

# Final Progress Report

## *Reach out and Touch Someone: Providing Remote Real-Time Interpreting\*

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### **Background**

Oregon State University provides higher education and services to a diverse population of students. Some of those students are students with disabilities. Section 504 ensures that the child or student with a disability has equal access to an education. As such, OSU provides accommodations to students based on student eligibility and student needs. One of those accommodations is the ability to provide interpreting services for those that are deaf or hard of hearing. Educational institutions generally are unable to match industry competitive wages and rely on individuals that enjoy a college environment and life style to provide interpreting services. Fortunately for OSU, we have an excellent interpreter that manages our Deaf and hard of hearing program. Unfortunately, her time is often limited and split between meeting with students and providing interpreting accommodations in the class. Other issues can include scenarios when multiple students require interpreting during the same block of time. OSU then has to locate interpreters and have them travel to OSU, which incurs additional costs. Unfortunately, at this time, OSU does not have sufficient funding to provide several on-site dedicated interpreters, so another solution needs to be developed.

### **Developed Technology**

Oregon State University's (OSU) Disability Access Services (DAS) has designed and tested a prototype system for remote sign language interpreting in the classroom. The need for remote interpreting is due to OSU's small-town location, which makes it difficult to find local interpreters. If we at DAS could implement a high-quality and cost-effective system, it would be of substantial benefit to campus accessibility. This project explores the hypothetical system that DAS will implement at OSU, the results obtained from testing the system, and conclusions on future implementation of a remote interpreting system.

The following is an overview of the proposed framework for a remote interpreting system. A dedicated server running the ZoneVideo server application will serve as a gateway in which client machines access remote interpretation video streams. Clients, including both students and their designated interpreter, will connect to the server via the ZoneVideo client. During a lecture, the instructor's speech will be sent via the Internet or a mobile device to the remote interpreter, who interprets the speech, and signs into a webcam. The interpreter's signing will be visible on the student's computer, enabling the student to view the interpretation and lecture simultaneously. Please see Figure 1 for an overview.

### **Equipment Purchased**

1. Laptop with webcam built-in
2. Samsung Q1
3. Logitech Quickcam
4. MyHava online video streamer
5. SlingBox online video streamer

## Test Results

Our preliminary tests dealt with three dimensions of streaming video: quality, how the video stream looks; clarity, the readability of the sign language; and bandwidth usage, the OSU wireless network's playback performance. In order to determine a baseline video quality, we recorded six videos at different video bit rates and resolutions, using ZoneVideo's built-in recording function to capture incoming video streams. Two computer setups were used, a client and a server. The client computer (i.e., the student's computer) was running Windows XP, the ZoneVideo client application, and was connected to the Internet via the "OSU\_Access" wireless network. The server computer (i.e., the interpreter's computer) was running Windows XP, the ZoneVideo client and server applications, and was connected to the Internet via a wired connection. A Logitech QuickCam Pro 9000 was used to record video.

### Remote Interpreting Trials

Trial #	Bit rate (kB/s)	Resolution (pixels)
1	128	320x240
2	128	640x480
3	192	320x240
4	192	640x480
5	256	320x240
6	256	640x480

An interpreter was recruited to sign for each of the trials. The interpreter signed into the webcam attached to the server, and the video stream was recorded on the client computer at aforementioned bit rate and resolution combinations. After the interpreting videos were recorded, a student fluent in American Sign Language analyzed the videos, offering feedback about their quality and clarity. It was found that the most legible videos had a bit rate of at least 192 kB/s. Above 192 kB/s, the student deemed both 320x240 and 640x480 resolutions to be readable. Having found baseline video quality settings, we began bandwidth testing.

Our bandwidth testing goal was to establish a baseline performance standard to which subsequent bandwidth tests could be compared. Using ZoneVideo, we streamed a looping video with constant motion, so that any lag would be apparent. The test stream was at a bit rate of 256 kB/s to ensure maximal bandwidth usage. We took a laptop around campus, watching the video stream in various classrooms, under different "OSU\_Access" signal strengths. Even under low-signal conditions, we found no lag or stuttering during video playback. Because OSU's wireless network can clearly handle up to 256 kB/s video streams, our baseline standard of video quality has been set at 192 kB/s, which is sufficient for our quality, clarity, and bandwidth requirements.

## **Conclusions**

So far, a few conclusions can be drawn regarding the status of remote interpreting at OSU. First, the OSU wireless network is sufficient for streaming video. Even in low-signal areas, high-motion video streams remained fluid, suggesting that the OSU network can support our baseline quality settings. Second, even at smaller resolutions (e.g., 320x240), sign language is legible, assuming bit rate is at least 192 kB/s. Third, because we have established a baseline standard for quality, clarity, and bandwidth usage, there is room for video quality improvement. OSU's wireless network is capable of handling streams at 256 kB/s, while ZoneVideo's maximal bit rate is 1024 kB/s. We will conduct further testing to find a balance between video quality and bandwidth demands. Lastly, the project's next step is a test-run of the system, using an off-campus interpreter, a student watching the stream on the OSU wireless network, and an on-campus ZoneVideo server. Because our tests have shown that lower video quality produced clear signing and excellent network stability, remote interpreting at OSU is feasible. However, a few performance tweaks are necessary to ensure optimum service.

## **Summary**

OSU has developed a working prototype for providing efficient, cost effective and functional remote interpreting. Once the prototype has been completely optimized and finalized, it will be ready for production level deployment and use in the field with students and interpreters. In addition, there is opportunity for partnerships with other educational institutions that also could benefit from remote interpreting. The project is a little bit behind schedule due to some unfortunate delays (the project lead had to leave OSU to assist family across the state). OSU is confident however, that the developed technology will become a viable method of providing accommodations and services to students that are deaf or hard of hearing. No additional funding was needed since not all funding was fully utilized. A paper or presentation may be submitted to CSUN Annual International Technology and Persons with Disabilities Conference 2010 (Link: <http://www.csunconference.org/>).

## Closing Financial Statement

Project Start: 05/07/2008

Project End: 02/28/2009

Index: J1221A MSA - NWACC Armas Reach & Touch

Agency: NorthWest Academic Computing Consortium

Fund: J1221A MSA NWACC 209 Armas Reach & Touch

OPAA Accountant: Lisa A Silbernagel

Organization: 160020 MSA - Disability Access Services

IC Rate:

Program: 18103 Othr Spon Acty On campus Domestic

IC Basis:

As of: 4/13/2009

Available Balance: \$2,502.08

### Salaries - Wages

	Budget	Actual	Encumbrance		Available
10410 Temporary Employees Pay	\$0.00	\$3,648.00	\$0.00	\$0.00	(\$3,648.00)
10501 Student Pay - Regular Pay	\$762.00	\$953.36	\$0.00	\$0.00	(\$191.36)
<b>Subtotal:</b>	<b>\$762.00</b>	<b>\$4,601.36</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>(\$3,839.36)</b>

	Budget	Actual	Encumbrance		Available
10901 Other Payroll Expenses	\$38.00	\$0.00	\$0.00	\$0.00	\$38.00
10978 OPE Class Other	\$0.00	\$306.67	\$0.00	\$0.00	(\$306.67)
10988 OPE Student Other	\$0.00	\$6.45	\$0.00	\$0.00	(\$6.45)
<b>Subtotal:</b>	<b>\$38.00</b>	<b>\$313.12</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>(\$275.12)</b>

### Other Expenses

	Budget	Actual	Encumbrance	Non-FIS Encumbrance	Available
20001 Supplies Expense	\$3,000.00	\$0.00	\$0.00	\$0.00	\$3,000.00
20200 Minor Equipment	\$4,000.00	\$0.00	\$0.00	\$0.00	\$4,000.00
20201 Computer (Noncapitalized)	\$0.00	\$1,793.46	\$0.00	\$0.00	(\$1,793.46)
20204 Other IT Related Peripherals	\$0.00	\$789.98	\$0.00	\$0.00	(\$789.98)
24503 Data Processing Service	\$1,200.00	\$0.00	\$0.00	\$0.00	\$1,200.00
24910 Vehicle & Equip Use Charge	\$1,000.00	\$0.00	\$0.00	\$0.00	\$1,000.00
<b>Subtotal:</b>	<b>\$9,200.00</b>	<b>\$2,583.44</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$6,616.56</b>

J1221A Totals: Expense \$10,000.00 \$7,497.92 \$0.00 \$0.00 \$2,502.08

Less F&A: \$0.00\*\*

Available Balance: \$2,502.08

### Notes:

\* Denote account subject to IC charge/rate

\*\* Less F&A calculation:  $((\$2,502.08 / (1 + 100)) * 100) = \$0.00$ lb

# A very basic Remote-Interpreter Scenario

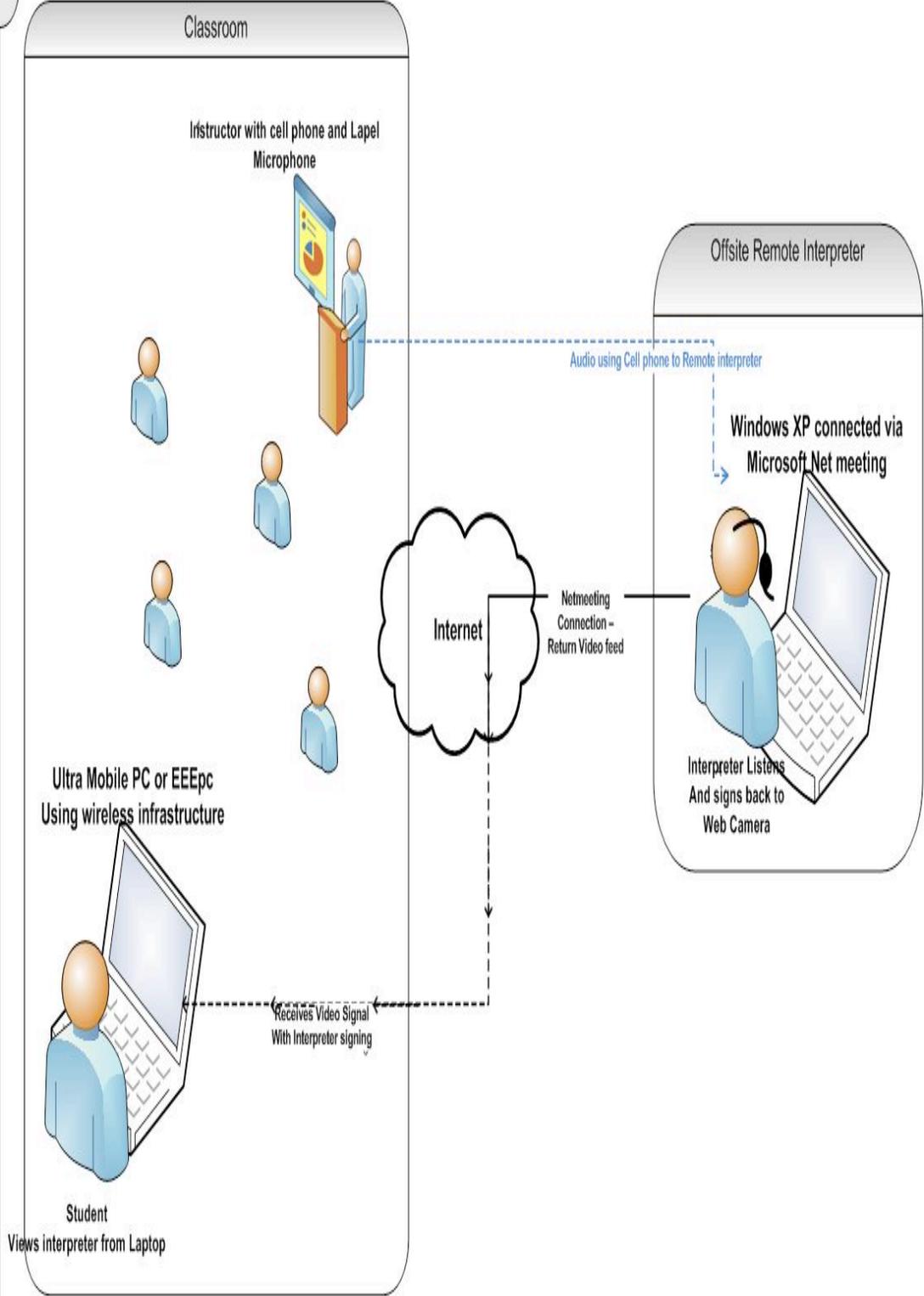
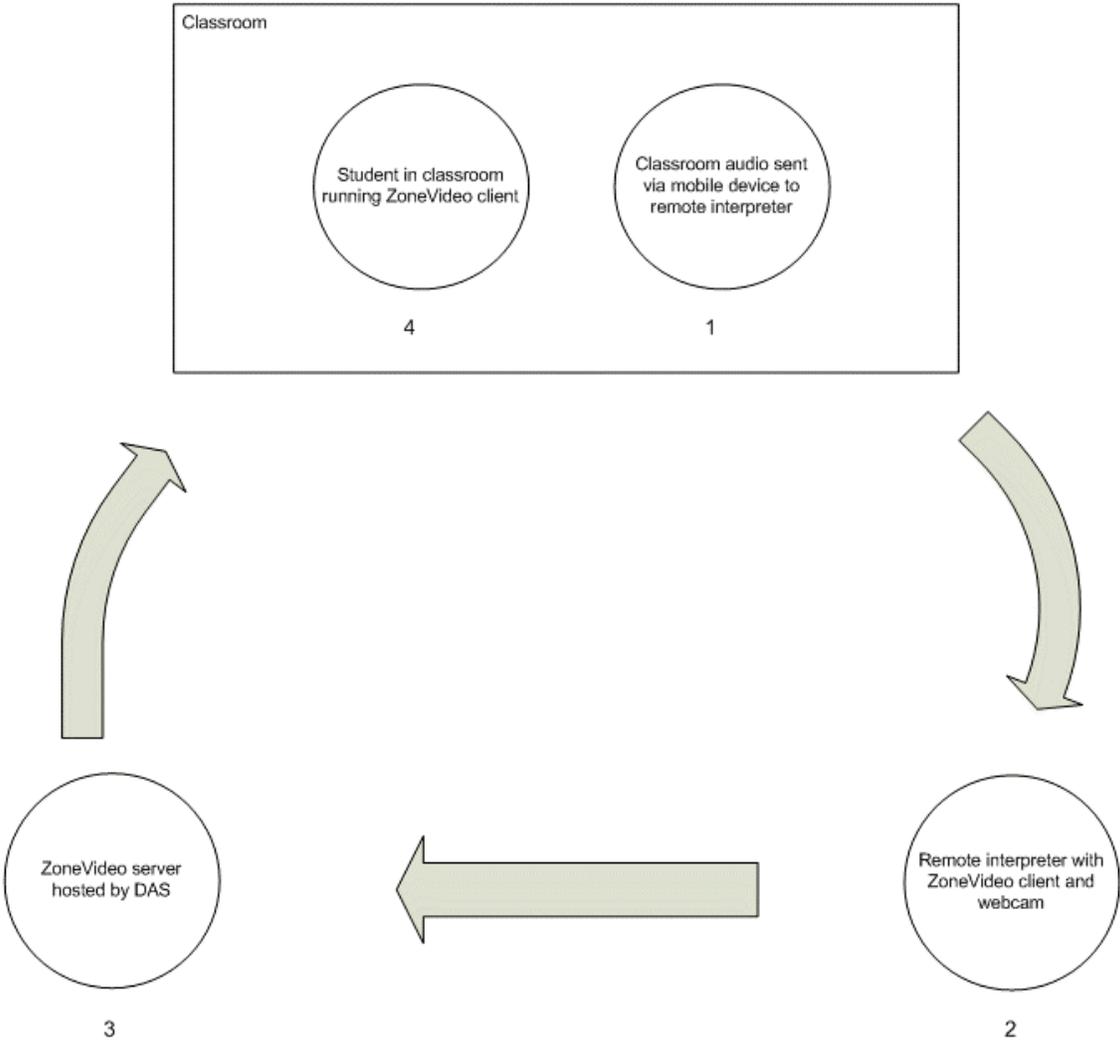


Figure 1. Remote Interpreting Overview



## Technical Details and Setup

### Server install:

Installation requirements:

1. Windows 2000, XP, or Vista, with IIS enabled.
2. The **ZoneVideo conference system** and **ZoneVideo management system** packages, available at <http://www.zonehope.com/download.htm>.

Installation:

1. Extract **zonevideo.zip** and **ZonevideoManage.zip**.
2. Open **ServerInstall.doc**, located in **zonevideo.zip**, and follow the instructions for IIS configuration.
3. Run the **ZVServerSetup.exe** file, and follow the installation instructions.
4. After the installation is complete, run the **ZoneVideo Server** application. The ZoneVideo server will come on-line, with the following address: *http://(computer IP address):3000*. Make sure that your firewall allows incoming connections on port 3000.
5. Keep the **ZoneVideo Server** application open for long as you wish to run the server.
6. Navigate to *http://localhost/zonevideo*, and log in to the ZoneVideo server. The default user name and password is **admin**.
7. To manage meeting rooms, click on the **Room manage** button.
8. To manage users, click on the **User manage** button.

### Client install:

Installation requirements:

1. Windows 98, 2000, XP, or Vista.

Installation:

1. Run the **ZVClientSetup.exe** file, and follow the installation instructions.
2. After the installation is complete, run the **ZoneVideo Client** application.
3. In the **Login** dialog box, enter the IP address of your ZoneVideo server, and click on **Next**.
4. Select your meeting room, and click on **Next**.
5. Enter your user name and password, and click on **Next**.

The **view** panel on the right will display all available webcams. To enlarge the video stream, click on the plus sign above the video.