OUT', 'AvgDelay_OUT', 'MinDelay_IN', 'MaxDelay_IN', 'AvgDelay_IN', and 'POLQAMIN_'. A red box highlights the delay metric columns, and a red arrow points to them with the text 'One Way Delay Metrics (Min, Max, Average)'. The table contains 12 rows of call data.

SINo	CALL ID	CALLER	CALLEE	START TIME	MinDelay_OUT	MaxDelay_OUT	AvgDelay_OUT	MinDelay_IN	MaxDelay_IN	AvgDelay_IN	POLQAMIN_
1	333022	1023	00230	2018-12-13 10:22:57.175	19	26	23	64	70	68	4.07
2	333021	1022	00220	2018-12-13 10:22:57.169	23	25	24	60	66	61	3.78
3	333020	1021	00210	2018-12-13 10:22:57.163	20	22	20	63	68	64	4.12
4	333019	1020	00200	2018-12-13 10:22:57.158	21	25	24	64	68	65	4.04
5	333018	1019	00190	2018-12-13 10:22:57.152	21	23	22	60	63	61	4.08
6	333017	1018	00180	2018-12-13 10:22:57.146	22	23	22	60	67	63	4.26
7	333016	1017	00170	2018-12-13 10:22:57.140	20	24	23	60	64	61	4.27
8	333015	1016	00160	2018-12-13 10:22:57.134	20	21	20	62	67	63	4.11
9	333014	1015	00150	2018-12-13 10:22:57.128	22	26	23	59	66	60	3.83
10	333023	1014	00140	2018-12-13 10:22:57.122	21	24	22	57	62	59	4.27
11	333013	1013	00130	2018-12-13 10:22:57.116	21	23	22	60	67	62	4.21
12	333012	1012	00120	2018-12-13 10:22:57.110	19	22	20	64	71	68	4.12

- All delay metrics from different capture and analysis tools are consolidated into central database and presented in web-browser to drill down to calls-of-interest.

Delay Measurement KPI



Thank you!