Automated IVR and Voice Mail Testing



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IVR and Voice Mail Systems - Overview

- IVR (Interactive Voice Response) Systems depend on DTMF digits or Voice as inputs from the user and in turn presents a menu for banking, technical support, hospitality, voicemail, and other automated applications
- Depending on the application, the branching of the menu can get complicated, and this requires accurate testing prior to deployment
- When calling an IVR system from any interface, the user is asked to send DTMF digits or speak in response to prompts
- The IVR system may have several sequences or stages and may require either single DTMF digit responses or several DTMF digit responses (i.e. the credit card number)



GL Solutions for testing IVR and VM Systems



- Simulate IVR Users and IVR System using VQuad[™] or MAPS[™] platform while interfacing to the IVR System via T1/E1, analog, digital, IP, or wireless
- Automated IVR testing process includes call setup, menu traversal, and traffic generation/detection using scripts

- Navigates all options of an Interactive Voice Response (IVR) menu
- Respond to prompts by transmitting DTMF digits or sending voice file
- Auto-generated report showing overall pass/fail and analysis at each IVR stage



GL Solutions for testing IVR and VM Systems (Contd.)

- Monitor IVR System for voice and data quality
- Perform audio quality measurement (POLQA, PESQ) on narrow band and wide band HD voice
- Additional analysis is available such as Round-trip Delay
- For VoIP calls, calculate RTP voice quality metrics such as R-Factor, listening and conversational quality MOS scores, packet loss, discarded packets, out of sequence packets and duplicate packets
- Command Line Interface support for remote testing



Speech Transcription Server for IVR Testing

- GL's Speech Transcription Server transcribes spoken language into text
- Transcription is performed on captured audio files (PCM or WAV formats)
- Cloud-based processing provides accurate translations
- Supports multiple languages such as U.S./U.K. English, French, German, Italian, Japanese and more
- Monitor single or multiple folders containing audio files for automatic transcription
- Analysis of transcribed text with quality scores
- Text to Speech synthesizer



Many languages and codecs



Speech Transcription Server

E File Help GL Speech Transcription Server [Administrator] - Default									_		\times	
	0		🖿 H	H								
_	Ma	nage	Results	Speech-to-Text	Text-to-Speech S	ettings						
				Directory Name	e	Transcribed	Status	Language	Encoding	Transcrib	Delete So.	
	1	C:/Pr	ogram Files/	GL Communications	Inc/Speech Transcripti	0	Ready	English (United States)	u-law			
	St	art	Start All	Stop S	top All Delete	Delete All]	Transcribed: 0 Que	ued: 0 🔮 Subscrij	ption 🥝 Inte	ernet 🥥 Se	erver



Transcribed Results

	File	Help		GL Speech Tr	ranscriptio	on Server [Admir	nistrator] - Default'	* - Running	_		×
6) 🖿 💾	B								
М	anage	Results	Speech-to-Text	Text-to-Speech	Settings						
		File	Folder	Language	Length	Date Modified	Date Transcribed	Transcript	Certainty	Time Taken	
1	ent	er-card-num	C:/Program File	English (United States)	1.88	2024/04/17	2024/09/24 14	Please enter your card number now	0.9009	1.476	
2	we	lcome-to-spe	C:/Program File	English (United States)	5.24	2016/11/04	2024/09/24 14	Welcome to Spectrum Your call may	0.8412	4.933	
C	ear Res	sults						Transcribed: 2 Queued: 0 🕏 Subscri	ption 🥑 Int	ernet 🕝 Ser	ver



Colorize Option

• Users can also create multiple configurations along with the differentiation of directories with the color combinations to identify the

automation





Speech-to-Text Conversion

• Users can transcribe speech to text manually for a single PCM, WAV or GLW file using **Speech-to-Text** option. This option will help users to quickly transcribe the required file manually

🛄 File H	elp	G	L Speech Transcriptio	n Server [Administrator] - D	efault	_		×
- o = 📄	= H	B						
Manage	Results	Speech-to-Text	Text-to-Speech	Settings				
File								
C:/Program	n Files/GL Co	mmunications Inc/Sp	eech Transcription Se	erver/sample audio/enter-ca	ard-number.pcm			
Language					Encoding			
English (Ur	nited States)			~	u-law			~
Transcript								
Please ente	er the card nu	mber now.						
Transcribe	Clear			Transcribed: 0	Queued: 0 🥝 Subscript	tion 🥝 Inte	rnet 🥑	Server



Text-to-Speech Conversion

• This option allows the users to convert text to speech (PCM or WAV file)

🗔 File Help	efault	_		×			
🍋 · 🖹 🖿 💾	B						
Manage Results	Speech-to-Text	Text-to-Speech	Settings				
Folder							
C:/Program Files/GL Co	mmunications Inc/Sp	peech Transcription S	erver/sample audio				
File Name				Encoding			
tts.pcm				u-law			\sim
Language				Voice			
English (United States)			~	Amber (Female)			\sim
Text 🥏							
Hello World							
Generate			Transcribed: 0	Queued: 0 🥝 Subscription	Inter	met 🥏	Server



Settings

📃 File Help	GL Speech Transcription Server [Administrator] - Default - 🛛 🗙
Manage Results	Speech-to-Text Text-to-Speech Settings
REST Server	REST Server
Proxy Server	Server port
Database	45728 Apply
Theme	Edit server TCP port (Default: 45728). Application restart is required.
About	Transcribed: 0 Queued: 0 오 Subscription 🥥 Internet 🥺 Server



Automated Transcriber Using Directory Watcher

- Monitor single or multiple directories
- For each directory watcher, configure
 locale, encoding
- When running, directory watcher continuously monitors for newly created audio files
- Transcription results are populated in real time and stored in a database

	File S	Settings	Help								
		100	BB	1 12							
	M	anage	Kesuits								
		File		Folder	Length (s)	Date modified	Date transcribed	Transcription		Certainty	Time take
	1	enter-ca	ard-numb.	C:/Users/gl/Doc	3.387	2017/04/27 11:0	2018/05/01 15:3	Please enter your card number not	w.	0.9531	0.817
	2	welcom	ie-to-gl	C:/Users/gl/Doc	3.325	2018/05/01 13:5	. 2018/05/01 15:3	Welcome to GL Communications.		0.9369	0.733
	3	Fr_f8 - C	Copy.wav	C:/Users/gl/Doc	12.399	2006/06/12 10:3	. 2018/05/01 15:3	Alors la bise se mettent à soufflé d	te toutes ses forces mai.	0.8355	3.232
	4	Ch_f3 -	Copy.wav	C:/Users/gl/Doc	6.076	2006/06/12 10:3	. 2018/05/01 15:3	我计划在三年之内学完高中的数理化	化全部课程。	0.9912	0.996
	5	kerrycall	I - Copy	C:/Users/gl/Doc	71.610	2004/11/15 10:0	. 2018/05/01 15:3	Hello Hey how's it going Pretty goo	d well right now I'm just	. 0.8928	4.08
File Settings Help											
Manage Results											
Directory name											
1 C:/Users/gl/Documents/sample audio											
2 C:/VQT_Degraded											
3 C:/Users/gl/Documents/FRENCH											
4 C:/Users/gl/Documents/CHINESE(MA											
									1.500 MILL-1222 MILLIN		
	Cle	ear Result	ts					Transcribed: 5	5 Queued: 0 🥝 Subscri	ption 🥝 Inte	ernet 🥝 Server
					N						
					6						
Start Start All Stop Stop A	All	Delete	Delet	e All		Transcrib	ed: 0 Queued: 0 🤇	Subscription 🥝 Internet 🥝 Server			



Use Case





IVR Testing with VQuad™



- VoIP, TDM, Analog, Wireless (Bluetooth, Wi-fi, 3G, 4G, LTE, PTT) test using Dual Universal Telephone Adapter or VQuad Probe
- Wideband support for Bluetooth, FXO, SIP
- Integrate with existing end-point interfaces, rackmount or portable
- VQuad scripting provides ability to automate IVR tests by providing the necessary inputs (generate call, send response) while also transcribing and analysing IVR prompts
- Provides additional voice quality, echo and delay test, voice band analysis capabilities

IVR Testing with MAPS™





codecs

Test Reporting

- Overall Pass/Fail
- Transcribed text for each prompt
 - Similarity score when compared with expected transcript
- (VoIP call) Calculated RTP voice quality metrics such as R-Factor, listening and conversational quality MOS scores, packet loss, discarded packets, out of sequence packets and duplicate packets
- Results are passed to Central Database and accessed via WebViewer™ or NetSurveyorWeb™



Sample IVR Traversal

• GL's main phone line, divided into IVR stages





Sample IVR Traversal

- Stage 1: verify welcome greeting and corresponding prompts are played properly. Respond with DTMF 3 for "directory by last name"
- Stage 2: verify by "directory" prompt is played properly and respond with DTMF digits to search directory
- Stage 3: analyze the search results, and respond with DTMF 1 when matching person is announced





Sample IVR Traversal – IVR Configuration Parameters

- Each Prompt Segment is configured with:
 - > Language
 - Expected transcript
 - Response type
 - DTMF
 - Voice (text to speech)
- Configurable through profiles or CSV files

Config	Value
IVR	
 Traffic Type After IVR Completion 	Terminate Call
 IVR Record Directory 	C:\RecordedFiles\
- DTMF Response Properties	
 Digit Duration in msec 	300
 Inter Digit Duration in msec 	500
 Power level in dB 	10
 Digit Band 	outband
🖃 Prompt	3
- Prompt 1	
– Language	English (United States)
 Expected Transcript 	Welcome to GL Communications. If you know your partys extension you can
 Response Type 	DTMF
 DTMF Response 	3
TTS Response	
- Prompt 2	
– Language	English (United States)
 Expected Transcript 	Welcome to the directory. Please enter the first 3 letters of your partys last nan
 Response Type 	DTMF
 DTMF Response 	926
TTS Response	
Prompt 3	
– Language	English (United States)
 Expected Transcript 	
 Trigger Phrase 	available agent
 Response Type 	DTMF
 DTMF Response 	1
L TTS Response	



Sample IVR Traversal – Call Generation

🍝 Call G	eneration - CallGenDefault					
	- 🔒 🖪 💡	8 🙃				
Sr No	Script Name	Profile	Call Info	Script Execution	Status	Events Events Profile
1	SipCallControl.gls	Profile0001	GL-MAPS_22_452445949-9139-94	Stop	Send Digits-Completed	SIP_TerminateCall
•			III			4
Add	Delete Insert Refresh S	tart Start All Stop	Stop All 🔽 Abort Abort	All		
<u>S</u> a	ve Column Width	— 🔽 Show Latest				
	MAPS			DUT		Find
		INVITE	E	17:37:34.156.4924		
		100 Tryi	ing			
		200 0	к	17:37:34.266.8615		
	·	ACK		17:37:34.267.8708		
	4	Stage 1: Welcome to GI	L Communications.	17:37:43 226 8402		
	Stage 1:	If you know your parties exte	ension you can do that anytime?	17:37:46 27 9460		
		Stage 1: For sales	s press one.	17:07:40 150 0500		
	Stage 1: P	atama call support press 2 fo	or a directory by last name press 3.	17:37:40:103:6033	Stage 1	similarity score:
		Stage 1: For directory by	first name press 4.	17:37:54.81.7228		0.9113
		Stage 1: Speak to an r	operator dial zero	17:37:57.34.3660		
	-	Diaita Terrer	Shad - O	17:38:00.186.9328		
		Digits Transm	iiiteu	17:38:00 122 7934		



IVR Call Monitoring

GL's suite of call capture and analysis (CCA, PacketScan[™], PPP Analyzer) solution can be used to capture and monitor live traffic over TDM, and Packet networks.

For each call it reports comprehensive information occurring on T1 or E1 lines and IP networks, including,

- Complete signaling information for each direction
- Detail voice band event information occurring during the call including dual tones (DTMF, MF, MFC-R2), fax tones, modem signals, and more
- Voice capture for both directions
- All alarms and errors occurring during the call
- Detailed analysis of the voice band noise level, speech level, speech activity factor, echo measurements, and more
- Categorization of the call as voice, fax, modem, or data





Thank you

