ClearOne.

SALES BRIEF

How to demo ClearOne's echo cancellation & full-duplex with only your laptop and a Chat 50 or 150

I have recently done this demo during a presentation at an industry show and also at a distributor training, and the result was as close to actual jaws dropping as I've seen in a while. The nice thing is, you don't need to establish a network connection so that you can make a call – this is a completely self-contained demo.

You <u>definitely</u> need to try this out beforehand and make sure you are comfortable with the explanation and the mechanics.

By the way, just because this demo uses a Chat 50 or 150 doesn't mean that it wouldn't be meaningful for customers looking for tabletop, premium, or professional audio solutions. Our technology essentially works the same way, and this demo shows off how well our audio processing works throughout the product line. And it's a lot easier to set up and demo compared to demonstrating a XAP or Converge Pro if you just need to quickly show off echo cancellation and full duplex.

The Setup

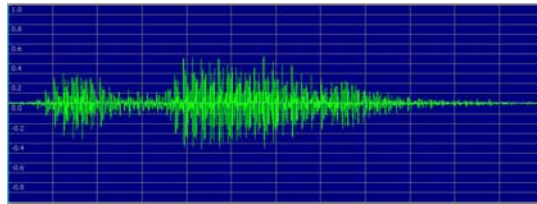Install the following on your laptop:
- iTunes (**http://www.apple.com/itunes/download/**)
- **GoldWave sound editing software (freeware) (http://www.goldwave.com/release.php#download)**
- The History of Audio.m4a sound file (attached to e-mail). This will open into iTunes.

The Explanation

If you don't explain this demo beforehand, customers won't understand the results and won't be so impressed. This is the script to follow:

Echo cancellation explanation

- **With audio conferencing devices, high-quality echo cancellation is essential to enable natural conversations.**
- **When we talk about echo in the audio conferencing area, we are simply referring to audio coming from the far side to our device that gets returned back to the far side, delayed slightly, so that participants on the far side hear their own voice echoing back. We've all experienced this on cell phone calls before.**
- **ClearOne is a pioneer in echo cancellation technology, and ours is truly one of the best, if not the very best in the industry.**
- **Here is how our echo cancellation technology works (point to your Chat 50/150 while explaining these points):**
  - **All of our products feature high-performance DSPs (digital signal processors). The audio coming from the far side passes through the DSP before it goes out the speaker. The DSP takes a snapshot, or sample, of that audio stream, so we know what the sound waveform looks like. We can call that audio stream "A".**

  - **Our DSP also analyzes audio coming through the microphone.**
  - **The microphone(s) are really picking up two sources of audio:**
    - **Our voices and any other audio here in the local room. We can call this audio stream "B".**
    - **The audio coming out of the speaker from the far side (since the microphone is located right next to the speaker) – again, audio stream "A".**
    - **So the microphone is picking up A + B.**
  - **Well, we already know what A looks like, because it came through the speaker. So our DSP analyzes the microphone audio, subtracts A out, and only sends B to the far side – only our local room audio.**

Full duplex explanation

- **The real challenge is to do echo cancellation <u>and</u> full duplex at the same time. <u>Very few companies have mastered the technology to actually do this</u> – it is extraordinarily difficult to do.**
- **Full duplex simply means a two-way street – audio goes both ways so that we can both talk and listen at the same time, which is important for natural conversations.**
- **Most devices that claim full duplex really are not full duplex. They provide half duplex or maybe slightly better.**

The Demo

I am going to show you how well our echo cancellation and full duplex performance work.

- **Have your laptop powered on with the Chat 50 or 150 connected.**
- **Double-click on the History of Audio.m4a sound file – it will open into iTunes (you may need to choose iTunes from a list of applications).**
- **Set the volume level on <u>both</u> iTunes and your Windows speaker volume somewhere around 1/3 to 1/2.**
- **Open up GoldWave. Select File→ New, and these settings:**
  - **Channels: 1 (mono)**
  - **Sampling rate: 44100**
  - **Initial file length: 2:00**
- **Start playing the History of Audio file in iTunes – audio comes out of the Chat 50/150 speaker.**
- **Explain that the man's voice represents the far side of a conference call. From the Chat 50/150's perspective, it doesn't know or care whether the audio is coming from the far side or from the computer. It is simply analyzing all audio coming through the speaker, and treating that as far-side audio that needs to be echo-cancelled.**
- **Switch back to GoldWave. Click on the red, round record button. You are now recording live, with the Chat 50/150 as your microphone.**
- **Start speaking into the Chat 50/150. Speak fairly loudly. Say whatever you want, but perhaps something like "It's great to be here today. This is a test and demonstration of ClearOne's echo cancellation and full duplex technology."**
- **Click on the square red button in GoldWave – this stops the recording.**
- **Switch back to iTunes, and stop the audio file playback.**
- **Switch back to GoldWave, and play back the file you just recorded (green triangle).**
- **You will only hear your own voice! This is astounding!**

At first, customers may not understand why this is cool. Explain that the microphone very clearly picked up the man's voice coming through the speaker, but what got passed through (to GoldWave, which represents what would pass through to the far side) was <u>only</u> your own voice, while the other audio stream was completely cancelled out. ClearOne's impressive echo cancellation demonstrated – you heard it live!

Not only that, but your voice didn't cut in and out (although you may hear some very slight suppression, but it's generally not even noticeable in a conference call). So even though audio was coming continuously through the speaker, your voice still got passed through. It's a 2-way street – you just heard a live example of full duplex performance.

This all may sound complicated reading it on paper, but it's really easy to do and should only take 3-4 minutes once you have everything set up.

A few hints

- **Don't make the volume too loud in iTunes, or you may get some slight bleed-through of the man's voice in the recording.**
- **A Chat 150 works better for this demo than a Chat 50 because the 150 has three microphones instead of one, which improves overall performance.**
- **If you're really daring, you can play a music file instead of the man's voice. Understand, however, that this represents the worst-case scenario in audio conferencing – full-time, constant audio stream from the far side, which makes our echo canceller work much harder. This typically wouldn't be the case in a conference call, which is why I recommend the man's voice file. However, the music file does make for a <u>very</u> impressive demo. If you do, I would strongly recommend only doing it with the Chat 150 – it doesn't work so well with the Chat 50.**

Give it a try today! There will be a quiz on how to do this demo!

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