Stretch DVR Control Panel

User's Guide

Version 1.7

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Using the DVR Control Panel

Stretch provides a sample DVR program that is used to demonstrate the features of the Stretch DVR Reference Design Kit. This DVR program is similar to a commercial PC-based DVR application. This program, however, is intended purely as a demonstration vehicle — it does not have the feature set and capabilities of a commercial PC-based DVR.

NOTE: The lack of features in this sample application is *not* a reflection of the capabilities of the Stretch DVR Reference Design. The Reference Design is capable of supporting all features of any commercial PC-based DVR.

1.1 DVR Control Panel GUI

The sample DVR application is called "Stretch DVR Control Panel" and abbreviated "DVRCP". When started, three separate panes display in the GUI. The pane on the top left corner is the System Navigator pane. It contains information about all the cameras and the boards in the system. If you expand the DVR Boards tab, you will see each board that is present. Boards are numbered 1 through 4. If you expand Board 1, you will see its Video Inputs, Audio Inputs, Sensors, Relays, Decoders, and its Spot Monitor (if it has one). Operations related to cameras, players, sensors, relays, and so on can be initiated from this pane, as well as from the pull-down menus along the top.

The Recording pane at the bottom left corner displays cameras that are being recorded. For each camera, it displays that camera's Frame rate and Bit rate for both the primary encoder and the secondary encoder (if one exists). As soon as a camera is created and connected to a video input on a board, the camera name appears in this pane. You can then select one or more cameras from this pane and either start or stop a recording or playback.

The pane that occupies most of the GUI space is the Monitor pane used to display live and decoded images. The images for the host monitor display are shown in this pane.

There are six top-level menus: System, Camera, Player, View, Tools, and Help. The System menu is used to set up and change DVR properties. The Camera menu is used to control camera and encoder settings. The Player menu is used to control player settings and playback. The View menu is used to control the Host Monitor (HMO) and Spot Monitor (SMO) displays. The Tools menu controls sensor and relay settings. The Help menu currently does not provide any online help.

The DVRCP GUI can be resized to suit your needs— you can fill the entire display or resize it to use less space on the desktop. Scroll bars on the right and the bottom can be used to view the parts of the GUI that are no longer visible as a result of window resizing.

1.2 PC Requirements

1.2.1 Installing on Windows XP

The DVRCP demonstration program requires your PC's video display card to support DirectX 9.0 or higher, and that DirectDraw acceleration be enabled. If DirectDraw acceleration is not enabled, you can still use DVRCP to record video, but playback and host monitor output (HMO) will not work. To find out if DirectDraw acceleration is enabled, from the Start->Run menu, type:

```
dxdiag
```

Verify the DirectX version is 9.0C or higher, then select the Display tab and verity that DirectDraw acceleration is enabled.

1.2.2 Installing on Linux

To display live video, the DVRCP demonstration program requires an X Server that supports Xv extensions. If the X Server does not support Xv extensions, you can still use DVRCP to record video, but playback and host monitor output (HMO) will not work. To find out if your X Server and video driver support Xv extensions, at a shell prompt, type

```
Xvinfo
```

If `xvinfo` prints "No adapter found" (or something similar), Xv is not supported. During installation, CentOS installs an Xv-capable driver/server if it detects a video card that supports it. If your card does not support Xv extensions, you may have to download the driver software from your video card

manufacturer's web site and install it. ATI and Nvidia both provide Linux drivers for download. The Stretch DVR kit has not been tested with any other type of video card.

1.3 Creating, Saving, and Opening a System Configuration

When the DVRCP application starts, it searches the PCI bus for Stretch DVR boards. Every board that is found is initialized and its capabilities determined. Then the application loads the firmware file to each specified board; otherwise, it is assumed that the firmware has already been downloaded to the DVR board. The DVRCP application looks for the start-up configuration file—this file contains the DVR settings (camera, players, CODEC, HMO, SMO, and so on). If a start-up configuration file is found, the system is initialized with the parameters found in that file.

If a start-up configuration file is not found, you must create one. Under the System menu, select New. The System Settings window pops up. Type the name for your system in the System Name box and select the path where the configuration file for the system is to be stored in the System folder box. All configuration files are named `config.xml`. If you are going to create multiple system configurations, put the configuration files in unique directories. Recorded video is stored in the same directory as the configuration file.

The Systems Settings dialog has three tabs: General, Settings, and Debug. From the General tab, select the video standard for the system (NTSC or PAL), and enable the watchdog timer and its timeout value. Currently, only one video standard is supported. For the watchdog timer, select a value of 0 to disable the timer. The watchdog timer is used to reset the board automatically should the board firmware crash. Specify the path to the ROMable firmware file to load at start-up. There is only one firmware file for the entire system configuration, and this file is loaded only at start-up. This means that if you want to change the firmware file, you must restart the system to load that file and have it take effect.

From the Settings tab, you can specify the time interval to wait before timing out on no response from the firmware as a result of an SDK request. You can also specify the time interval to use to calculate the recording frame rates and bit rates. Additionally, to limit the maximum size of a recorded file, you can specify the maximum number of frames to record for the H.264 and MPEG4 encoders, as well as select whether to create a new file each time recording starts. Each file name is the concatenation of the camera name and the time

stamp of when the recording started. By default, MJPEG video frames are recorded in `.avi` file container. You can overwrite this behavior to record the MJPEG video and audio frames into the `.mov` file container from this tab.

NOTE: Setting the maximum number of frames to record too low (such as less than 2000 frames) could affect the PC's CPU performance and frame rate recording. This is because DVRCP is continuously closing and opening files to record.

NOTE: MJPEG `.avi` files are hard coded for a maximum of 108000 frames per recorded file and contain only video frames. Currently, the `.avi` file container does not support recording of audio frames.

From the Debug tab, you can control the level of SDK debug tracking. The debug information is saved in two files, called `sdk.log` and `sdk.log.fw`, in the the current system configuration folder. `sdk.log.fw` includes all the low-level communication with the firmware, and `sdk.log` contains only the high-level SDK function tracking.

If you want this configuration to be the start-up configuration, check the box to make this the start-up system configuration.

When creating a new system, you may choose to start with Blank configuration or Encoder configuration. Choosing Encoder configuration starts the system with 16 cameras, each one having an H.264 video encoder and a G.711 audio encoder, as well as a number of predefined view panel configurations. Choosing Blank configuration starts the system with no cameras or decoders, which requires you to create a camera, connect it to a port on the board, then set the encoder parameters. Following sections describe how to perform these tasks.

Click OK on the System dialog box when you are done.

To save the system configuration, either select Save System from the System menu, or type Control-S at any time; the system configuration is saved automatically when you exit the application, but saving it explicitly from time to time is recommended. As you define cameras and connect them to video inputs, periodically save the configuration using Control-S.

You can exit the DVRCP application at any time before configuration is complete. When you restart the DVRCP application, you can open the file you were working on by selecting Open under the System menu and browsing to the directory containing the configuration file (`config.xml`) and then selecting it.

You can close one system configuration and open another one by first selecting Close under the System menu, and then opening another configuration.

You can also edit the system name and other system parameters of an existing configuration by selecting Properties under the System menu when that configuration is open.

1.4 Creating a Camera

After you have created a system configuration file, the next step is to create cameras. Under the Camera menu select New. The Camera Setup window pops up. If you want to encode the video coming from the camera, check the Video Encoding box and select the encoding algorithm to use. Similarly, if you want to encode the audio coming from the microphone attached to the camera, check the Audio Encoding box and select the encoding algorithm (audio is currently not supported). Each camera may have zero, one, or two different video encoders. You may choose not to do any encoding for a particular camera. That camera can then be viewed only, and its audio and video cannot be recorded. Or you may choose an H.264, MPEG4, or MJPEG video encoder for either a primary or secondary video encoder, which can be started or stopped independent of each other. Currently, G.711 is the only supported audio encoder. Click OK.

> **NOTE:** Assigning both primary and secondary encoders to a video channel takes away computing power from the S6 chip, which may result in less than 30 fps encoding performance with four D1 channels per chip.

When you click OK, the Camera Settings window pops up. It has four tabs: General, Encoding, Alarms, and Encoding on Alarms.

In the General tab, type the name of the camera in the Camera name box. Typically, you should give a descriptive name to the camera so you can identify what you are looking at, for example, “Hallway 1", “Kitchen”, and so on. If you want on screen display (OSD), enable it by checking the OSD box and typing the OSD text and selecting where in the image the OSD will be displayed. If you choose Debug Mode for the OSD time stamp format, the alarm values (motion, blanked, or night detection) are appended to the OSD text and displayed on each video frame for the current camera in the location set in the OSD location field. In addition to your OSD text, you can include the current time in your OSD by checking the Time stamp box and selecting the format in which time is displayed. You can specify a frame rate slower than 30fps to display streaming raw video. Finally, if this camera supports pan, tilt, and zoom (PTZ), you can enable it by checking the Enable PTZ box. This feature is currently not supported.

If you have selected both primary and secondary video encoders, you must select the one for which you are setting video encoder parameters by choosing the corresponding radio button on the main Camera Settings window pop up.

Now, select the Encoding tab to define the (normal) encoder parameters for the selected encoder. You will be defining the parameters for H.264, MPEG4, or MJPEG depending on the video encoding selected for the camera's current sub-encoder. First, select the resolution of the image that you want to record. Each camera has the highest resolution of the currently selected video standard specified when the system was created. If you select a D1 NTSC or D1 PAL, then choosing the decimation field of EQUAL results in encoding D1, CIF 1:4, QCIF 1:16, and 2CIF the same width as EQUAL, but one-half the number of lines, and DCIF 3/4 the width of 4CIF and 2/3 the of number lines; if your video standard is anything other than D1 NTSC or D1 PAL, the encoding resolution is decimated according to the selected ratio.

To change H.264 or MPEG video encoder parameters, first select the GOP size, then the Bit rate control algorithm. Depending on the algorithm you choose, you need to provide the Average bit rate and Maximum bit rate that you want. If you have chosen Constant Quality as your rate control algorithm, you must provide a value between 1 and 100 for quality (higher values mean higher quality).

The only parameter that you can modify for MJPEG video encoding is the quality. To change it, provide a value between 1 and 99 (as with H.264, higher numbers mean higher quality).

Now, select the Alarms tab to define the parameters for the intelligent analytics built into the encoder. The encoder can detect motion, camera blinding, video loss, and night condition. To enable any particular alarm, check the corresponding box. For motion, blind, and night detection, you also need to specify a threshold beyond which alarms will be triggered and below which alarms will not be triggered. You can specify regions of interest within a video frame where the alarms should be detected (refer to Section 1.14 for details of how to set or change alarm regions of interest).

Select the Video-In Settings to change different attributes of the video image input such as Hue, Brightness, Contrast, Saturation, Sharpness, and so on. If you like to see the changes take affect as you change these attributes, makes sure to select the check box Live Update the Video-in Frames as Settings are Being Changed. Even if this box is checked, you must click OK to save the changes.

> **NOTE:** Not all video settings are supported by all DVR boards; no action is taken when a board does not support a particular video setting.

Finally, select the Encoding on Alarm tab to specify how the encoder parameters will change when an alarm is detected. This way, you can have a low frame rate and bit rate during normal operation, and you can change to higher frame and bit rates when an alarm is detected. To enable this feature, first check the Adjust encoding on alarm box. Then select the frame rate that is to be used when an alarm is detected. In addition, select how long this frame rate is to be active if no further alarms are detected by setting a time in the Minimum ON time box (in

seconds). After the frame rate reverts to the pre-alarm (normal) rate, you can choose to wait a minimum amount of time before raising the frame rate in response to another alarm. You can set this time in the Minimum OFF time box (in seconds) — typically, this value is set to 0.

During the period defined by the Minimum ON time, the encoder can not only record at a different frame rate, but can also change its parameters. You can now set the entire set of H.264 or MPEG4 encoder parameters that will be used during alarm encoding. You can set a different GOP size, bit rate control algorithm, and bit rates, just as you did for normal encoding in the Encoding tab.

Having set all these parameters, click OK. At any time, you can disregard your changes and exit this window by clicking Cancel.

1.5 Connecting a Camera

After a camera is created, it can be connected to a video input port on the board. In the System Navigator pane expand the Cameras tab and select the camera you want to connect (this camera must not be already connected to another port). Right click on the camera and select Connect from the pop up menu. The Camera Connection window pops up. If needed, you can add, change, or remove existing audio and video encoders that are assigned to this camera by selecting the Change A/V Encoders... button that brings up the Camera Setup dialog box (refer to Section 1.4, “Creating a Camera”, on page 1-5 for details of this dialog box). Select the board and the port number (Video Input) that you want to connect this camera to, and click OK. The camera is now connected to a video input, and the connection is displayed in the System Navigator pane. Expand the Boards tab and look at the video inputs for the particular board that you connected the camera to, for example, if you connected “Camera 1” to video input 1, then you will see “#1 <--- Camera 1”.

Make sure that your physical camera connection is done in the same way; that is, the cable from Camera 1 is connected to the physical video input 1 in the preceding example.

If you want to, after a camera is connected, you can disconnect it by right-clicking on the camera and selecting Disconnect in the pop up menu.

1.6 Creating a Player and Connecting a Decoder

You must create players and connect them to decoders to be able to play back the recorded video streams.

To create a new player, from the Player menu, select New Player and give it a unique name representative of what is playing. Attach the player to a file to be played back (currently, only MP4 players containing H.264 videos can be specified). The video size of the currently selected video is displayed for the currently selected encoded file. You also have the option to connect the player to a decoder channel. When you are done, click OK to save your changes, or Cancel to discard them.

1.7 Connecting a Player to a Decoder

After a player is created, it can be connected to a logical decoder port on the board. In the System Navigator pane, expand the Player tab and select the player you want to connect. This player may not be already connected to any other decoder port. Right-click on the player and select Connect from the pop-up menu. The Player Connection window appears. Select the board and port number to which you want to connect this player. Click OK. The player is now ready to decode and the connection is displayed in the System Navigator pane.

Expand the Boards tab and look at the decoders for the particular board to which you connected the player. For example, if you connected Player 1 to Decoder 1, then you will see `#1<---- Player 1`. This means that the decoder is created on the first S6 chip on the board.

> **NOTE:** Decoders 1–4 are created in the first S6 chip, decoders 5–8 on the second chip, decoders 9–12 on the third chip, and so on. For this release, we recommend you add only two decoders per chip if there are also cameras on that chip.

To disconnect a connected player, right-click the player and select Disconnect from the pop-up menu.

1.8 Starting and Stopping a Recording

You can start recording the primary or secondary encoder on a video channel independent of the other encoder. To start recording, select the camera(s) in the Recording pane and right click and select Start Primary Recording, Start Secondary Recording, or Start All Recording in the pop up menu. You can select multiple cameras using either Shift-Click or Control-Click selection as used in Windows to select multiple items.

To stop recording, select the cameras you want to stop recording, and right click and select Stop Primary Recording, Stop Secondary Recording, or Stop All Recording in the pop up menu.

1.9 Playing Back a Recording Using an External Decoder

You may choose to play back on the PC using a PC-based H.264 decoder, or an AVI MJPEG decoder. Therefore, only one camera can be played back at any time. Select a particular camera in the Recording or System Navigator pane then right-click and select Playback from the pop up menu. If the camera is currently being recorded, recording stops during playback (this is a limitation of PC-based decoders, *not* of the Stretch Reference Design).

The H.264 encoder produces MPEG Elementary Streams and the DVRCP application stores these streams into an mp4 file (one for each camera) with a `.mov` suffix. The DVRCP application launches the default player for a file with a `.mov` suffix. Set up your Windows system such that the default player for files with a `.mov` suffix is one that can play MPEG Elementary Streams; we recommend using Quicktime or Elecard H.264 decoders. You must install these, or similar, applications for playback to work.

The MJPEG encoded frames are saved as AVI MJPEG files. These files can be played back using Microsoft's Media Player.

> **NOTE:** You must exit the application used to play back the recorded video for a particular camera before you can start recording from that camera again.

In addition to launching the decoder from the DVRCP GUI, you can find the files in the same directory where you stored the system configuration file. H.264-recorded files are named `XXX.mov` and MPJEG-recorded files are named `XXX.avi`, where `XXX` in both cases is the camera name.

1.10 Playing Back a Recording Using the Internal Decoder

You can play back H.264-encoded streams using the Stretch H.264 decoder and view the results as either a channel on the Spot Monitor (SMO) or on the Host Monitor (HMO).

Before starting the decoder, add the player you want to use for decoding to one of the tiles in the HMO display (refer to Section 1.11, "Setting up a Monitor and Host Monitor"). To play back a recording from a camera, right-click the player in either the HMO display or from the System Navigator pane and select Start Playback. The result is displayed on the HMO if the player is assigned a tile on the currently selected display.

To stop play back, select the player and right-click Stop Playback in the pop-up menu.

1.11 Setting up a Monitor and Host Monitor

To see live video from cameras connected to the board, you need to set up monitors. The DVRCP application allows you to set up multiple monitors in one system. To set up a monitor, select the New Monitor option in the View menu. The Monitor Settings window pops up. Enter a name for the monitor in the Monitor Name box. This name is used to identify the monitor in the Monitor pull-down menu at the top of the monitor pane.

A monitor displays cameras or decoded video in a tiled rectangular pattern with N rows and M columns. The number of rows and columns in the monitor are specified in the Rows and Columns boxes (these numbers must be between 1 and 4). The size of each tile is specified in the Resolution Decimation box. Select `EQUAL` if you want each tile to be equal to the full resolution of the currently selected video standard; select `2CIF` if you want the same width as `EQUAL` resolution, but one-half the number of the lines; select `CIF` if you want 1:4 of the `EQUAL` resolution; and `QCIF` if you want 1:16 of the `EQUAL` resolution. There are three classic resolutions that can only be used for HMO. The classic resolutions have a fixed size regardless of the selected video standard (NTSC or PAL). Classic CIF is 320x240, Classic 2CIF is 640x240, and Classic 4CIF is 640x480.

A monitor can be used to display images on the PC (Host Monitor [HMO]) or on the display connected to the board (Spot Monitor [SMO]). To use a monitor for both HMO and SMO, check the Spot Monitor box in the Monitor Settings window (2CIF, Classic CIF, Classic 2CIF, and Classic 4CIF resolutions are not supported by SMO). Now select the board to which the Spot Monitor will be connected and select the margins for display and the spacing between images on the Spot Monitor. Click OK when done. You have now set up the monitor and monitor pane displays the tiled rectangular pattern. Each tile is black until you assign a camera to it.

To select a camera or player output to display in a particular tile, select the tile by left-clicking inside it. At the top of the monitor pane is a pull-down called Display that lists all the cameras and players that can be displayed in this tile. Select the camera or player you want to display and the live or decoded image from the camera or player is displayed in that tile. Continue doing this for all tiles in the display. One camera or player can be displayed in only one tile and not in multiple tiles if defining an SMO monitor (HMO-only monitor allows the same camera or player to be displayed in multiple tiles). Make sure you save your monitor configuration in the configuration file by typing Control-S.

Additionally, you can start and stop recording playback, or change the encoded camera's parameters, by right-clicking on a particular tile and choosing the desired action. You can save the raw video frames that are being displayed in an HMO tile into a file. To do so, right-click on a particular tile and select Save YUV Buffers from the context menu. To stop saving the raw video, right-click on a particular tile and select Stop Saving <camera name> YUV Buffers from the context menu.

If you have set up multiple monitors this way, you can switch between them by using the Monitor pull-down menu at the top of the monitor pane. Clicking the pull-down arrow displays a list of all monitors defined, from which you can select the one you want to use.

If a monitor is no longer useful, it can be deleted by first selecting it and then selecting Delete Monitor from the View menu. You can similarly rename a monitor by selecting View -> Rename Monitor.

1.12 Spot Monitor

To enable the Spot Monitor (SMO), you must first define a monitor with Spot Monitor enabled, as described in Section 1.11, "Setting up a Monitor and Host Monitor", on page 1-10. You must also assign a camera or player to each tile in the display using the procedure outlined in Section 1.11. After a monitor is ful-

ly specified, you can enable the Spot Monitor in one of two ways. Under the View menu, if you select Spot Monitor for the board that you are interested in, you will see a list of monitors that can be used for the Spot Monitor. Select the one you want and the Spot Monitor starts displaying the grid pattern of that monitor.

You can also expand the DVR Boards tab in the System Navigator pane and right-click on the Spot Monitor. A list of spot monitors available is displayed and you can select the one you want.

1.13 Sensors and Relays

To test sensors and relays, you must first connect the external alarm board to the DVR board. After the external alarm board is connected, you will see the number of sensors and relays that are supported by the system in the System Configuration Tree. Now, you can trigger relays and configure sensor from the Tools menu.

You can clear the contents of the System Log by selecting the Clear System Log Text menu item under the View menu. Additionally, you can stop writing the informational text into the System Log by selecting the Skip System Log Info menu item under the View menu. You always receive alarm and error message notification regardless of the current setting of the Skip System Log Info menu item.

Relays are actuators that are activated by the DVR application. You can trigger one or more relays by selecting the Trigger Relays... item from the Tools menu. You are presented with a dialog box with a list of all the supported relays. Select one or more relays, then click Apply to trigger the relays. At this point, the LEDs corresponding to the relays on the alarm board light. To clear a specific relay, uncheck the corresponding relay, then click Apply. The associated LED turns off.

Sensors are external inputs that can be triggered. Some sensors are edge triggers, whereas others are level sensitive. You can specify how each sensor should be triggered, as well as its initial enable status. You can also enable or disable an individual sensor.

From the Tools menu select Sensors Configuration.... You are presented with the Sensor Configuration dialog. For each sensor select whether it is Edge Trigger or Level Sensitive by selecting the appropriate item from the combo box next to the sensor. After all the sensors are configured, you must enable them to respond to alarms. You enable or disable a sensor by selecting the check box next to the sensor. When you are done, click OK.

Now, trigger the sensor from the external alarm board for the sensors that are enabled, you will see a message in the system log indicating that the sensor was triggered.

1.14 DVRCP Region Dialog

This dialog is a tool for defining regions. Each frame is divided into 16x16 meta blocks. A *region* is a set of 16x16 blocks. Defining a region is about turning on and off the blocks.

With the left button pressed, drag the mouse over the video area. If the mode is Draw (Draw button pressed) all blocks crossed by the mouse pointer are drawn in semitransparently. If the mode is Erase (Erase button pressed), the blocks are erased.

A motion region has four layers. In multi-layer mode, the dialog enables a table of layer selection controls. For each layer there is a check box, and a radio button with the layer color on it. The radio button selects the layer for drawing or erasing operations. The layer radio buttons are mutually exclusive, so the active (pressed) one indicates the selected layer. Check boxes show or hide the corresponding layer. If the layer is selected, it is always shown regardless of the state of the check boxes.

When a region is defined, press Ok; Cancel discards all the changes and closes the dialog.

1.15 Displaying the System Log

The System Log displays all alarms received by the DVRCP application. To display the log, select System Log from the View menu. A System Log window pops up. This window can be placed anywhere on the desktop, and can also be docked in the DVRCP GUI by clicking on the maximize icon in the top right corner of the window (it can be undocked by clicking on the minimize icon). You can clear the contents of the system log by selecting Clear System Log Text from the View menu. Additionally, if you are running a long test and are not interested in displaying lots of informational text in the system log, you can disable writing informational text by selecting Skip System Log Info from the View menu.

Alarms are displayed with a time stamp and particulars of the camera from which the alarm came. For example:

[13:16:46] ALARM: camera 'Cam 1' blinded, mag=21

[13:19:28] ALARM: motion detected on camera 'Cam 1', mag=22

After an alarm for a camera is displayed, the ALARM button turns red. Subsequent alarms from the same camera are not displayed until the alarm is reset by left-clicking the Reset Alarm button.

This window pops up automatically if an error or alarm occurs.

1.16 Device I/O Control

For testing purposes, DVRCP lets you directly read or write the values of a particular register on a given device I/O control for a given camera. Do this by selecting Device I/O Control from the Tools menu. The Camera field specifies the data port within the selected Device I/O ID. The device ID value and register numbers are specific to the particular I/O device that is used on your DVR board. Before using this dialog box, we suggest that you read the I/O device data sheet. There is no error checking for these values.

To change the value of a register corresponding to a data port, you must select a camera from the list of cameras, enter the Device ID where the selected camera resides, specify the register number to be altered, and enter the new value for the register in hexadecimal. After all the fields are entered, click the Send button.

To read the value of a particular register of a data port, follow the previous steps without entering any data in the Value field. Click the Read button and the new value is displayed in the Value field

1.17 Rebuilding the DVRCP Executable

DVRCP is built using the commercial Qt application development package. To rebuild DVRCP, follow these steps:

1. Obtain the Qt GUI toolkit from Trolltech.
2. Set the environment variables `QT_ROOT` to where Qt is installed.
3. Use the `qmake` project file provided in the source tree to build the entire application.

In MS Windows

DVRCP depends on the `sdvr_sdk_dll.lib`, `sdvr_ui_sdk_dll.lib`, and `sct.lib` libraries, so you must link these libraries. Additionally, DVRCP depends on `ddraw.lib` and `dxguid.lib`, which are part of the Microsoft DirectX SDK. Refer to `sdvr_ui_sdk.html` for more detailed information.

In Linux

DVRCP depends on the `sdvdr_sdk.lib`, `sdvr_ui_sdk.lib`, and the following libraries (depending on the version of Linux you are using):

CentOS 5	Ubuntu 7.10
gcc-c++	g++
libaio-devel	libaio-dev
kernel-dev	kernel-package
qt4-devel	libqt4-dev
libXv-devel	libxv-dev