



Evaluating Skype™ for Telephone Interviewing & Recording

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RTI International

Prepared for FedCASIC Conference
March 22-24, 2011

Agenda

- Audio Recording in Survey Research
- Challenges of Telephone Audio Recording
- VOIP as an Alternative
- Skype™: Advantages & Challenges
- Integrating Skype™ with Recording Software

Audio Recording in Surveys

- Data Quality Assurance
 - Check data entry error or inconsistent response
 - Questionnaire item effectiveness
 - Enables inter-rater reliability study
- Interviewer Monitoring
 - Performance Feedback
 - Verification & Detect Falsification

The problem with traditional telephone...

“Go into any office supply and pick up the cheapest pocket micro cassette recorder you can find. With all its hiss, distortion, flutter, and narrow bandwidth, its still far better than any recording you’ll make over the telephone line. The fact is, that telephone audio quality is much worse than it was just 10 years ago.”

Joe Klinger, Audio Engineer (2006)

Challenges in Telephone Audio Recording



- “Narrow pipe”
 - Bandwidth-reduction
 - Recording devices
 - Ground loop hum (hiss, buzz)
 - Volume leveling
- Difficult to balance levels without expensive equipment and additional processing

VOIP as an alternative

- Audio transmitted data packets over internet vs. PSTN electrical signals
- Codecs **code/decode** audio to/from digital signals
- Audio quality function of data/packet transmission
- Firewalls can slow, block packets
- No humming, buzzing associated with electrical signals & grounding issues on VOIP calls



What is Skype™?

- Skype™ is a VOIP system first released in 2003 using peer-to-peer network architecture
- Calls to cell phones, landlines or Skype™ users
- Significant growth in recent years - in 2010 reported to SEC 124 million users/month*
- Skype Manager™ - business version recently released allows for centralized software versioning and account management



Skype™: Advantages

- Higher Quality audio
- Free API allows recording caller & receiver separately
- Security
 - End-to-end encryption of data with 256 bit AES encryption keys
- Low-Cost
 - Free software, accounts, “unlimited” “Skype-to-Skype” calls
 - “Skype-Out” calls incur small fee; per minute or monthly
- Minimal hardware
 - Computer/device w/Mic.

Skype™: Challenges

- Internet connection speeds can vary
- “Last mile” over POTS or cellular network could degrade audio quality
- Firewalls
- Dependence on single provider
- Will low calling rates continue in the future?

Now an example...

- Integrated case manager and audio recording application developed for remote telephone interviewers using traditional telephones for calls
- Recording devices connect to telephone handset or wall jack
- Interviewers control recording via software
- Audio files stored locally on encrypted laptop and transmitted via internet to RTI

Quest ID	Status Code	Quarter	Create Date	Contact Name	Contact Phone	Time Zone	Contact Date	Contact Time
9999015	00 10/09/2007	1	10/09/2007		(206) 123-1234	Pacific	Thursday	afternoon
9999019	50 10/09/2007	1	10/09/2007		(231) 123-1234	Eastern	weekdays	momings
9999041	54 10/09/2007	1	10/09/2007		(617) 123-1234	Eastern	T, H	7-9 am
9999069	00 10/09/2007	1	10/09/2007		(505) 123-1234	Mountain	M, W	1-3 pm
9999905	00 10/09/2007	1	10/09/2007		(201) 123-1234	Eastern	Friday	7-9 pm
9999923	52 10/09/2007	1	10/09/2007		(701) 123-1234	Central	S, Su	10 am to noon
9999950	71 10/09/2007	1	10/09/2007		(314) 123-1234	Central	weekends	evening
9999978	00 10/09/2007	1	10/09/2007		(919) 123-1234	Eastern	W or Th	any time
9999988	86 10/09/2007	1	10/09/2007		(702) 123-1234	Pacific	Tuesday	6 or 7 pm
9999996	52 10/09/2007	1	10/09/2007		(212) 123-1234	Eastern	M, W	7-9 pm

Quest ID: Contact Date:

Time Zone: Contact Time:

Recording Test Contact Phone:

File Name	WAV Size (KB)	MP3 Size (KB)	Record Start Date/Time	Record Stop Date/Time	Converted?	Convert Date/Time	Uploaded?	Upload Date/Time
000998_9999019_20110315101942	98.482	31.896	3/15/2011 10:19 AM	3/15/2011 10:19 AM	<input checked="" type="checkbox"/>	3/15/2011 10:19 AM	<input type="checkbox"/>	
000998_9999019_20110315102005	20.898	6.84	3/15/2011 10:20 AM	3/15/2011 10:20 AM	<input checked="" type="checkbox"/>	3/15/2011 10:20 AM	<input type="checkbox"/>	
000998_9999019_20110315102009	10.912	4.32	3/15/2011 10:20 AM	3/15/2011 10:20 AM	<input checked="" type="checkbox"/>	3/15/2011 10:20 AM	<input type="checkbox"/>	
000998_9999019_20110315102217	140.988	46.08	3/15/2011 10:22 AM	3/15/2011 10:22 AM	<input checked="" type="checkbox"/>	3/15/2011 10:22 AM	<input type="checkbox"/>	
000998_9999019_20110315102238	43.35	14.976	3/15/2011 10:22 AM	3/15/2011 10:22 AM	<input checked="" type="checkbox"/>	3/15/2011 10:22 AM	<input type="checkbox"/>	

Integrating Skype™ with Recording Software

- Free Skype™ Application Programming Interface (API)
 - Access to Skype™ objects & events
 - Easy integration with existing software
- Back-end programming changes are minor
- User Interface stays the same

Skype™ API - VB.NET Example

- Original implementation > 300 LOC
- Skype™ API: < 10 LOC needed to record

```
Dim oSkype As New Skype() 'Create a Skype object
'Create a Skype call object
Private WithEvents oCall As SKYPE4COMLib.Call = New CallClass()
oSkype.Client.Start(True, True) 'Ensure Skype client is running
oSkype.ChangeUserStatus(TUserStatus.cusOnline) 'Set user online
oCall = oSkype.PlaceCall("555-111-1234") 'Call to land/cell line
'Check call status
If TCallStatus.clsInProgress = oCall.Status Then
    'Save Mic & Callee audio to file
    oCall.CaptureMicDevice(DeviceType.DeviceTypeFile) = "mic.wav"
    oCall.OutputDevice(DeviceType.DeviceTypeFile) = "callee.wav"
End If
```

Conclusion

- Status of Skype™ evaluation
- Poor audio quality from POTS
- VOIP is a viable alternative to POTS, “Wide pipe”
- Skype™ is a low cost alternative
- Improved recorded Audio quality
(assuming high-speed connection, low network congestion)
- Free Skype™ API

More Information

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Comparing Skype™ vs. POTS

	Skype	POTS
Software / Service	Free	Monthly service ~\$25-\$35/mo
Usage charges	Free – \$20/mo.	Rates vary
Audio	Larger frequency range	Smaller frequency range
Security	256 bit AES encryption	Wire tapping laws, special hardware
Hardware	Computer or device connected to the internet with microphone	Telephone
Connection	Dependent on connection speed, network traffic	Consistent service
Firewalls	Can slow packet transmission	N/A
Recording	<10 LOC	>300 LOC

Challenges in Telephone Audio Recording

- The big issue: the “narrow pipe” and bandwidth-reduction
- Variation in quality of phone connection
- Physical condition of wires
- Variation in quality of telephone
- Recording devices
- Increasing use of cell phones





Problems with recordings...

- Hissing, buzzing associated with the electrical signal gets recorded & is more noticeable when we try to amplify the sound
- Voice volume level of remote person (interview respondents) is significantly higher/lower than the caller who is recording (interviewer)
 - Difficult to balance levels without expensive equipment and additional processing