



Project plan for the HDVC session on December 9th

CSD Fall 2010

Version: 1.1

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1.1	12/08/2010	The document is formatted and spellchecked, added Speex codec installation steps, added a few more troubleshooting approaches, incorporated feedback from Souris and Udis	❖ Boris Ristov ❖ Manxing Du
1.0	12/06/2010	Changed bandwidth requirements, added comment in "Risk analysis" part, added contact information	❖ Manxing Du
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1. Introduction

1.1. Purpose of document

The purpose of this document is to provide the technical details about the preparation for the High Definition Video Conference (HDVC) session on December 9th.

1.2. Scope of document

This document covers topics related to the system requirements for the HDVC session, the “responsible persons” list, various test scenarios and a comprehensive risk analysis.

1.3. Audience of document

This document is aimed at the technical facilitators for each spot that will be involved in the HDVC session on December 9th, providing technical support. Any technical support staff can also use this document as a reference when preparing for any similar HDVC session in the future.

2. System requirements

2.1. Hardware requirements

2.1.1. Hardware requirements for the HDVC client

The requirements for the HDVC client are listed as following:

- ❖ A computer which supports the processing of high definition video
- ❖ HD camera
- ❖ HDTV that serves as a HD monitor
- ❖ Conference speaker or any other types of speakers

The following (*table 1*) is a list of components used by the HDVC client in Karolinska as a reference:

Component	Brand	Model
Motherboard	ASUS	Rampage II GENE
CPU	Intel	4 x Intel® Core™ i7-920 2.66GHz
Memory	Unknown	3072 MB
HDD	Patriot	Patriot Warp V2 32GB
Graphic Card	nVidia	G92 [GeForce GTS 250] memory 16MB (32-bit, non-prefetchable), 256MB (prefetchable), 32MB (non-prefetchable)

DeckLink card	Blackmagic	A120 Memory 1MB (32-bit, non-prefetchable)
HD Camera	Sony	RM-EV1-HD1
Speaker	Phoenix	Phoenix TMX320VC5509

Table 1: Currently used hardware in the client in Karolinska

2.1.2. Hardware requirements for the Multipoint Control Unit (MCU)

The following (table 2) is a list of components used by the MCU server in the CareNet room:

Component	Brand	Model
Motherboard	ASUS	P5ND2SE
CPU	Intel	2X Intel(R) Core™ 2 Duo CPU E4500 2.2GHz
Memory	Unknown	2048 MB
HDD	Unknown	16 GB (USB)

Table 2: Currently used hardware in the MCU in the CareNet network

2.2. Software requirements

Components	The name of the software	Comments
Operating system	Ubuntu 9.10	To avoid any incompatibility issues between the graphics card driver and Ubuntu 10.04
Software	MiniSIP	Suggestion is to use the Automated Installer (AI) tool to install
Installation tools	AI	

Table 3: Software requirements for the HDVC client

2.2.1. Installation steps

The Ubuntu, AI and MiniSIP step-by-step installation and configuration instructions can be found here:

<https://github.com/csd/csd/wiki/Setting-up-an-HDVC-Client-%28Radeon%29>

NOTE:

Please follow the steps in the instructions carefully and also pay attention to the notes listed below. Please use the commands below to install MiniSIP.

- 1) Install Ubuntu **9.10**.
- 2) Install AI (following the instructions provided in the URL above).
- 3) Install the Speex codec to improve the audio quality. Open a Terminal window and enter the following command:

```
sudo apt-get install libspeex-dev
```

4) Install MiniSIP:

- ❖ Open a Terminal window and enter the following command:

```
ai install minisip --no-temp --vendor
```

NOTE:

--no-temp means using a subdirectory in the current directory as working directory instead of /tmp which will be deleted after the installation by default.

--vendor means use the latest version from the vendor's repository (SVN).

- 5) Install the DeckLink card (following the instructions provided in the URL above).
- 6) Update the graphics driver (following the instructions provided in the URL above).
- 7) Set up the video camera (following the instructions provided in the URL above).
- 8) Configure MiniSIP (following the instructions provided in the URL above).
- 9) Go to /usr/local/lib/libminisip/plugin/ to check if mspeex.so is in this folder.
- 10) Open MiniSIP, go to "File" → "Preferences" → "Audio" and move Speex to the top of the list.
- 11) Set up the audio devices (following the instructions provided in the URL above).

2.3. Bandwidth requirements¹

Scenarios	Components	Upload rate	Download rate	Total bandwidth usage
Two clients making a call directly	Each client	2.5Mb/s	2.5Mb/s	5Mb/s
Two clients joining a call with MCU	Each client	2.5M/s	2.5Mb/s	5Mb/s
	MCU	5Mb/s	5Mb/s	10Mb/s
Three clients joining a call with MCU	Each client	2.5Mb/s	5Mb/s	7.5Mb/s
	MCU	15Mb/s	7.5Mb/s	22.5Mb/s

Table 4: Bandwidth requirements for the HDVC session

A four-client scenario will occur on December 9th. The approximated bandwidth usage can be calculated based on the data above.

Scenarios	Components	Upload rate	Download rate	Total bandwidth usage
Four clients joining a call with MCU	Each client	2.5Mb/s	7.5Mb/s	10Mb/s
	MCU	30Mb/s	10Mb/s	40Mb/s

Table 5: Approximated bandwidth requirements for the December HDVC session

¹ Refer to "HDVC test report 2" provided by the CareNet team:

[http://csd.xen.ssvl.kth.se/csdlive/sites/default/files/projects/CareNet%20Fall%202010%20HDVC%20Test%20Report%202%20\(v1.2\)%20\(11-26-2010\).pdf](http://csd.xen.ssvl.kth.se/csdlive/sites/default/files/projects/CareNet%20Fall%202010%20HDVC%20Test%20Report%202%20(v1.2)%20(11-26-2010).pdf)

3. Troubleshooting

This section lists possible problems that may occur in MiniSIP and the corresponding solutions. More troubleshooting approaches can be found in “HDVC test report 3”.²

1) Open MiniSIP, a crash report pops out

Reason: This error occurs because MiniSIP does not detect an Internet connection.

Solution: close MiniSIP and check the Internet settings, and make sure the client has access to the Internet. When the client has a functional connection, restart MiniSIP.

2) No sound can be heard from the other end

Solution:

In MiniSIP, go to “File” → “Devices” → “Audio”

- 1) Make sure the “Spatialize audio sources” checkbox is unchecked.
- 2) Check that the “Input device” and the “Output device” are pointing to the device that is currently tested.
- 3) If any changes are made, quit MiniSIP in order to make the changes take effect and then reopen MiniSIP and make a call again.

If, after these steps, the sound still does not work, proceed with the following steps:

In Ubuntu, go to “System” → “Preferences” → “Sound” → “Hardware”

- 1) Set the “Profile” of the “Internal Audio” to “Off”.
- 2) Set the “Profile” of the device which is being used into “Analog Stereo Duplex”.
- 3) Go to “Input” options. Adjust the “Input volume”, make sure the “Mute” option is unchecked and that the “Input level” bar reacts when the microphone is picking up sounds.

If, after these steps, the sound still does not work, please reboot the computer and try to make a call again.

3) The other end cannot hear anything from your side

Solution:

- ❖ Check if there is any other application on your computer which is occupying the audio device, such as Skype or TeamViewer. Close these applications and then re-open MiniSIP.
- ❖ Check the connection between the speaker and the computer, unplug the cable and reconnect it. Re-open MiniSIP.

² Refer to “HDVC test report 3 (Pre-conference Testing)” provided by the CareNet team:
[http://csd.xen.ssvl.kth.se/csdlive/sites/default/files/projects/CareNet%20Fall%202010%20HDVC%20Test%20Report%203%20\(v1.6\)%20\(12-08-2010\).pdf](http://csd.xen.ssvl.kth.se/csdlive/sites/default/files/projects/CareNet%20Fall%202010%20HDVC%20Test%20Report%203%20(v1.6)%20(12-08-2010).pdf)

- ❖ Check whether the power to the speaker is on. Press the volume up and down buttons to check if there is any sound.

In MiniSIP, go to “File” → “Devices” → “Audio”:

- 1) Make sure the “Spatialize audio sources” checkbox is unchecked.
- 2) Check that the “Input device” and the “Output device” are pointing to the device that is currently tested.

If you do not know which device is being used:

- ❖ Open a Terminal window and type the following command:

```
ls /dev/dsp
```

It will list all the audio devices in the system.
 - ❖ Check which audio devices you are using:
 - X is the number of the device
 - a . snd is an example of the audio file name
 - ❖

```
cat /dev/dspX > a . snd
```

 (make some sounds and it will be recorded into the a . snd file)
 - ❖ Press CTRL+C to stop the recording.
 - ❖

```
cat a . snd > /dev/dspX
```

 (play the file that was just recorded)
- 3) If any changes are made, quit MiniSIP in order to make the changes take effect and then reopen MiniSIP and make a call again.

If, after these steps, the sound still does not work, proceed with the following steps:

In Ubuntu, go to “System” → “Preferences” → “Sound” → “Hardware”

- 1) Set the “Profile” of the “Internal Audio” to “Off”.
- 2) Set the “Profile” of the device which is being used into “Analog Stereo Duplex”.
- 3) Go to “Input” options. Adjust the “Input volume”, make sure the “Mute” option is unchecked and that the “Input level” bar reacts when the microphone is picking up sounds.

If, after these steps, the sound still does not work, please reboot the computer and try to make a call again.

4) When making a call, you get the message: “User not found”

Reason 1: This is because the callee does not open MiniSIP or the computer is not running.

Solution: Notify the callee to open MiniSIP and call again.

Reason 2: This can also occur because the callee is not registered on the SIP server. The callee therefore needs to:

- 1) Open MiniSIP.
- 2) Go to "View" → "Status" → "Accounts" to check the status of this account.
- 3) If the status is "Unregistered", right-click the account and click "Register".
- 4) Close MiniSIP and open it again to check the status. If done correctly, the status should say "Registered".

The above problems may happen during the preparations for the HDVC session. All these problems should be solved before the conference begins.

The test needs to be done as many times as possible before the conference begins. All the participants need to be involved in the tests. If any of them cannot join the test during that day, the client in Kista needs to be the backup participant in order to simulate a multi-party conference. All the tests need to be documented and should list all the results and problems found during the test. All the participants should write a short test report or feedback paper after each test. In the morning of December 9th, one last test needs to be finished.

The problems which may happen during the conference are listed in the "Risk analysis" part in section 5.

4. Test scenario

Considering the bandwidth limitations in Africa, several solutions are suggested as follows:

1) Decrease the framerate in the MiniSIP configuration

Open MiniSIP and go to "File" → "Preferences" → "Devices" → "Video" → "Primary Input Device"

The framerate can be decreased by changing the "@25" value.

Drawbacks:

- ❖ The video quality may be even worse when there is any movement on-screen.
- ❖ If the data sending rate is unchanged, only decreasing the frame rate can cause the video to turn blocky.

2) Decrease the bitrate in the MiniSIP source code

The value will be decided after the test. We will execute a test to choose a reasonable value which can reduce the bandwidth usage to a certain degree and guarantee adequate video quality at the same time.

To evaluate the video quality, we will throttle the bandwidth used in the *CareNet* network to an approximated lower value and therefore simulate low bandwidth circumstances in Africa.

A cause of concern is that the MCU requires huge bandwidth availability. If we decrease the bandwidth, the performance of the MCU will be affected tremendously. Instead, we can make a point-to-point call using lower bandwidth to test a reasonable bitrate.

3) Change the configuration in the reflector

Configure the reflector to send SD video instead of HD video. We need the help from Erik Eliasson who is familiar with the i2conf source code.

Drawback:

The video quality will not fulfill the High-Definiton criteria.

Before the external partners are ready, a simulation test of a three-party HDVC session can be done using three clients in Stockholm:

- 1) *Client1*: In the SALCAS room
- 2) The client in Karolinska
- 3) The client in Erik's home

5. Risk analysis

In this section, the possible problems that may occur during the conference are included and the strategies for solving or bypassing them are also listed in the table. Do note that the listed risks are from the perspective of the *CareNet* team.

<i>Risk</i>	<i>Likelihood</i>	<i>Severity (1-10)</i>	<i>Risk value</i>	<i>Mitigation strategy</i>	<i>Contingency strategy</i>
The CareNet server goes down during the conference	3	10	30	Inform the CareNet team members not to do any testing during the conference, fix all documented and likely problems before conference.	Anand and Shabnam need to recover the server as soon as possible. If the problem cannot be solved in a short time, then a backup video needs to be made and distributed to every participant afterwards.

The CareNet network goes down during the conference	2	10	20	Inform the CareNet team members not to do any testing during the conference. Make adequate tests on network infrastructure before conference.	Anand and Shabnam need to monitor the network using Nagios and recover the network as soon as possible. If the problem cannot be solved in a short time, then a backup video needs to be made and distributed to every participant afterwards.
The CareNet MCU goes down during the conference	3	10	30	Continuous testing needs to be done. Prepare a backup MCU in the SALCAS room. Simulate the following scenario: tell every participant the SIP URL of the backup MCU and every participant should know how to handle this problem beforehand.	If the CareNet MCU is down, every node should be notified through Skype to hang up the call immediately. (VERY IMPORTANT) Manxing starts the backup MCU and informs everyone to call the backup MCU.
None of the MCU's can work	1	10	10	Continuously test every day before the conference.	If none of the MCU's can work, the multi-party conference cannot continue.

					Instead we can have a point-to-point conference between any two participants.
The client in Karolinska suffers from severe hardware problems (e.g. overheating CPU)	3	10	30	Continuously test every day before the conference and run stress tests.	If the client does not work at all, the conference can still progress between other participants and a backup video can be distributed afterwards.
The computer in Karolinska suffers from software problems (e.g. Ubuntu suspended during the conference)	4	7	28	Continuously test every day before the conference. Simulate this scenario and every participant should know how to handle this problem beforehand.	Every end should be notified through Skype to hang up the call immediately. (VERY IMPORTANT) Reboot the computer and Manxing restarts the MCU. Manxing restarts the MCU and informs everyone to call the MCU again.

MiniSIP terminates itself at any client's end during the conference	7	7	49	Continuously test every day before the conference. Simulate this scenario and every participant should know how to handle this problem beforehand.	Every end should be notified through Skype to hang up the call immediately. (VERY IMPORTANT) The end where MiniSIP crashes needs to reboot the computer and restart MiniSIP. Manxing restarts the MCU and informs everyone to call the MCU again.
Audio is suddenly lost during the conference	1	10	10	Continuously test every day before the conference. Check all the audio settings beforehand.	Check the cables and the audio settings once again. Reboot the computer if needed.
Really low video quality during the conference	8	5	40	Decide the video transfer mode during the testing beforehand. We will manage to find a good trade-off beforehand.	As long as the audio can work, the conference can be continued. The material can be distributed and if the video quality is too bad during the presentation, the material can be displayed locally.

Problems with screen-sharing	5	5	25	Continuously test every day before the conference. Simulate this scenario and every participant should know how to handle this problem beforehand.	Every participant needs to prepare a PDF version of the presentation material. If the screen-sharing function does not work, the presentation material can be transferred through Skype and all the participants can open it locally.
Other technical problems	5	8	40	Perform as many tests as possible and try to identify any problems and potential solutions during the test period.	Try to solve the problem using the Skype channel. If the problem cannot be solved in a short time, distribute the backup video.
Manxing is unable to support the conference in Karolinska	1	5	5	A backup person who has sufficient technical knowledge needs to be ready.	Biniam in CareNet team will attend the conference as a backup person.
Some medical participant(s) cannot attend the conference	3	8	24	Nothing can be done by us. Every participant needs to find a backup person.	Backup person can attend the conference instead.

Table 6: Risk analysis for the December session

6. Check-list

In this section, all the requirements that need to be checked before any test and the December conference are listed below. The step-by-step instructions are already included in sections 2 and 3.

❖ **Make sure MiniSIP works properly, check:**

- 1) The network connectivity.
- 2) The cable connections, avoid any loose cables.
- 3) The "Audio device" settings, both in MiniSIP and in the sound settings in Ubuntu.
- 4) Account status in MiniSIP: Make sure the user is registered.

❖ **Set a Skype communication channel:**

In order to contact the technical facilitator immediately from one side to the other, we plan to use a separate backup channel other than MiniSIP. A channel in Skype needs to be created which contains all the responsible technical staff at each location.

❖ **Install TeamViewer and SSH:**

In order to enable remote controlling, TeamViewer is recommended to be installed on each client.

Advantage: When an emergency occurs, technical facilitators at any location can remotely control the problematic client and provide assistance.

Drawback: Relies heavily on the available bandwidth. The software may occupy the audio/video devices which will cause MiniSIP to crash.

SSH is also an alternative tool to provide remote control services.

Advantage: Bandwidth-friendly.

Drawbacks: Can only start MiniSIP using a command line interface but cannot make a call using MiniSP, still need someone to operate the graphical user interface (GUI). SSH is also not as user-friendly as TeamViewer.

❖ **Brief Manxing with the IP addresses of all participants and the bandwidth capacity of each site**

7. Contact information

This section lists all the contact information of the technicians who will provide technical support for the HDVC session, and when they are available:

	<i>Full name</i>	<i>Phone number</i>	<i>Email address</i>	<i>Skype ID</i>	<i>Availability until Dec. 9th</i>
KTH Stockholm Sweden	Björn Pehrson	+46706256140	bpehrson@kth.se	bjornpehrson	Present - Dec. 9 th
	Manxing Du	+46707308519	manxing@kth.se	bettystar16	Present - Dec. 9 th
	Charalampos Souris	+46765829991	souris@kth.se	partakits	Present - Dec. 9 th
	Erik Eliasson	+46702358832	ere@kth.se	erik_hdviper	
	Udochukwu Akunna	+46760831096	akunna@kth.se	udotech	Present - Dec. 9 th
	Hieu Tran	+46707772277	hieutd@kth.se	hieutd.ict	Not available
KIST Kigali Rwanda	Jean-Pierre (Peter)	+250783206574	xid76@yahoo.fr		Present - Dec. 9 th
	Misa Simon	+250788400948	misimon2001@yahoo.fr	saibock	Present - Dec. 9 th
	Sylvie Mboyo	+250788867842	dict@kist.ac.rw		
KFH Kigali Rwanda	Aaron Niyonzima	+250788385650	aaron.niyonzima@gmail.com	kamatalia	Present - Dec. 9 th
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Blantyr Malawi	Anthony Muyepa	+265888538596	muyepaa@medcol.mw		

Table 7: Contact information for involved technicians