



WebMedia Plugin Manager

Operational Reference

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Overview This document describes the command set and command-line utility available for controlling the various video-related hardware subsystems found in the Cygnus Set Top Box (STB) running Century Software's WebMedia software tool suite.

The STB supports a number of video subsystems that require software control for configuration and operation. These subsystems include:

- 181-channel analog television tuner
- Composite video and stereo audio input/output system
- S-Video (Y/C) video and stereo audio input/output system
- DVD player including drive and hardware MPEG2 decoder
- MPEG file player including hardware MPEG2 decoder
- Vertical-interval closed-captioning data extraction system
- Video scaling, positioning, and overlay (chromakeyer) system
- NTSC, PAL, and SECAM television standard compatibility
- Separate framebuffer status "layers" for status display, ID bugs, etc.

Other subsystems may be supported in the future, including Digital Video Broadcast (DVB), all screen and audio modes supported by High Definition Television (HDTV), local playback of computer video files, and real-time streaming audio and video playback.

Document Outline In the sections that follow, each supported subsystem is defined and a set of commands listed that are available. These text-based commands can be invoked automatically through Century Software's WebMedia Viewer (described in a separate document) or by using the **wmcmd** command-line utility from within the Linux operating system environment.

wmcmd Command Line Utility

Overview A stand-alone command-line utility has been developed that is capable of executing the entire set of device control commands found in this document. The name of the utility is **wmcmd**, and can generally be found in the /bin directory on the STB.

The wmcmd utility is used extensively by the WebMedia Viewer to issue commands to the various video subsystems in response to events generated by the user as they navigate and interact with the STB. This interaction occurs when using the handheld remote, wireless keyboard, and the STB menu set. In these cases, the WebMedia Viewer and associated software modules will call the wmcmd utility directly.

It is also possible to use the wmcmd utility manually, either by logging into the STB directly or through a modem or Ethernet network connection such as telnet or ssh. Once the user or developer has access to the wmcmd utility, they can invoke any of the commands listed in the sections below simply by entering them on a command line followed by depressing the return key.

Plugin Files The wmcmd utility is based on “plugins”, small support files that add additional commands and capabilities to the wmcmd command set. When the wmcmd utility is launched, it searches for any compatible plugins to expand its command set. Using this capability, new commands can be added in the field or enhancements and bug fixes made to existing commands without having to update the entire program.

WebMedia plugin files compatible with the wmcmd utility will be found in the /bin directory and have a “.wmp” extension.

A separate document is available that contains detailed information on how to develop plugins compatible with the wmcmd utility.

Data File The wmcmd utility maintains a small data file, found in the /tmp directory, that contains the current “state” of the various hardware systems. This support file contains the current video mode, the last selected television channel, and other associated data items.

The file is written in plain text to make development and debugging simplistic. The file may be edited and changes made, which will be read as the current

system state on the next invocation of the wmcmd utility. Each time the wmcmd command is executed, this file is read for current state information. After the command has been executed the file is updated with any new data.

Command Execution To execute a command using wmcmd, simply enter the command after “wmcmd” on the command line as shown below:

```
[user@cygnus]$ wmcmd tuner channelup <cr>
```

After entering the command above and depressing return (denoted by the ‘<cr>’ notation), the wmcmd utility would increment the TV tuner channel up by 1.

Plugin Help In some cases, it is important to know what plugins are being used by the wmcmd utility. To display the list of current plugins (including their file name, version, and description), enter “plugins” for the command as shown below:

```
[user@cygnus]$ wmcmd plugins <cr>
```

Command Help If no parameters are entered on the command line, a brief list of all currently available commands will be displayed. This command listing is also displayed if the user types “help” as the command. In addition, help for a specific subsystem can be displayed by typing the name of the subsystem after typing “help” on the command line. These three methods are shown below:

```
[user@cygnus]$ wmcmd <cr> displays all commands  
[user@cygnus]$ wmcmd help <cr> displays all commands  
[user@cygnus]$ wmcmd help tuner <cr> displays tuner commands
```

Composite Video

Overview The following commands are available for manipulation of the Composite audio and video source. This source is available on the back of the Cygnus system as a set of three RCA jacks: video signal (color-coded yellow), left audio channel (color-coded white) and right audio channel (color-coded red).

Command	Operation
<code>cvideo source</code>	Selects the composite audio/video source.
<code>cvideo mute</code>	Mutes (disables) the <code>cvideo</code> audio output. While muted, the volume up and volume down commands may be used to adjust the audio level value.
<code>cvideo unmute</code>	Un-mutes (enables) the <code>cvideo</code> audio output. The audio output is restored to the current audio level value, which may have been adjusted while muted.
<code>cvideo volup</code>	Increments the <code>cvideo</code> audio output level by one unit. The audio output level range is 0-255, where 0 is no audio output level and 255 is full audio output level.
<code>cvideo voldn</code>	Decrements the <code>cvideo</code> audio output level by one unit. The audio output level range is 0-255, where 0 is no audio output level and 255 is full audio output level.

DVD Player

Overview The following commands are available for manipulation of the DVD audio and video source.

To adjust the audio levels for the DVD player, use the audio level commands available in the MPEG file player.

Command	Operation
<code>dvd source</code>	Selects the DVD audio/video source.
<code>dvd stop</code>	Halts all DVD operations. If the DVD is selected as the video/audio source, the screen is blanked. The stop command also resets the DVD logic so the next play or ffwd operation is from the beginning of the DVD program.
<code>dvd play</code>	Plays the DVD program at the standard play speed. If audio is available, it is output. This command can also be issued from a pause, ffwd, or rew state to resume standard playback.
<code>dvd pause</code>	Pauses the current DVD operation. Pause is a toggle, so issuing a second Pause resumes the previous DVD state. The DVD states that can be paused are play, ffwd, and rew.
<code>dvd ffwd</code>	Forward plays the DVD program at twice the standard speed and mutes audio (if available). The ffwd command may be paused, played, or stopped.
<code>dvd rew</code>	Reverse plays the DVD program at twice the standard speed and mutes audio (if available). The rew command may be paused, played, or stopped.

Overview The following commands are available for displaying ID “bugs” or other bitmapped images in the three status layers. Each layer may contain one ID bug, graphic, or image. Images loaded into the layers may be any of the BMP, GIF, JPEG, and XBM image formats.

Layers are identified by their number (0-2), with layer0 being the highest priority, layer1 stacked in between layer0 and layer2, and layer2 under both layers 0 and 1.

Transparency (alpha value) is specified in a range of 0-255, where 0 is completely transparent and 255 is completely opaque.

Command	Operation
<code>idbug add (layer image)</code>	Adds the specified image to the specified layer. The image to be loaded is specified by a full path.
<code>idbug remove (layer)</code>	Erases (removes) the image found on the specified layer.
<code>idbug position (layer xposition yposition)</code>	Positions the image found on the specified layer at the specified horizontal and vertical values. Setting the xposition value to $-1/-2$ will align the image to left/right safe title. Setting the yposition value to $-3/-4$ will align the image to top/bottom safe title.
<code>idbug setlevel (layer alpha)</code>	Sets the transparency (alpha value) of the specified layer.
<code>idbug info</code>	Displays each layer’s image position, image transparency value, display thread process ID, and the full path of the image being displayed.

MPEG File Player

Overview The following commands are available for manipulation of the MPEG2 audio/video source. This source is provided by the Realmagic EM8400 on-board hardware MPEG2 decoder. The Realmagic hardware can properly display most MPEG2 files and streams, as well as properly decrypt and display DVD movies, which are generally organized as a number of '.vob' files.

DVD Playback To playback a DVD '.vob' file using the MPEG subsystem, the DVD drive must be initialized and mounted as a file device. Once mounted, the DVD directory structure can be traversed to locate the .vob files. Enter the full path and filename to one of these .vob files to begin playback.

File Playback To playback an MPEG2 file from the local system, enter the full path and filename to an MPEG2 encoded file to begin playback.

Streaming Playback To playback an MPEG2 file from a remote system using the HTTP protocol, enter the URL of the remote host, full path, and filename of the MPEG2 encoded file to begin playback. Due to wide variations in network connectivity speeds and Internet latencies, it is possible that the remote file will not playback smoothly.

Command	Operation
<code>mpeg source</code>	Selects the output of the MPEG2 hardware decoder as the audio/video source.
<code>mpeg stop</code>	Halts all MPEG decoder operations. If the MPEG subsystem is selected as the audio/video source, the display is blanked.
<code>mpeg play (file)</code>	Plays the specified MPEG2 encoded file from either the local host or a remote HTTP (web) server.
<code>mpeg pause</code>	Pauses the playback of the current MPEG2 file or stream. Issuing another pause command will continue playback.
<code>mpeg mute</code>	Mutes (disables) the mpeg audio output. While muted, the volume up and volume down commands may be used to adjust the audio level value.

mpeg unmute	Un-mutes (enables) the mpeg audio output. The audio output is restored to the current audio level value, which may have been adjusted while muted.
mpeg volup	Increments the mpeg audio output level by one unit. The audio output level range is 0-255, where 0 is no audio output level and 255 is full audio output level.
mpeg voldn	Decrements the mpeg audio output level by one unit. The audio output level range is 0-255, where 0 is no audio output level and 255 is full audio output level.

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Source Selection

Overview The following commands are available for sequential selection of all supported audio/video sources. This provides a single call point that will sequentially step through all audio/video devices.

Command	Operation
source step	Selects and displays the next audio/video device in the list. If the current audio/video source is the last in the list, the step operation loops around and begins over at the first source in the list.
source info	Displays the currently selected audio/video source.

Overview The following commands are available for manipulation of the S-Video audio and video source. This source is available on the back of the STB as a set of two RCA jacks: left audio channel (color-coded white), right audio channel (color-coded red), and the S-Video 4-pin luminance/chrominance (Y/C) jack.

Command	Operation
<code>svideo source</code>	Selects the svideo audio/video source.
<code>svideo mute</code>	Mutes (disables) the svideo audio output. While muted, the volume up and volume down commands may be used to adjust the audio level value.
<code>svideo unmute</code>	Un-mutes (enables) the svideo audio output. The audio output is restored to the current audio level value, which may have been adjusted while muted.
<code>svideo volup</code>	Increments the svideo audio output level by one unit. The audio output level range is 0-255, where 0 is no audio output level and 255 is full audio output level.
<code>svideo voldn</code>	Decrements the svideo audio output level by one unit. The audio output level range is 0-255, where 0 is no audio output level and 255 is full audio output level.

Overview The following commands are available for manipulation of the system state.

Command	Operation
state restore	Restores the STB to the state currently specified by the “state” data file.
state write (parms)	Allows the user to “write through” the utility to create the state file. The STB is not updated after this operation; if this is desired, execute a “state restore” command to refresh the STB with the new settings.

Write Parameters The “write” command requires 9 parameters to create an initial state file. The parameters are entered one after another on a single line. The required parameters are shown below:

- parm1 - video source
- parm2 - tuner channel
- parm3 - maximum allowed tuner channel number
- parm4 - minimum allowed tuner channel number
- parm5 - video window upper-left corner horizontal position
- parm6 - video window upper-left corner vertical position
- parm7 - video window width
- parm8 - video window height
- parm9 - base HTML directory

The example below shows how this command might be used:

```
[user@cygnus]$ wmcmd state write tuner 11 181 2 10 20 240 180 /usr/html
```

In this example, the state file will be written with the tuner specified as the current video source, the tuner set to channel 11, the tuner range is from 2 – 181, the video window is positioned at 10,20 and is 240 pixels wide and 180 pixels tall, and the HTML base directory can be found at /usr/html.

Overview The following commands are available for manipulation of the standard cable television (CATV) tuner.

Command	Operation
tuner source	Selects the Tuner audio/video source.
tuner channelup	Increments the current channel by 1. If the current channel is the highest channel available, the channel number “wraps” to the lowest channel number.
tuner channeldown	Decrements the current channel by 1. If the current channel is the lowest channel available, the channel number “wraps” to the highest channel number.
tuner channel (n)	Sets the current channel to the value specified by <i>n</i> . If <i>n</i> lies outside the range of valid channels, no change is made.
tuner info	Displays the current tuner channel number.
tuner mute	Mutes (disables) the tuner audio output. While muted, the volume up and volume down commands may be used to adjust the audio level value.
tuner unmute	Un-mutes (enables) the tuner audio output. The audio output is restored to the current audio level value, which may have been adjusted while muted.
tuner volup	Increments the tuner audio output level by one unit. The audio output level range is 0-255, where 0 is no audio output level and 255 is full audio output level.
tuner voldn	Decrements the tuner audio output level by one unit. The audio output level range is 0-255, where 0 is no audio output level and 255 is full audio output level.

Video Window

Overview The following commands are available for the positioning and scaling of the real-time video window.

Command	Operation
<code>vidwin off</code>	Disables all video output and blanks the screen.
<code>vidwin full</code>	Set the display to full-screen mode (no scaling artifacts) for regular video viewing.
<code>vidwin position (x y)</code>	Positions the video display based at the specified x and y positions.
<code>vidwin size (w h)</code>	Sets the size of the video display to the specified width and height
<code>vidwin scale (s)</code>	Scales the size of the video display using the specified scaler. A value of '50' would shrink the size of the display in half while a value of '200' would double it's size.
<code>vidwin info</code>	Displays the current position and size of the video window.

.wav Audio

Overview The following commands are available for the playback of “wav” formatted audio files.

Command	Operation
play (file)	Plays the specified audio file. Control is not returned to the user until playback has completed.

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Command Set Reference

The following table briefly describes all available commands:

Subsystem	Command	Parameters
cvideo	source	-
	mute	-
	unmute	-
	volup	-
	voldn	-
dvd	source	-
	stop	-
	play	-
	pause	-
	ffwd	-
idbug	rew	-
	add	layer file
	remove	layer
	position	layer xposition yposition
	setlevel	layer transparency
mpeg	info	-
	source	-
	stop	-
	play	file url
	pause	-
source	mute	-
	unmute	-
	volup	-
	voldn	-
	step	-
svideo	info	-
	source	-
	mute	-
	unmute	-
	volup	-
state	voldn	-
	restore	-
tuner	write	9 parameters (see state section)
	source	-
	channelup	-
	channeldown	-

	channel	channelnumber
	mute	-
	unmute	-
	volup	-
	voldn	-
	info	-
vidwin	off	-
	full	-
	position	xposition yposition
	size	width height
	scale	scaler
	info	-
wav	play	file

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