Video Server Toolkit Developer’s Guide

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Record of Revision

Version	*Description*
003	May 1999 Incorporates information about a variety of features that are new to version 1.2.

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About This Guide

The Video Server Toolkit (VST) is the SGI broadcast-quality video playback, edit, and record engine that unifies SGI Origin servers and digital media components. VST allows application developers to create powerful, high-performance solutions for broadcast playout. This tool enables (supported) automation systems and developer applications to trigger video for playout through (supported) video output devices on an SGI workstation or server.

The *Video Server Toolkit Developer's Guide* describes how to use VST to play and record digital media and to store the data in, and retrieve it from, a StudioCentral 2.0 archive system.

Also described in this document are the graphical user interfaces (GUIs), which are used to manually control VST, and MVCP (Multi-Unit Video Computer Protocol), which is a command line, control protocol supported by VST.

Note: Video Server Toolkit is the new name for what used to be called VCP-Recorder.

What This Document Contains

The following material is covered in this document:

- Chapter 1, "New Features," provides a streamlined description of the new features in VST, version 1.1.
- Chapter 2, "Overview of Video Server Toolkit," contains an overview of the product.
- Chapter 3, "Using the Video Server Toolkit GUIs," describes how to use the VST graphical user interface (GUI) to play and record clips and to determine status information.
- Chapter 4, "Adding and Removing Clips," describes how to add and remove audio and video media clips from VST.

- Chapter 5, “Using Clip Manager,” describes how to use the VST GUI to manage clips.
- Chapter 6, “Archiving Clips,” describes how to use VST with an archive system.
- Chapter 7, “Virtual Clips,” explains the MVCP commands you use to manipulate virtual clips. A virtual clip is a list of in and out points that refer to one or more clip files.
- Chapter 8, “4:2:2:4 Sampled Video,” describes how to play and record 4;2:2:4 sampled video.
- Chapter 9, “DVB-ASI Time-Delay Server,” describes how you can pause or stop a compressed MPEG-2 transport stream.
- Chapter 10, “FailSafe Operations,” describes how to use redundant servers to provide a high-availability system.
- Chapter 11, “Completing Common Tasks Using MVCP Commands,” explains how to complete common tasks you routinely perform using MVCP commands.
- Appendix A, “Multiport Video Computer Protocol (MVCP) Command Summary,” describes the SGI Multiple-Unit Video Computer Protocol.

The glossary provides definitions of key words used in this document.

HTML versions of the VST books are installed at URL:

- http://*hostname.domain*/VST/VST_DG
- http://*hostname.domain*/VST/VST_AG

Who Should Read This Document

This document is written for Video Server Toolkit application developers and system integrators, and others who are interested in obtaining an overview of the product. It is assumed that the reader is already familiar with broadcast industry concepts.

Related Documentation

Refer to the man pages for specific command help. The man page titles are:

- vtrstart(1)— for startup
- vtrstop(1)— for shutdown
- vtrstat(1)— for status
- vtrclip(1)— for clip management
- mcpanel(1)— for media control panel
- mcclips(1)— for clip manager
- mcstat(1)— for status display
- mccompstats(1)— for compression monitor
- vcp-recorder-controls(5)— for VST controls
- mvcp(5)— Multiport Video Computer Protocol
- vvtr(1)— for VST server
- vtrd(1)— for VST daemon
- vtrvfutil(1)— for VST vframe clip utility

You can list the man pages by entering the following command:

```
% versions long vcp_recorder_eoe | grep man
```

Refer to the following documents for related information:

- *Video Server Toolkit Installation and Administration Guide* (part number 007-3622-*nnn*) for information about installing and maintaining a Video Server Toolkit system

Refer to the following documents for supplementary information:

- *IRIX Admin: Software Installation and Licensing* (part number 007-1364-*nnn*) for information about installing software that runs under IRIX, the SGI implementation of the UNIX operating system
- *IRIX Admin: System Configuration and Operation* (part number 007-2859-*nnn*) for information about IRIX system administration tasks
- *IRIX Admin: Disks and Filesystems* (part number 007-2825-*nnn*) for information about general filesystem concepts and system administration procedures for SCSI disks, XFS and EFS filesystems, logical volumes, and guaranteed rate I/O

Conventions Used in This Document

The following type and symbol conventions are used in this document:

Italics	Used for filenames, pathnames, directory names, emphasis, document titles, variable names, glossary terms, and command-line programs
Bold	Used for keywords
`Fixed-width`	Used for code examples and command syntax
`Bold fixed-width`	Used for user input, including nonprinting keyboard keys
Square brackets ([])	Surround syntax statement arguments that are optional
Square bullets (■)	Indicate substeps within a multistep process
Ellipsis (...)	Indicate that the preceding is repeated
Right angle brackets (>)	Indicate a path through menus to a menu option. For example, “File > Open” means “Under the File menu, choose the Open option.” Right angle brackets also indicate the play button in the graphical user interface.

Chapter 1

New Features

This chapter provides a description of the new features in Video Server Toolkit (VST), versions 1.1 and 1.2. These features are discussed in greater length throughout the book.

New Features in Version 1.2

Version 1.2 of VST provides support for the following new features:

- FTP with in and out points; see "Transferring a Clip Segment" on page 54.
- DVB-ASI recording, see the *Video Server Toolkit Installation and Administration Guide*.
- Backup server support, see the *Video Server Toolkit Installation and Administration Guide*.
- Virtual clips, see Chapter 7, "Virtual Clips"
- 4:2:2:4 sampled video with alpha support, see Chapter 8, "4:2:2:4 Sampled Video"

New Features in Version 1.1

Version 1.1 of VST provides support for the following new features.

Format Support

- DVCPRO—a video compression format created by Panasonic
- O2 support for MPEG
- DVB-ASI

422 Deck Control Support

- Sony BVW-75 Betacam SP tape deck
- Sony Digital Betacam DVW-500
- Panasonic AJ-D780 4X Transfer deck
- Panasonic AJD950W DVCPRO tape deck

Automated Playout and Edit Control Support

- Odetics Control System
- Sony P2 remote 9-pin and RS 422
- Buf VTC-4000
- NewsMaker StarDrive
- Panasonic AJ-A850 multi-VTR edit controller.
- Accom Axial edit controller’s autoedit feature

Miscellaneous Support

- IRIX 6.3 and IRIX 6.4
- Numerous new MVCP commands
- Archiving media using StudioCentral 2.0

Overview of Video Server Toolkit

This chapter contains an overview of Video Server Toolkit (VST), which is a software product used by application developers and systems integrators to enable a SGI Origin server or O2 workstation to be used as a video server. VST provides real-time, frame-accurate recording and playback of broadcast-quality digital media data.

Note: The term *Origin* in this document refers to Origin200, Origin2000, and Onyx2 servers. Where there is a distinction, the pertinent product name is used.

The following topics are discussed in this chapter:

- "Functional Overview" on page 3
- "Software Overview" on page 6
- "Hardware Overview" on page 14

Functional Overview

Digital media data is brought into VST by recording it from a live feed or a videotape deck, retrieving it from a StudioCentral 2.0 archive system, or copying it from a file. The data can then be played out to a broadcast system, a video port, or a videotape deck; sent to an MPEG-2 decoder for playout; or transferred to a StudioCentral 2.0 archive system for storage and distribution.

VST can be automatically controlled by an application or through the use of a broadcast system *automation controller*, which can control video servers using serial control protocols, such as the Louth VDCP or Odetics VDR protocols, or an edit controller that can control a VTR using the Sony RS-422 VTR protocol.

VST can also be manually controlled by using the VST graphical user interface or can be controlled by an application using the Multiple-Unit Video Computer Protocol (MVCP).

This functionality is shown in Figure 2-1.

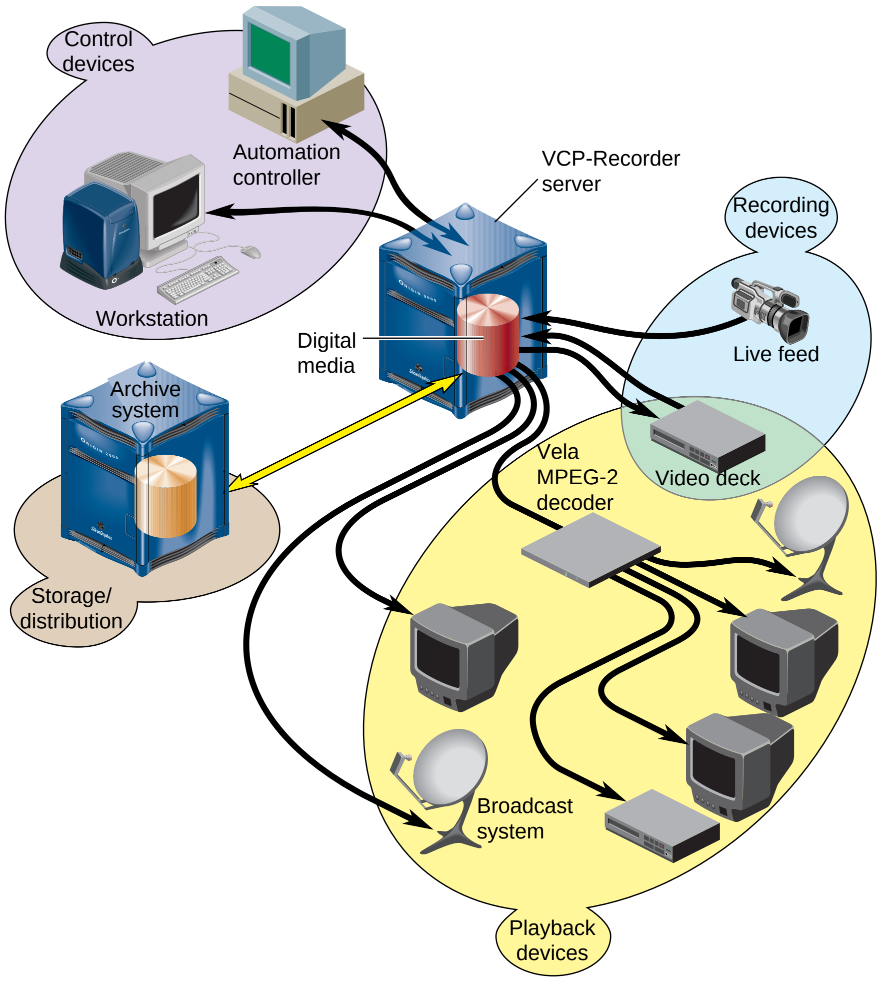


Figure 2-1 Functional Overview

The graphical user interface (GUI), which is used to control VST, was designed as both a demonstration of the capability of VST and a beginning point from which broader graphical applications can be developed. The GUI consists of screens that are used to record and play digital data, determine status information, and manage digital media data stored in VST.

The GUI screen that is used to record and play digital media data is the VST Media Control Panel (mcpanel), which is shown in Figure 2-2. The control panel is similar in function to a standard videotape player or recorder. For example, there are buttons in the control panel to cue the video, play it, stop the playback, and so on.

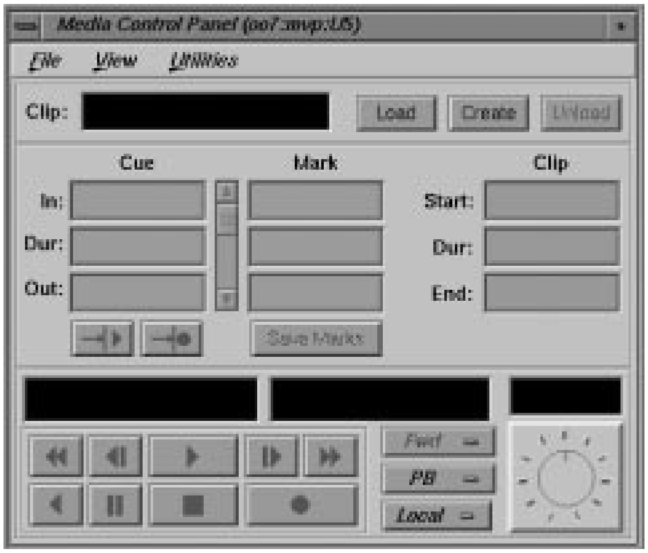


Figure 2-2 Video Server Toolkit Media Control Panel

The graphical user interface is described in Chapter 3, “Using the Video Server Toolkit GUIs.” The MVCP protocol, which was used to implement the VST GUI, is described in Appendix A.

Software Overview

The VST software provides scalability and maximum flexibility, while enabling real-time, frame-accurate control of digital media. The software includes the following:

- Core software, which provides the basic VST functionality for playback and recording of digital data.
- Control interface modules, which provide device-dependent code. For example, there is a control interface module that contains the code that is specific to a Louth *automation controller.*
- Media device interface modules, which contain format-dependent code that provides access to the *port*s over which media is played and recorded. For example, there is a media device interface module that contains the code that supports the Vela Research SCSI-attached MPEG-2 decoder.
- Format interface modules, which provide handlers for accessing specific digital media storage formats. For example, there are format interface modules for the VST variable-frame format, the MPEG-2 stream-based format, and the *DVCPRO* Data Interchange Format (DIF).

Figure 2-3 shows the primary software components in VST.

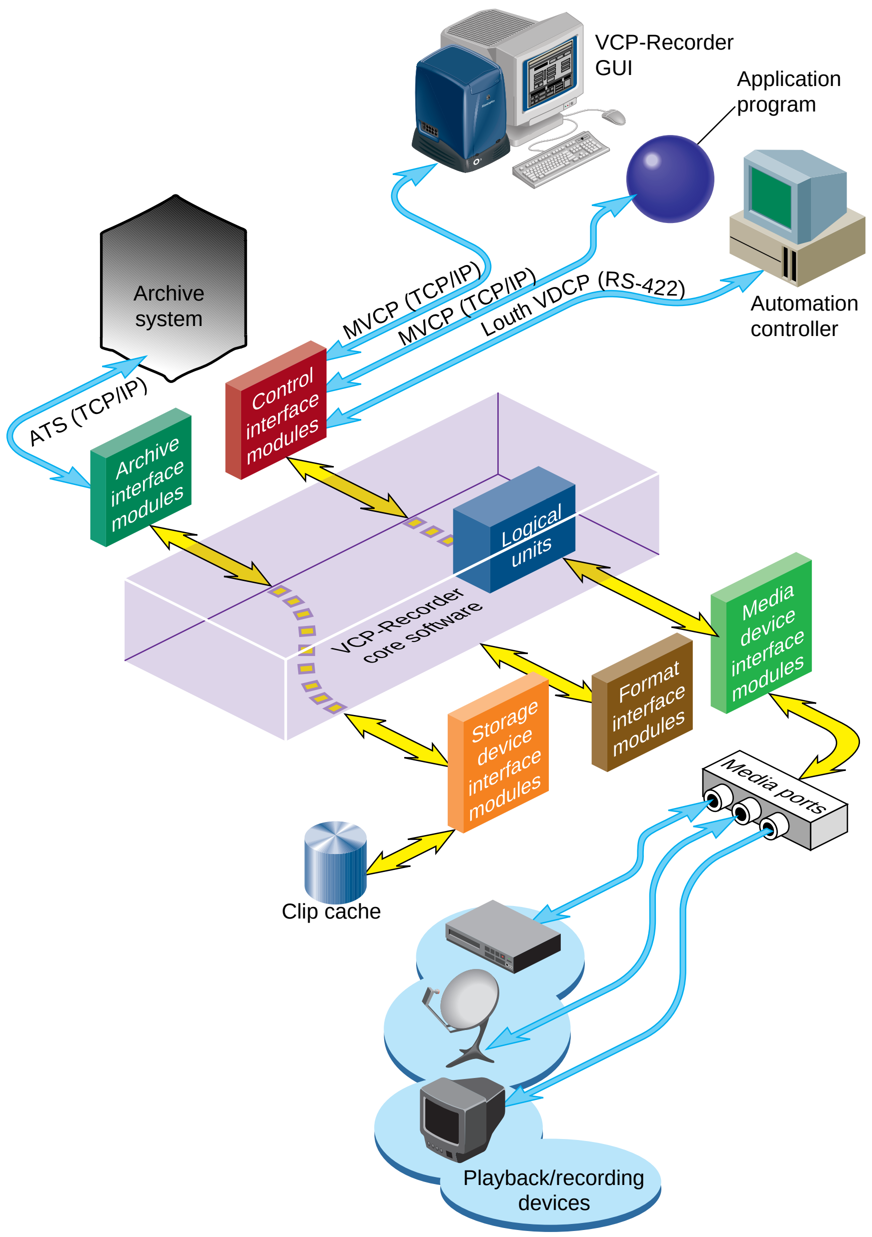


Figure 2-3 Video Server Toolkit Software Components

The remainder of this section discusses the software components shown in Figure 2-3.

Clip Cache

Digital media data that Video Server Toolkit (VST) processes for playout and recording is stored in one or more *clip cache*s. Each unit of data that is stored in a clip cache (for example, a movie) is called a *clip*.

Clips can be added to the cache by:

- Using VST to record the clip
- Generating the clips elsewhere and adding them to the cache
- Transferring clips from a StudioCentral 2.0 archive system

Clips can be transferred from the clip cache into a StudioCentral 2.0 archive system for storage.

Core Software

The core software provides the basic VST functionality for playback and recording of digital data. It utilizes the IRIX operating system as well as portions of the SGI Digital Media Libraries.

The core software provides the following basic functionality:

- Archive management, which oversees the transferring of *asset*s into and out of a StudioCentral 2.0 archive system
- Clip cache management, which maintains persistent information about the media that is either stored in the *clip cache* or is in the process of being transferred into or out of it
- Controller management, which links one or more external control protocol modules (for example, *Louth*) to the internal VST processing logic
- Configuration management, which automatically configures the VST software according to the hardware capabilities of the system on which it runs

VST provides a core library that supports external interface modules, dynamic shared objects (DSOs) that contain the code specific to a given external entity. When VST is started, the VST software loads and initializes all external interface modules it locates so that the modules can be used.

Archive Interface Module

VST has an archive interface that enables VST to retrieve *clip*s from, and store them in an archive asset repository. VST transfers the media to and from an archive system using the Asset Transfer Service (or ATS), communicating with ATS using the FTP-like ATS protocol.

Archive interface modules contain the code that is specific to a StudioCentral 2.0 archive system. These modules provide the support that is needed to locate a given *clip* in the StudioCentral 2.0 archive system and bring it into VST, and to store a clip from VST in the StudioCentral 2.0 archive system.

Control Interface Module

Control interface modules allow various *automation controller*s and digital media applications to control the use of VST. These modules translate to and from external control protocols.

The following control interface modules are provided:

- The Louth Video Disk Communications Protocol defined by Louth Automation. This control protocol provides control of VST over RS-232, RS-422, or TCP/IP. The VST's Louth interface module supports back-to-back play and record (subject to restrictions imposed by the video I/O port capabilities) and archive management.
- The Sony RS-422 VTR (also called, 9-pin or P2) protocol. VST supports this protocol through a full-featured VTR deck-emulation mode that includes frame-accurate insert editing and variable-speed shuttle.
- Multiple-Unit Video Computer Protocol (MVCP) defined by SGI. This control protocol provides full-featured control of VST through TCP/IP. This control interface module supports archive management, multiple-unit control, and event monitoring, and provides access to advanced features of SGI devices.
- The *Odetics* protocol is a Video Disk Control Protocol similar in purpose to the Louth VDCP. Unlike Louth, it is built upon the foundation of the Legacy Sony RS422 VTR Control Protocol, with which it shares many commands and features. Odetics adds to the Sony protocol commands specific to Video Disk Recorders, such as back-to-back playout and recording and clip management operations.

Storage Device Interface Module

Storage device interface modules provide access to the storage systems on which the *clip cache* resides. Currently, there is a storage device interface module for the IRIX XFS filesystem.

Format Interface Module

Format interface modules provide handlers for accessing specific digital media storage formats. VST currently provides format interface modules that support the following:

- VST variable-frame format (uncompressed, *Rice* 2:1 lossless compression, and motion JPEG)
- MPEG2 stream-based format (transport and program streams)
- DVCPRO Data Interchange Format (DIF)
- DVB-ASI (Digital Video Broadcast Asynchronous Serial Interface) protocol

Note: *vtrmpegutil* is a utility that parses MPEG2 Program and Transport streams. It provides syntax reporting for Transport streams, semantic analysis of PID mapping and multiplexed bitrate. For more information, see the *vtrmpegutil* man page.

Media Device Interface Module

Media device interface modules provide access to the *ports* over which the media is played and recorded (that is, the media ports). Each type of I/O port typically has its own media device interface module.

VST has media device interface modules for the following:

- SGI Video Library. This media device interface module supports the Digital Video Option (*DIVO*) on Origin servers and the video port on O2 workstations.
  – DIVO enables broadcast-quality video and embedded audio, and is used for the recording and playback of uncompressed and *Rice* compression formats.
  – DVC/DIVO is the DVCPRO version of the DIVO card. It performs all the functions of the DIVO card and DVCPRO.

  - DVB-ASI (Digital Video Broadcast Asynchronous Serial Interface) protocol
  - The O2 video port is used for playback and recording of the motion JPEG format, and is suitable for a test or development environment.

    Note: The O2 video port is usually referred to as *mvp* (multiport video processor) or *O2Video*.
- Vela Research four-port analog decoders. This media device interface module enables the playback of MPEG-2 format data on Origin servers and O2 workstations.
- V-LAN transmitters. This media device interface module enables frame-accurate capture from, and lay-down to, videotape decks.
- Diaquest. Direct Sony 422 control of videotape decks; used in the same way as V-LAN.

DVB-ASI Format

The Viewgraphics MediaPump is a PCI-based, DVB-compliant adaptor board. It multiplexes MPEG 2 transport streams and transmits them over coaxial cables using the DVB-ASI (Digital Video Broadcast Asynchronous Serial Interface) protocol.

For more information, see the *Video Server Toolkit Installation and Administration Guide*.

DVCPRO Format

The DVCPRO compression algorithm compresses four video frames into one frame. This compression format is useful for transporting video data across networks, such as between video decks. DVCPRO-compressed frames in 1 times mode can be displayed normally. The following section describes how to display DVCPRO-compressed frames in 4 times mode

Displaying 4 Times Mode DVCPRO-Compressed Frames

The Serial Digital Transport Interface (SDTI) is a video networking protocol that allows arbitrary data to be packeted and transmitted over the SMPTE-259M Serial Digital Interface (SDI). VST supports playback and recording of DVCPRO (DIF) over SDTI at 1 times and 4 times normal speed. When recording SDTI / DVCPRO using DIVO-DVC, the incoming signal can be looped to the output (EE mode) in either 1x or 4x mode.

Logical Playback and Record Units

Logical *unit*s enable media *port*s to play and record *clip*s. Each VST unit can be thought of as a logical videotape recorder (*VTR*) transport that is capable of loading, cueing, playing, and recording clips using a specific media port.

Logical units are created automatically by VST when the VST GUI or an *automation controller* is used. When the *MVCP* protocol is used, a command requests that a unit be created or that a unit created by another control connection be used.

There is normally a one-to-one relationship between a control connection to VST and a VST logical unit, and between a logical unit and a media port. This is shown in Figure 2-4.

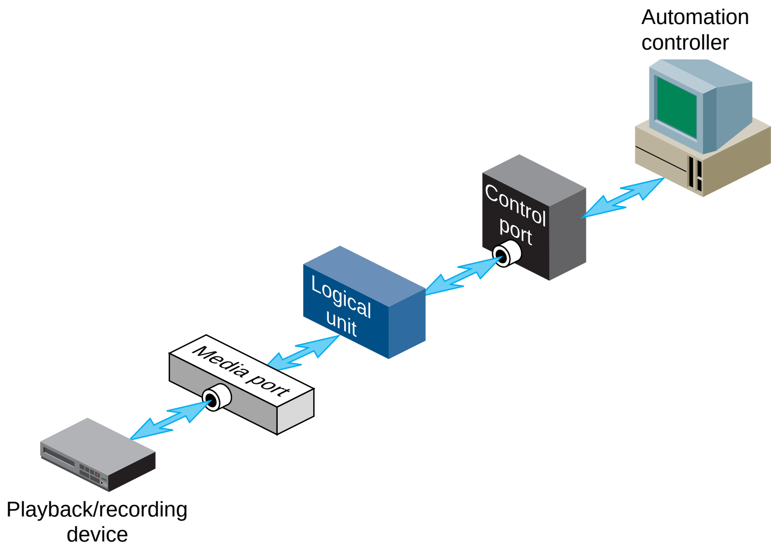


Figure 2-4 One Logical Unit With One Control Connection

A single unit can also be controlled by multiple control ports. For example, two tightly integrated applications might control a single unit, where each application would have its own control port. This is shown in Figure 2-5.

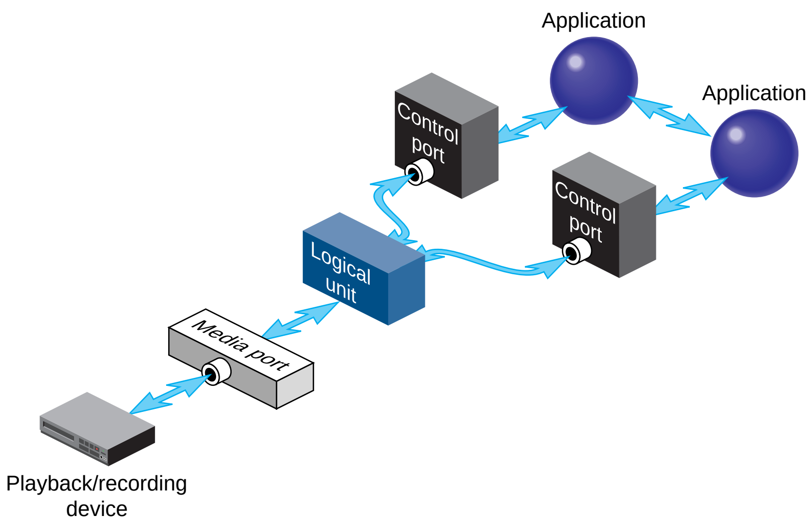


Figure 2-5 One Logical Unit With Two Control Connections

Caution: Exercise extreme care when the control of a unit is shared between two controller connections. Interfering with a unit owned by a Sony, Odetics, or Louth *automation controller* leads to unpredictable behavior in VST.

A media port can be controlled by multiple logical units. For example, an application with one control connection and two units could be cueing one clip while playing out another, enabling back-to-back playout of clips when allowed by the media format. This example is shown in Figure 2-6.

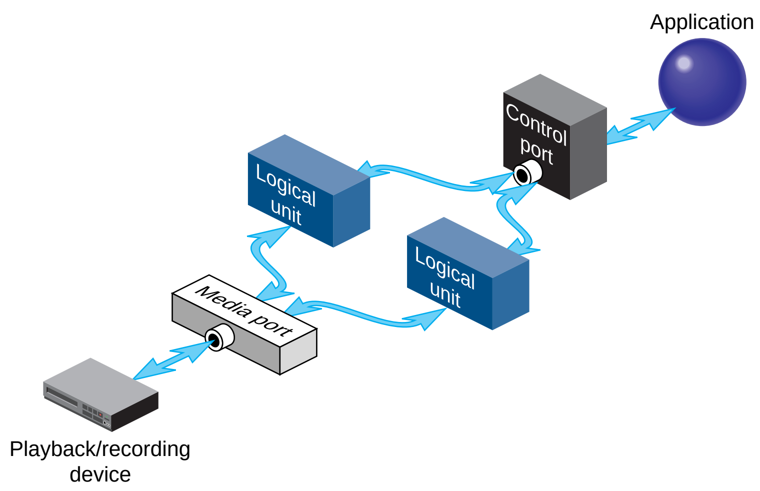


Figure 2-6 Two Logical Units With One Control Connection

If a media port supports multiple logical units, the sharing is subject to the device-sharing characteristics of that port.

Hardware Overview

A VST hardware configuration consists of the following components:

VST Server	O2, O200 with GIGAchannel, O2000
Storage	Internal ultraSCSIs or external CIPRICO 7000 RAIDS
Internal Devices	MVP (video card for O2), DIVO (video card for O200 and O2000), DIVO-DVC (video card for Panasonic setups using DVC Pro), RAD (audio card), ENET/ESER (ethernet cards), PCI fiberchannel, PCI DVB-ASI, ATM.
External Devices	Controllers: Sony controllers, Panasonic AJ-A850, Louth ADC, Odetics. Decks: connected using VLAN Media recorders/playback units: Vela, decoders

A typical hardware configuration is shown in Figure 2-7.

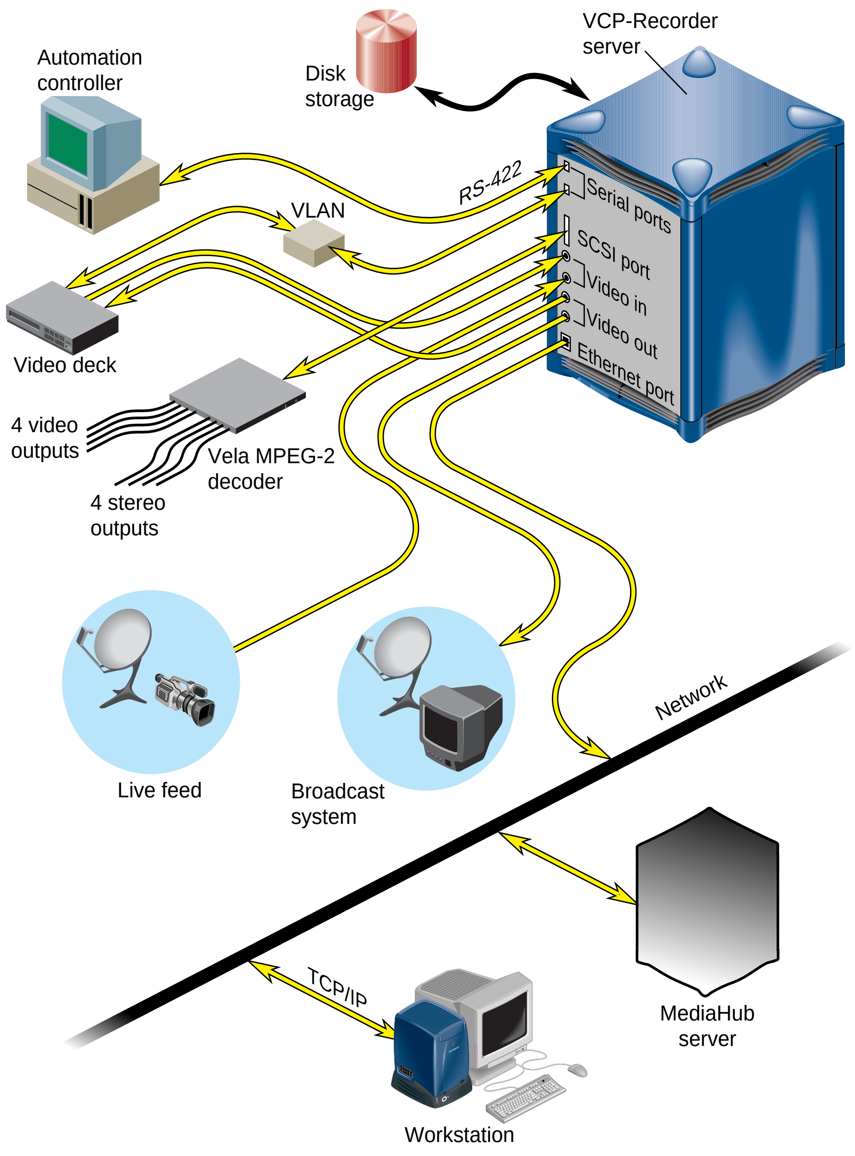


Figure 2-7 Video Server Toolkit Hardware Components

Video Server Toolkit Server

The Video Server Toolkit (VST) server can be an Origin200 or Origin2000 Scalable Symmetric Multi-Processing (S2MP) server, or an O2 workstation.

Origin Servers

The Origin servers provide massive processing, storage, and throughput capabilities to satisfy even the largest production requirements. They are built from a scalable node architecture, enabling small configurations that can be incrementally upgraded to the larger configurations. Each Origin server can be configured as a single module or as multiple modules with a single system image.

The Origin servers provide:

- Playback and recording of uncompressed and *Rice* compression video data with the Digital Video Option (*DIVO*) card.
- DVCPRO, Data Interchange Format (DIF), a compression algorithm that compresses four video frames into one frame. This compression format is useful for transporting video data across networks, such as between video decks.
- Playback of MPEG-2 (system and transport streams) data with the Vela Research SCSI-attached decoder.
- GIGAchannel expansion box for the O200, which allows the addition of up to five DIVO boards.
- DVB-ASI is a PCI-based, DVB-compliant adaptor board. It multiplexes MPEG 2 transport streams and transmits them over coaxial cables using the DVB-ASI (Digital Video Broadcast Asynchronous Serial Interface) protocol.

O2 Workstations

The O2 workstation provides a low-cost, entry-level video server platform that supports some but not all of the features supported by the Origin platform.

The O2 workstation provides:

- Playback and recording of M-JPEG video
- Playback of MPEG-2 (system and transport streams) data with the Vela Research SCSI-attached decoder

Disk Storage

The VST disk storage holds the XFS real-time filesystems that contain the movies, trailers, commercials, and other digital media data stored in the *clip cache*. The descriptive information about VST *clip*s, for example, clip names, duration, *edit point*s, and so on, are also stored on these filesystems.

The VST storage system supports the use of scalable storage to enable the total disk space to range from only a few gigabytes to hundreds of terabytes or more. The type of disk storage that is used depends upon several factors, including the number and size of stored clips, the use of RAID, and the required availability (uptime) of the system.

Three different types of disk storage are available:

- Normal XFS filesystems residing on a single disk drive. This type of disk storage does not provide redundancy.
- Standard disk storage, sometimes called RAID-0, in which several disk drives are striped into XLV logical volumes. This type of disk storage does not provide redundancy but it does provide higher bandwidth than XFS on a single disk drive.
- RAID storage, such as RAID-3 and RAID-5, which provides high-availability, redundant digital storage.

External Devices

VST supports the use of the following external devices:

- Vela Research 4-port MPEG-2 decoders, used for the playback of MPEG-2 format data. Vela decoders are connected to the VST server through a SCSI connection.
- V-LAN transmitters, used to control a videotape deck for frame-accurate capture and lay-down. A V-LAN transmitter is connected to a VST server through an RS-422 serial port connection.
- Broadcast system *automation controller*s that use, among others, the Odetics and Louth Video Disk Communications Protocol, defined by Louth Automation. Automation controllers are connected to the VST server through an RS-422 serial connection or a TCP/IP Ethernet connection.

- DVB-ASI, from Viewgraphics, is a PCI-based, DVB-compliant adaptor board. It multiplexes MPEG 2 transport streams and transmits them over coaxial cables using the DVB-ASI (Digital Video Broadcast Asynchronous Serial Interface) protocol. For more information, see Chapter 8, “Installing the DVB-ASI Adapter Board,” in the *Video Server Toolkit Installation and Administration Guide*.
- Edit controllers, including Panasonic AJ-A850, Buf VTC4000 / RM4000, and the edit control portion of the Sony DVW 500 digital Betacam deck.

For more information about installing these devices for use with VST, see the *Video Server Toolkit Installation and Administration Guide*.

For a complete list of external devices that interface with VST, see the release notes.

Internal Devices

Video Server Toolkit supports the use of the following internal devices:

- DIVO, a CCIR 601 format digital video board that provides two sets of incoming and outgoing video / audio signals and lossless 2:1 compression using the Rice format. DIVO enables you to choose square or rectangular pixels, and compatibility with PAL and NTSC.
- DIVO plus DVCPRO,. which compress four video frames into one frame using cosine compression.
- MVP, which provides standard, uncompressed, analog or CCIR 601 audio / video using RCA jacks, S-Video jacks, stereo input and output audio, the choice of using square or rectangular pixels, and compatibility with PAL and NTSC.

Video Device Control

V-LAN transmitters provide the means by which VST can control remote video devices, such as video decks.

VST can also control remote video devices directly using Sony 422 deck-control software provided by DiaQuest.

Using the Video Server Toolkit GUIs

The Video Server Toolkit (VST) graphical user interfaces (GUIs) were designed as both a demonstration of the VST capability and a beginning point from which broader graphical applications can be developed. The GUIs consists of the following:

- Media and Deck Control Panel (mcpanel), which enables *clip*s to be played and recorded
- Unit Status Monitor (mcstat), which displays the status of VST ports
- Clip Manager (mcclips), which is used to manage clips, including getting them from, and writing them to a StudioCentral 2.0 archive system

The following topics are discussed in this chapter:

- "Playing and Recording Clips with mcpanel" on page 20
- "Monitoring the Status of Video Server Toolkit (mcstat)" on page 44

Playing and Recording Clips with mcpanel

This section describes how to use the VST Media Control Panel (mcpanel)and how to control a video deck. The following topics are discussed:

- "Starting the Video Server Toolkit Media Control Panel" on page 20
- "Determining Available Ports" on page 23
- "About the Media Control Panel" on page 26
- "Playing or Recording an Existing Clip" on page 33
- "Creating a New Clip" on page 35
- "Changing Cue Points and Edit Points" on page 36
- "Controlling a Video Deck" on page 37

See the *Video Server Toolkit Installation and Administration Guide* for information about how to copy digital media data from a file into the VST *clip cache*.

Starting the Video Server Toolkit Media Control Panel

To establish a control connection to VST and start the Media Control Panel, enter the following, either from the workstation on the VST server or from a workstation on which the VST tools software[1] has been installed:

```
% /usr/vtr/bin/mcpanel  -h hostname  -p videoPort|unit
```

For more complete control of mcpanel, use it with the following set of flags:

```
% /usr/vtr/bin/mcpanel  [-h hostname]  [-p videoPort|unit]  [-D deckCtlPort]
[-c clipname]  [-r]  [-C "inpoint outpoint"]  [-P]  [-v loglevel]
```

[1] To run the Media Control Panel from a remote workstation, the vst_eoe.sw32.tools subsystem must be installed on a workstation that has IRIX 6.2 or later. See the *Video Server Toolkit Installation and Administration Guide* for more information.

Table 3-1 describes each of the options available when starting the VST Media Control Panel.

Table 3-1 VST Media Control Panel Options

Option	Description
-c	Identifies the name of a clip to be loaded when the Media Control Panel starts. If this option is not specified, no clip is initially loaded.
-D	Specifies the video deck control port (*deckCtlPort*) to be used for V-LAN communication to an external video storage device, such as a digital videotape recorder (VTR). The deck is controlled by the Deck Control Panel. If this option is not specified, deck control is not available.
-h	Identifies the host on which VST runs. This enables the Media Control Panel to be run from a remote workstation. If this option is not specified, the local host is assumed.
-p	Identifies the VST host video *port* or *unit* to which the control connection is made. *videoPort* is the VST host video port to which the control connection is made. If you specify a port, VST creates a new logical unit that is used by this control connection. *unit* is the VST logical unit to which the connection is made. If you specify a unit, it must have already been created by another control connection. The control connection being made shares the unit with the control connection that created the unit. (Units are named with a capital “U” followed by a number, for example, U4.) If this option is not specified, the first video port on the VST is used.
-r	Specifies that if an mcpanel already exists for the video port, the existing mcpanel should be raised on the desktop instead of creating a new one.
-C	Specifies that the loaded clip should be cued with the specified in- and out-points. If “*” is specified for either *inpoint* or *outpoint*, the default edit in-point or out-point is used.
-P	Specifies that the clip whose name is *clipname* should start playing when the Media Control Panel starts.
-v	Sets the logging verbosity level to *loglevel*. The default is 0, meaning all log messages up to and including Info priority are written to STDOUT. (The mcpanel program writes its log messages to STDOUT.) The values for *loglevel* are defined in Table 3-2.

Table 3-2 shows the log severity levels and codes, which are listed in decreasing order of severity

Table 3-2 Log Severity Levels

Priority	Log Level	Description
Emergency	-6	Panic condition.
Alert	-5	Condition that should be corrected immediately, such as a corrupted system file.
Critical	-4	Critical condition that has system-wide impact, such as a hard device error; immediate action required.
Error	-3	Problem that needs correcting but does not require immediate action.
Warning	-2	Possible problem but could be a transient problem that corrects itself.
Notice	-1	Condition that might require attention, but is not an error condition.
Info	0	Informational message.
Debug*n*	*n*	Informational message that normally is of use to engineers for debugging; may be Debug1, Debug2, or Debug3, with Debug3 producing the most debugging information.

Priority levels Info and Notice result from user-caused actions. Priority levels Warning through Emergency generally result from system problems.

The VST Media Control Panel, shown in Figure 3-1, is displayed in its own window. This control panel represents a unit, or logical *VTR*, that is used to play and record *clip*s. The buttons in the Media Control Panel are similar in function to those of a standard VTR. For example, there are buttons to load a clip, play it, and pause.

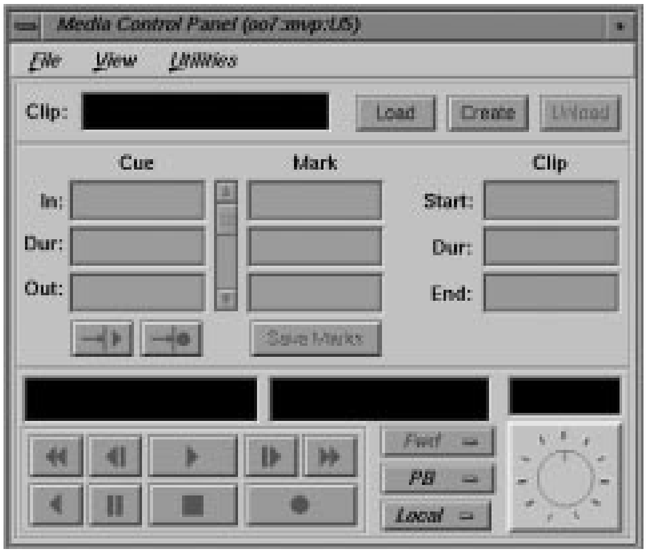


Figure 3-1 Video Server Toolkit Media Control Panel

See “About the Media Control Panel” on page 26 for a detailed description of the Media Control Panel.

Determining Available Ports

To determine which video and deck control ports are available on a VST server, use the */usr/vtr/bin/vtrstat* command as follows:

```
% /usr/vtr/bin/vtrstat -ports
#  Port    Type    Description
----------------------------------------------------------
0  mvp     Video   SGI O2Video (Multiport Video Processor)
```

See the vtrstat(1) man page for more information.

Using Telnet to Determine Available Ports

To determine which video and deck control ports are available on a VST server, establish a telnet connection to the VST server and then use the MVCP *PLS* (List Ports) command. (See “Establishing an Interactive MVCP Connection” on page 125 for details.) The following example shows the type of information returned by *PLS* for an O2 server. This example identifies “mvp” as the video port (VID) on the server:

```
PLS
201 OK
mvp BOTH "SGI O2 (MACE) Video Processor" VID
```

The following example shows the *PLS* command output for an Origin server. This output identifies “vlan_1” as the deck control port (DECK) and “DIVO_*n*,” where *n* is 0-7, as the video ports (VID):

```
PLS
201 OK
vlan_1 BOTH "VLAN Deck Control" DECK
DIVO_0 BOTH "SGI XT-DIVO Digital Video Option" VID
DIVO_1 BOTH "SGI XT-DIVO Digital Video Option" VID
DIVO_2 BOTH "SGI XT-DIVO Digital Video Option" VID
DIVO_3 BOTH "SGI XT-DIVO Digital Video Option" VID
DIVO_4 BOTH "SGI XT-DIVO Digital Video Option" VID
DIVO_5 BOTH "SGI XT-DIVO Digital Video Option" VID
DIVO_6 BOTH "SGI XT-DIVO Digital Video Option" VID
DIVO_7 BOTH "SGI XT-DIVO Digital Video Option" VID
```

See “PLS” on page 135 for more information.

Determining Units in Use

To determine which units are in use on a VST server, use the */usr/vtr/bin/vtrstat* command as follows:

```
% /usr/vtr/bin/vtrstat -units
Unit  Owner        Port    Clip       Function Location
-----------------------------------------------------------
U3    mvcp/oo7     mvp     *          IDLE     *
```

See the vtrstat(1) man page for more information.

Using Telnet to Determine Units in Use

To determine which units are in use on a VST server, establish a telnet connection to the VST server and then use the MVCP *ULS* (List Units) command. The following example shows the information returned by the *ULS* command:

```
ULS
201 OK
U1 mvcp/originserver mvp BOTH * DONE IDLE * 0 *
U2 mvcp/originserver mvp BOTH * DONE IDLE * 0 *
```

This example indicates that there are two units (U1 and U2) on the server, both using the mvcp port on the host named originserver. The units were opened for input and output (BOTH) and they are currently idle.

See “ULS” on page 137 for more information.

Starting the Media Control Panel

The following are examples of starting the Media Control Panel:

- When the Media Control Panel is started by entering the following command, a control connection is made to the DIVO_1 video *port* on the “origin_server” host using a newly added unit. Messages with a severity level of Info and above are written on STDOUT:

  ```
  % /usr/vtr/bin/mcpanel  -h origin_server  -p DIVO_1
  ```

- When the Media Control Panel is started by entering the following command, a control connection is made to the U9 unit, which must already exist. Messages with a severity level of Debug2 and above are written on STDOUT:

  ```
  % /usr/vtr/bin/mcpanel  -v 2  -h origin_server  -p U9
  ```

- When the Media Control Panel is started by entering the following command, a control connection is made to the mvp video port on the “o2server” host. Messages with a severity level of Info and above are written on STDOUT:

  ```
  % /usr/vtr/bin/mcpanel  -h o2server  -p mvp
  ```

About the Media Control Panel

Figure 3-2 shows the appearance of the Media Control Panel after a *clip* has been loaded. The header of the control panel identifies the host, control *port*, and *unit* to which the control panel is connected.

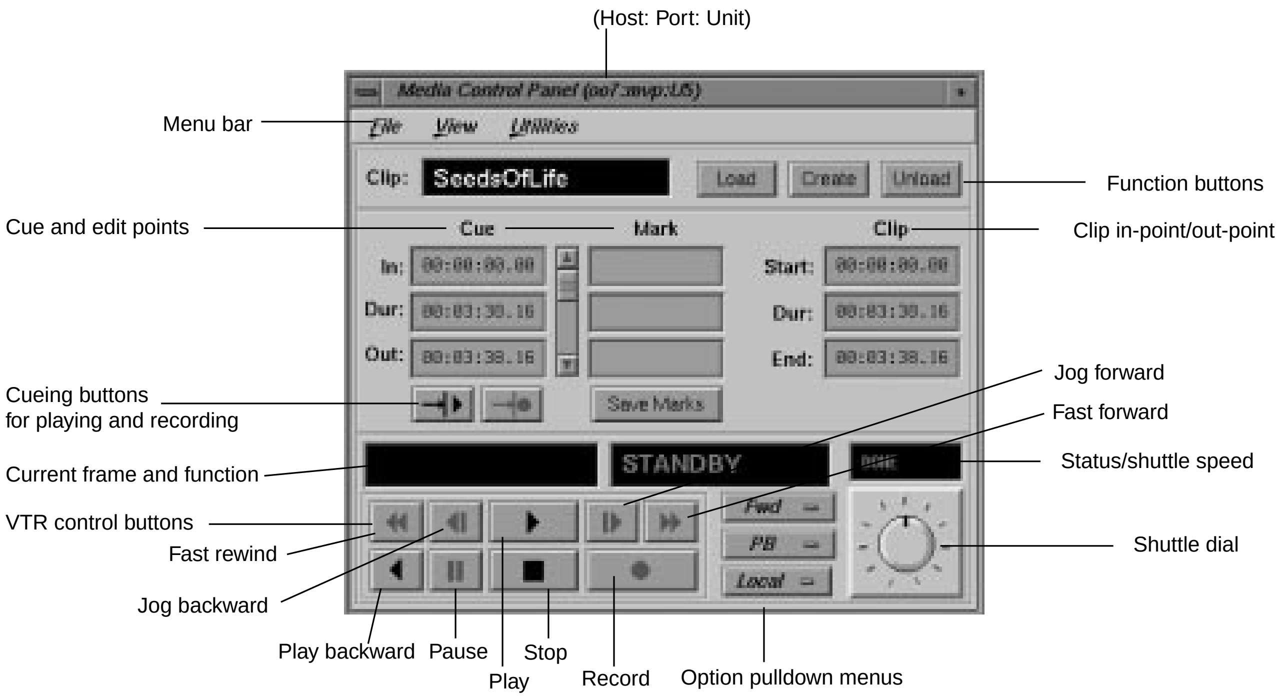


Figure 3-2 Video Server Toolkit Media Control Panel With a Clip Loaded

The menu bar gives you access to the following:

- The File pulldown menu, which lets you load or unload an existing *clip*, create a new clip, or close the Media Control Panel. Most of the functions available in this pulldown menu are available through buttons in the Media Control Panel.
- The View pulldown menu, which lets you access the Deck Control window. The Deck Control window, shown in Figure 3-5, is used to control a video deck attached to the VST host. See "About the Deck Control Window" on page 39 for more information.
- The Utilities pulldown menu, which lets you access the following:
  - IRIX audio panel
  - IRIX video panel
  - VST Unit Status Monitor (mcstat), described in "Monitoring the Status of Video Server Toolkit (mcstat)" on page 44
  - VST Clip Manager (mcclips), described in Chapter 5, "Using Clip Manager"

The following describes each of the displays and buttons in the Media Control Panel:

- The Clip field contains the name of the *clip*, if one is loaded. The display is blank if a clip is not loaded.
- The *Load*, *Create*, and *Unload* function buttons let you load an existing clip, create a new one and record into it, and unload a clip, respectively.
- The *cue points* are used to move around within a clip and to control the portion of the clip that is played. An in-point (In), the duration (Dur), and an out-point (Out) are specified using the following format:

  hh:mm:ss:ff

  where *hh* is the hours, *mm* is the minutes, *ss* is the seconds, and *ff* is the frame number. In drop-frame mode, the final colon is replaced by a period:

  hh:mm:ss.ff

  For example, if a clip with a cue in-point of 00:00:30.00 is cued for playing, it is cued at thirty seconds.

  See "Changing Cue Points and Edit Points" on page 36 for information about how to change the cue points.

- The *edit point*s (under “Mark” in the Media Control Panel) are persistent values stored with a clip. They are used to initialize the *cue point*s when the clip is loaded. An in-point (In), the duration (Dur), and an out-point (Out) are specified using the following format:

  hh:mm:ss:ff

  where *hh* is the hours, *mm* is the minutes, *ss* is the seconds, and *ff* is the frame number. In drop-frame mode, the final colon is replaced by a period:

  hh:mm:ss.ff

  Note: Edit points may also be referred to as “edit marks.”

  If a clip has edit points associated with it, those values are used to initialize the clip’s cue points when the clip is loaded. The cue points are often different from the start and end points of the clip.

  See “Changing Cue Points and Edit Points” on page 36 for information about how to change the edit points.

- To the right of the cue and edit points are the start, the duration (Dur), and end of the clip. Each is specified in the following format:

  hh:mm:ss:ff

  where *hh* is the hours, *mm* is the minutes, *ss* is the seconds, and *ff* is the frame number. In drop-frame mode, the final colon is replaced by a period, as in:

  hh:mm:ss.ff

  If a clip does not have edit points associated with it, these start, duration, and end values are used to initialize the cue points when the clip is loaded.

  Note: You cannot change the values of the start, end, or duration of the clip itself. However, you can select any of the values and copy it to the cue points or edit points.

- The cue buttons cue the clip for playout (—> | >) or recording (—> | ●). The location at which the clip is cued depends on how the clip is cued and the play direction, as discussed in the descriptions of the *VTR* control buttons and the Media Control Panel’s Option pulldown menus. (The play direction is determined by the setting of the topmost Option pulldown menu.)

  Note: A clip must be cued before it can be played or recorded. This can be accomplished explicitly by clicking a cue button or implicitly by clicking the play or record button without first clicking a cue button. If you click a cue button and then click play or record, the clip starts playing or recording immediately. If you click play or record without first clicking a cue button, the Media Control Panel first cues the clip and then starts the requested function. In the latter case, there is a brief delay before the requested play or record function begins.

- The current frame display is initialized to the cue in-point or cue out-point each time the clip is cued. The actual *cue point* depends on how the clip is cued and the clip's play direction, as discussed in the descriptions of the *VTR* control buttons and the play direction. (The play direction is determined by the setting of the topmost Option pulldown menu.) As the clip is played or recorded, the display changes to indicate the current frame number.
- The function display shows the current function. When a clip is first loaded, the word "STANDBY" is displayed.
- When a clip is being played or recorded, the status / shuttle speed display shows the speed. If the clip is not being played or recorded, the status is displayed. The status may be one of the following:
  - WAIT, when the function is waiting to execute or waiting for another *unit* to finish (for example, a Louth *automation controller* that is playing a clip). The word BUSY blinks on and off.
  - RUN, when the function is in progress.
  - DONE, when the function completed without an error. The word DONE and the function display are grayed-out.
  - ERROR, when an error has occurred. The word ERROR blinks on and off, and appears in red.

- The *VTR* control buttons control the playout and recording of clips. The following describes these buttons, which correspond to standard VTR buttons:
  - Fast-reverse (<<) plays the clip in reverse at a fast speed.
  - Jog backward (<|) jogs the clip backward by one frame. Each time you click the jog backward button, the clip jogs back one frame.

    If the clip is playing when you click this button, the clip jogs backward one frame and then pauses. You have to click either the play button or the pause button to resume play.
  - Forward play (>) plays the clip in the forward direction. If the clip is not cued, it is cued before it begins playout.
  - Jog forward (|>) jogs the clip forward by one frame. Each time you click the jog forward button, the clip advances one frame.

    If the clip is playing when you click this button, the clip jogs forward one frame and then pauses. You have to click either the play button or the pause button to resume play.
  - Fast-forward (>>) plays the clip forward at a fast speed.
  - Reverse play (<) plays the clip in reverse. If the clip is not cued, it is cued before it begins playout.
  - Pause (| |) temporarily stops the clip from playing or recording. You have to click the play, record, or pause button to resume.
  - Stop (■) stops the clip and de-cues it. After the clip has been stopped, you must re-cue it before playing it again.
  - Record (●) begins recording. If the clip is not cued, it is cued for recording before it begins.

- The top Option pulldown menu lets you specify the play direction, which determines the direction in which the clip is played and whether it plays once or plays until it is stopped. The following options are available through this menu:
  - *Fwd*, for forward play (default)
  - *F Lp*, for forward loop play
  - *Bwd*, for backward play
  - *B Lp*, for backward loop play
  - *F/Bwd*, for alternating forward and backward play
  - *F/B Lp*, for alternating forward and backward loop play
  - *B/Fwd*, for alternating backward and forward play
  - *B/F Lp*, for alternating backward and forward loop play
  - FCue, for forward play without cue (in and out) points set
  - BCue, for backward play without cue (in and out) points set

  If the direction is one of the forward directions (*Fwd*, *F Lp*, *F/Bwd*, or *F/B Lp*), the clip is cued at its in-point. If the direction is one of the backward directions (*Bwd*, *B Lp*, *B/Fwd*, or *B/F Lp)*, the clip is cued at its out-point.

  The forward direction means that the clip plays from its in-point to its out-point. The backward direction means that the clip plays from its out-point to its in-point. For alternating directions, the clip plays once in each direction. In loop mode, the clip continues to play in the given direction until you click the stop button. If you do not choose loop mode, the clip plays once in the indicated direction and then stops.

  Note: When you change the option in this menu, the change takes effect the next time you cue the clip. For example, assume that the *Fwd* option is in effect when you start playing a clip. If you choose the *F Lp* option after the playing starts, the play stops when the out-point is reached. The next time you play the clip, the clip plays in forward loop mode.

  To play forward or backward without using cue points, you first use FCue and BCue, respectively, to cue the clips. When clips limits are disabled using the controls, *vtr.media.clip.limit.start* and *vtr.media.clip.limit.end*, you can play forward or backward without limitation; past the beginning or end of a clip, however, the clip will play black.

- The middle Option pulldown menu lets you choose the following options:
  - *PB*, the clip’s audio and video are output when a clip is playing; nothing is output at other times (default).
  - *PB/EE*, the clip’s audio and video are output when a clip is playing; the input signal is output at other times.

    Note: The EE (end-to-end) option emulates a video deck feature and works only when you have an active input source.
  - *PB/Im*, the clip’s audio and video are output when a clip is playing; SMPTE 75% colors bars and 1 kHz tone are output at other times.
  - *PB/B*, the clip’s audio and video are output when a clip is playing; a black screen is output at other times.
  - *EE*, the output always displays the input signal instead of the signal from VST, even when a clip is playing. (When a clip is playing, the output displays the input signal.)
  - *Image*, the output always displays SMPTE 75% colors bars and plays a 1 kHz tone.
  - *Black*, the output always displays a black screen.
  - *Hold*, the output always displays the last image.
- The Local / Rem Option pulldown menu lets you put the *unit* in remote mode. The following options are available through this menu:
  - *Local*, which puts the unit in local mode and enables the *VTR* control buttons (local).
  - *Rem*, which puts the unit in remote mode and disables the VTR control buttons. This mode prevents you from accidentally operating a Media Control Panel while the unit is being controlled remotely, for example, by an *automation controller.*
- The shuttle dial lets you control the speed of a clip that is playing. To use the shuttle dial, begin playing the clip and then use the mouse to point to the black notch on the dial. Press the left mouse button and keep it pressed while you turn the dial clockwise to increase the speed or counterclockwise to decrease it.

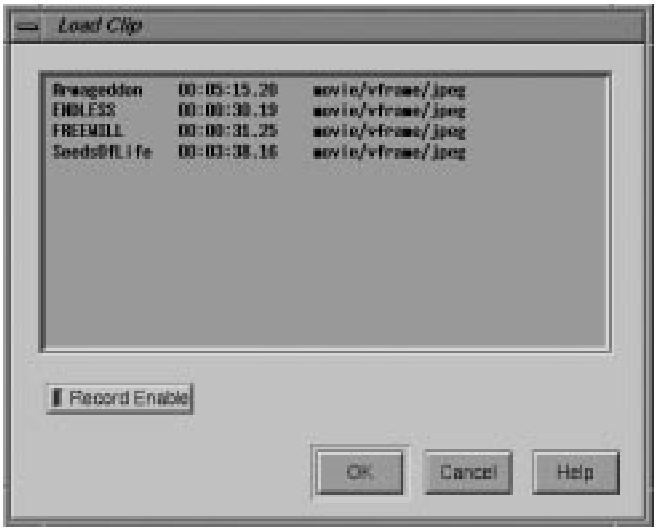
  Note: The straight up position of the dial is zero, or pause.

In general, buttons that are enabled and can be used appear darker than those that are disabled. For example, when you load an existing clip, the cue for playout button (—> | >) is darker than the cue for recording button (—> | ●). This indicates that the cue for playout button is enabled and the cue for recording button is not.

Playing or Recording an Existing Clip

To play or record an existing *clip*, follow these steps:

1. If the clip is not loaded, load the clip:
   - Click the *Load* button in the Media Control Panel. A window that lists the clips in the VST cache appears, as shown in Figure 3-3.



```
Armageddon    00:05:15.20    movie/vframe/jpeg
ENDLESS       00:00:30.19    movie/vframe/jpeg
FREEWILL      00:00:31.25    movie/vframe/jpeg
SeedsOfLife   00:03:38.16    movie/vframe/jpeg
```

Figure 3-3 Loading a Clip Into the Logical VTR

The Load Clip window lists the name, duration, and format of each clip that is stored under */usr/vtr/clips*, which is the VST *clip cache*. For example, the SeedsOfLife clip has a duration of 00:03:38.16 and its format is movie / vframe / jpeg. (If the duration contains an asterisk [*], it means that no material has been recorded in the clip.)

Note: If a clip is stored in a directory within */usr/vtr/clips*, that directory name precedes the clip name. For example, if the clip name appears as ADS / COMM1, the clip is stored in */usr/vtr/clips/ADS/COMM1*.

- Select the clip that you want to load. (You select the clip by pointing to it with the mouse cursor and pressing the left mouse button.)
- If you want to record over this clip, click *Record Enable*. (When recording is enabled, the yellow LED is lit in the *Record Enable* button.) Click *Record Enable* a second time if you want to disable this option.
- Click the *OK* button. The window closes and the selected clip appears in the Media Control Panel. The cue for playout button (—> | >) is enabled. If the clip can be recorded over, the cue for recording button (—> | ●) is also enabled.

2. Change the *cue points*, as needed. (See “Changing Cue Points and Edit Points” on page 36 for information.)
3. Click the cue for playout button (--> | >) or the cue for recording button (—> | ●).

   Note: If you cue the clip first, the clip starts playing or recording as soon as you click the play or record button. If you do not cue the clip beforehand, the Media Control Panel automatically cues the clip and then starts playing or recording it. In the latter case, there is a delay before the requested function begins.
4. Click the play button (>) to start the playout or the record button (●) to start recording.
5. To stop playing or recording, click the stop button (■).

   Note: If you want to replay or re-record the clip after it stops, the clip must be re-cued. If you click the play or record button without first clicking the cue button, the Media Control Panel automatically cues the clip before it starts playing or recording.

Creating a New Clip

To create a new *clip* and record its content, follow these steps:

1. Click the *Create* button in the Media Control Panel. The Create Clip window, shown in Figure 3-4, appears.

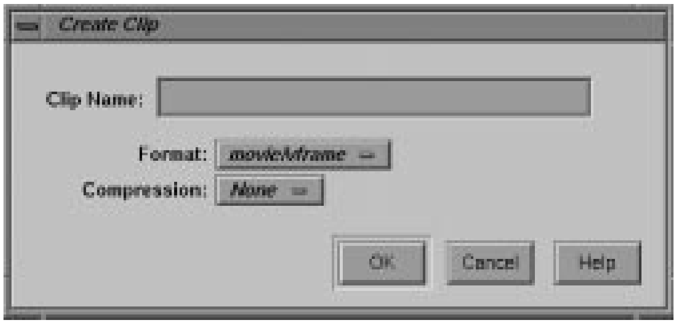


Figure 3-4 Create Clip Window

2. Enter the name of the clip in the Clip Name field.
3. Choose the compression type of the clip from the *Compression* Option pulldown menu. You can choose from the following compression types:
    - Rice (*Rice* compression)—only on Origin servers with the Digital Video Option.
    - None (uncompressed)—only on Origin servers with the Digital Video Option.
    - JPEG (M-JPEG)—only on O2 workstations.
    - DVCPRO—only on Origin with the DIVO DVC option.
4. Choose the format of the movie from the *Format* Option pulldown menu.

    Note: You can create clips through the VST graphical user interface using one of the following options:

    - movie / vframe, the VST variable-frame movie format
    - movie / dif / dvcpro
5. Click the *OK* button. The window closes and the clip appears in the Media Control Panel. Both the cue for recording button (—> | ●) and the cue for playout button (--> | >) are enabled.
6. Click the cue for recording button (—> | ●).

7. To start recording, click the record button (●).
8. To stop recording, click the stop button (■).

For more information about controlling the video deck, see “Controlling a Video Deck” on page 37.

Changing Cue Points and Edit Points

You can change the *cue point*s and *edit point*s of a clip in the Media Control Panel in three ways:

- Select and type a new value. For example, if you want to change a value from 00:00:00.01 to 00:00:00.05, select the “1” and type “5.”
- Click inside a field and use the scroll bar. The Media Control Panel automatically adjusts the other entries, accordingly, when you use the scroll bar. For example, to increase the cue in-point, click any place within the cue in-point field and then click the scroll bar to move it down. As the cue in-point increases, the duration decreases by the same amount.
- Select values with the left mouse button and then copy them using the middle mouse button.

If you press the Enter key after changing one of the values, the Media Control Panel verifies the new value. If the new value is valid, the Media Control Panel adjusts the other values to correspond to the new one, if necessary. If the new value is invalid, the Media Control Panel displays an error message in a dialog box.

If you do not press the Enter key after changing one of the values, the Media Control Panel does not check the validity of the new value. When you perform a function that uses the new values (for example, cueing the clip), the Media Control Panel then performs validity checking and displays an error message if a value is invalid.

Note: Changes that you make to the cue points take effect the next time the clip is cued. They have no affect on a clip that is already cued or is playing.

Any changes you make to the edit points or cue points are temporary. The changes cease to exist after the clip is unloaded unless you do one of the following:

- To make changes to the edit points permanent (that is, stored persistently with the clip), click the *Save Marks* button after you make the changes.
- To make changes to the cue points permanent, copy them to the edit points and then click the *Save Marks* button. The next time the clip is loaded, the newly saved edit points are copied to the cue points.

Note: Only the last set of edit points are saved. That is, when you save the edit points, they replace the edit points that are currently stored with the clip.

Controlling a Video Deck

This section describes how to use the Deck Control window to control a video deck that is attached to the VST host. (For information on attaching a video deck to a VST server, see the *Video Server Toolkit Installation and Administration Guide*.)

Note: To use the Deck Control window, you must specify a deck control port in addition to a video port when starting the Media Control Panel. (See “Starting the Video Server Toolkit Media Control Panel” on page 20 for details.)

The following topics are discussed in this section:

- “Accessing the Deck Control Window” on page 38
- “About the Deck Control Window” on page 39
- “Recording From the Deck to a Clip” on page 42
- “Recording From a Clip to the Deck” on page 43

Accessing the Deck Control Window

To access the Deck Control window, choose View > Deck Control Panel from the menu bar of the Media Control Panel. The Deck Control window, shown in Figure 3-5, appears in a separate window.

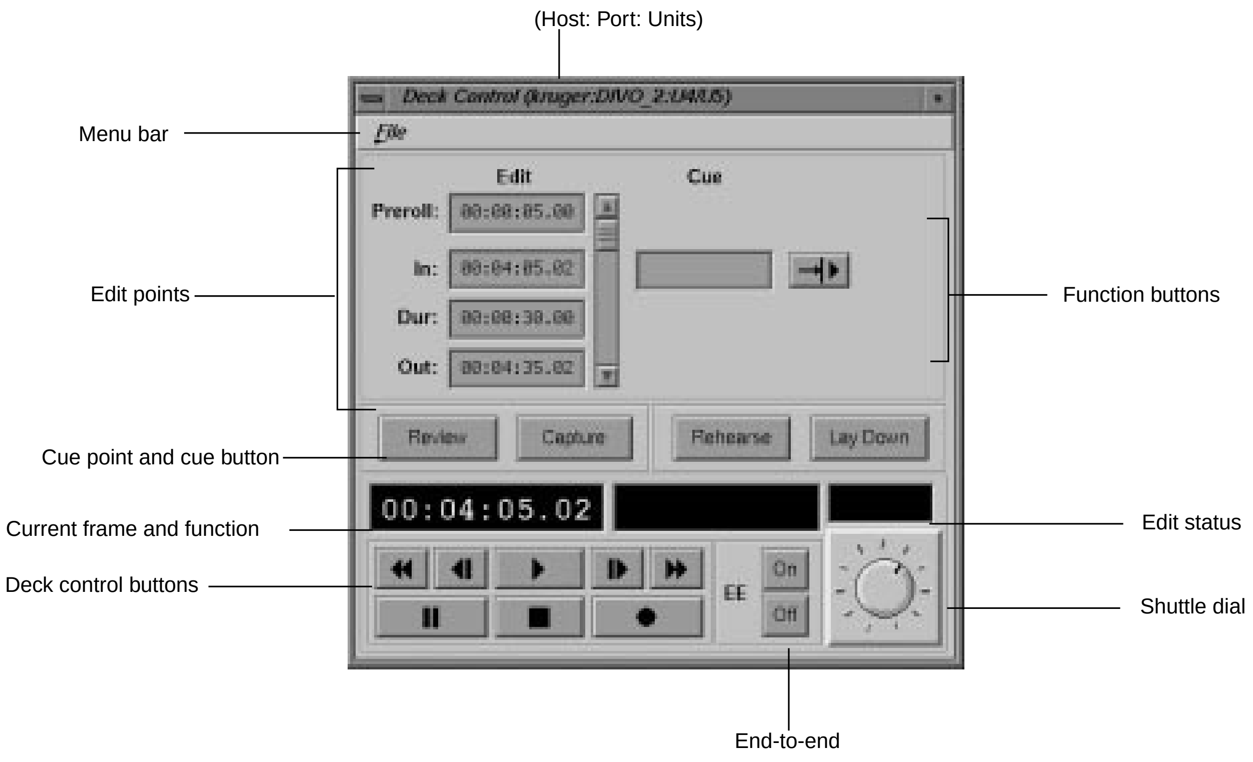


Figure 3-5 Deck Control Window

This window is the same regardless of whether you are using V-LAN transmitters or VST software to control the remote video decks.

About the Deck Control Window

The File pulldown menu in the menu bar of the Deck Control window gives you access to the following options:

- Close, to close the Deck Control window
- Exit, to close both the Deck Control window and the Media Control Panel from which it was launched.

The following describes each of the displays and buttons in the Deck Control window:

- The *edit point*s let you set the amount of time to preroll, the in-point, the duration, and the out-point. Each of these can be specified in the following format:

  hh:mm:ss:ff

  where *hh* is the hours, *mm* is the minutes, *ss* is the seconds, and *ff* is the frame number. In drop-frame mode, the final colon is replaced by a period:

  hh:mm:ss.ff

  See “Changing Cue Points and Edit Points” on page 36 for information about how to change the edit points.
- The *cue point* is the location at which you want to position the deck. The cue point can be specified in the following format:

  hh:mm:ss:ff

  where *hh* is the hours, *mm* is the minutes, *ss* is the seconds, and *ff* is the frame number. In drop-frame mode, the final colon is replaced by a period:

  hh:mm:ss.ff
- The cue button (—> | >) tells VST to search the deck to the cue point and park it there.

- You can use the following deck control function buttons:
  - *Review*, to review the specified edit. After the edit is finished, you can use this option to examine the finished edit.
  - *Capture*, to perform a frame-accurate recording from the selected portion of a loaded and cued source tape to the VST *clip* currently loaded. For more information about recording, see “Recording From the Deck to a Clip” on page 42.
  - *Rehearse*, to practice the specified edit. The decks go through all the mechanics of a real except that the edit is not recorded.
  - *Lay Down*, to perform a frame-accurate recording from the selected portion of the clip on the VST video server to the destination VTR. For more information, see “Recording From a Clip to the Deck” on page 43.
- The current frame display is initialized to the cue in-point each time the clip is cued. As the clip is played or recorded, the display changes to indicate the current frame number.
- The function display shows the current function.
- The edit status display shows the status when performing an automated edit (that is, a capture, review, lay-down, or rehearse). The status may be one of the following:
  - CUE, when searching for the *cue point*
  - SYNC, when doing a preroll
  - LOCK, when the deck transport is locked
  - EDIT, when the edit is in progress
  - DONE, when the edit is complete

- The deck control buttons, which control playout and recording, correspond to standard *VTR* buttons. The following describes these buttons:
  - Fast-reverse (<<) moves the deck in reverse at a fast speed.
  - Jog backward (<|) jogs the deck backward by one frame. Each time you click the jog backward button, the deck jogs back one frame.

    If the deck is playing when you click this button, the deck jogs backward one frame and then pauses. You have to click either the play button or the pause button to resume play.
  - Forward play (>) moves the deck in the forward direction. If the deck is not cued, it is cued before it begins playout.
  - Jog forward (|>) jogs the deck forward by one frame. Each time you click the jog forward button, the deck advances one frame.

    If the deck is playing when you click this button, the deck jogs forward one frame and then pauses. You have to click either the play button or the pause button to resume play.
  - Fast-forward (>>) plays the deck forward at a fast speed.
  - Pause (||) temporarily stops the deck from playing or recording. You have to click the play, record, or pause button to resume.
  - Stop (■) stops the deck and de-cues it. After the deck has been stopped, you must re-cue it to play it again.
  - Record (●) begins recording.
- The EE *On* and *Off* buttons turn the deck's end-to-end mode on and off, respectively. If you click the *On* button, the output displays the input signal instead of the signal from the deck. If you click the *Off* button, the output displays the signal from the deck.
- The shuttle dial lets you control the speed of the deck. To use the shuttle dial, use the mouse to point to the black notch on the dial. Press the left mouse button and keep it pressed while you turn the dial clockwise to increase the speed or counterclockwise to decrease it.

  Note: The straight up position of the dial is zero, or pause.

Recording From the Deck to a Clip

Before using VST to record video from a deck you must:

- Connect the output of the deck to the input of the video card on the VST server.
- Connect the audio output of the deck to the audio inputs of the VST server.

To record from the deck to a *clip*, follow these steps:

1. Use the Media Control Panel to do the following:
   - Create a new clip. (See “Creating a New Clip” on page 35 for information about how to create a new clip.)
   - Change the cue in-point, if needed.

     Note: The cue in-point in the Media Control Panel is the point in the clip to which you want the material captured.
   - If the Deck Control window is not displayed, choose View > Deck Control Panel in the menu bar of the Media Control Panel.
2. Use the Deck Control window to do the following:
   - Review the clip’s *edit point*s and change them if needed.

     Note: The edit points in the Deck Control window identify the portion of the tape that you wish to capture and the duration of the capture.
   - To see what would be recorded without actually recording into the clip, click the *Review* button.
   - To perform the edit, click the *Capture* button.

Recording From a Clip to the Deck

Before using VST to lay back video to a deck you must:

- Connect the input of the deck to the output of the video card on the VST server.
- Connect the audio input of the deck to the audio outputs of the VST server.

To record from a clip to the deck, follow these steps:

1. Use the Media Control Panel to do the following:
   - Load the clip from which you want to record.
   - Change the cue in-point, if needed.

     Note: The cue in-point in the Media Control Panel is the point in the clip from which you want to record.
   - If the Deck Control window is not displayed, choose View > Deck Control Panel in the menu bar of the Media Control Panel.
2. Use the Deck Control window to do the following:
   - Review the edit points and change them if needed.

     Note: The edit points in the Deck Control window identify the portion of the tape to which you want to record and the duration of the recording.
   - To see what would be recorded without actually recording onto the tape, click the *Rehearse* button.
   - To record from the clip to the deck, click the *Lay Down* button.

Monitoring the Status of Video Server Toolkit (mcstat)

There are two ways to start the Unit Status Monitor. The quickest way is to choose Utilities > Status Monitor from the Media Control Panel menu bar.

Starting the Unit Status Monitor from the Command Line

To monitor the status of VST, enter the following, either from the workstation on the VST server or from a workstation on which the VST tools software[1] has been installed:

```
% /usr/vtr/bin/mcstat  [-v loglevel]  [-h hostname]
```

where

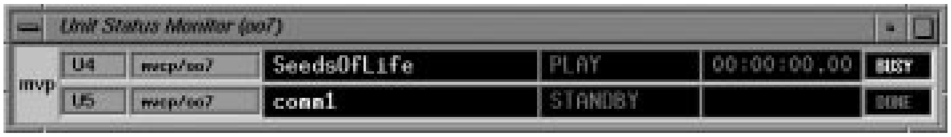
- *loglevel* sets the severity level of the messages that are written on STDOUT.

  Note: The *mcstat* program writes its log messages to the window from which it is invoked.

  If this option is omitted, all messages with a severity level of Info and above are written on STDOUT. If this option is present, *loglevel*, which can be a positive or negative number, identifies the minimum level of the messages that are written to the log. (See Table 3-2 on page 22 for the definition of the log severity levels.)
- *hostname* is the name of the host on which VST is running. If this parameter is omitted, it is assumed that VST is running on the same host as the one from which the program is invoked.

[1] To run the Unit Status Monitor from a remote workstation, the vst_eoe.sw32.tools subsystem must be installed on a workstation that has IRIX 6.2 or later. See the *Video Server Toolkit Installation and Administration Guide* for more information.

The Video Server Toolkit Unit Status Monitor appears in a separate window, which is shown in Figure 3-6. This monitor identifies each *port*, *unit*, type of connection and host, clip name (if one is loaded), current function and frame, and the status of unit. (See “About the Media Control Panel” on page 26 for more information.)



```
Unit Status Monitor (oo7)
mvp  U4  mvcp/oo7  SeedsOfLife  PLAY     00:00:00.00  BUSY
     U5  mvcp/oo7  comm1        STANDBY               DONE
```

Figure 3-6 Unit Status Monitor

See “About the Media Control Panel” on page 26 and “About the Deck Control Window” on page 39 for a description of the status information that is displayed by the Unit Status Monitor.

Chapter 4

Adding and Removing Clips

Clips are segments of audio and video. Managing clips involves adding and removing them from Video Server Toolkit (VST).

Managing clips is discussed in the following sections:

- "VST Media Formats and Types" on page 48
- "Adding Clips to VST" on page 50
- "Transferring a Clip Segment" on page 54
- "Removing Clips" on page 54
- "Exporting VST Clips" on page 55

Overview of Adding Clips Procedure

This section provides a procedural overview of the tasks involved in adding clips to VST's cache.

The following sections explain the steps in the following procedure in greater detail.

To add clips to the cache, use the following procedure.

1. Copy media to the VST machine.

   If you are not using a real-time filesystem, use FTP *put* or *get* commands.

   If you are using a real-time filesystem (recommended), you can either use the *vtrutil* tool included with VST, or a modified form of FTP, *vtrftpd*, installable from the VST image. You use the familiar FTP command, *get*, with *vtrftpd* to add files to VST.

   For more information, see "Adding Clips to VST" on page 50.

2. Align the clips.

   If you used FTP or *vtrftpd* to add clips to VST, you must align them. For more information, see “Clip Alignment” on page 51.

   Clips added to VST using the *vtrutil* tool are already aligned.

3. Register the clip with VST.

   Clips are registered automatically upon startup of VST.

   If you want notify VST more quickly, or if you have added clips to the system in a different way from those listed in step 1, use one of the following options:

   - Install the *fsmon* daemon from the VST image. It periodically updates the list of clips in the cache.

     At times, however, *fsmon* may not auto detect a clip because of an unrecognized format. In that case, you must use one of the following options to notify VST.

   - Use the mvcp command, *CADD*.
   - Use the *vtrclip* tool.

   For more information see, “Notifying VST” on page 53.

VST Media Formats and Types

VST can use different media types and formats

Media Types

VST supports two types of media:

- Intraframe

  In intraframe media, the video data for each frame is self-contained and does not depend on the data from neighboring frames. Examples of intraframe media include JPEG, Rice, DVCPRO, and uncompressed video.

- Interframe

  In interframe media, the compression techniques used for some video frames may require data from neighboring frames in order to decompress the video frame. An example of interframe media is MPEG1 and MPEG2.

Media Format

VST uses different formats for storing digital media in its clip cache filesystem(s):

- Intraframe media
  - vframe format—for variable-sized frames, including Rice, JPEG, and uncompressed
  - DIF format—for fixed-sized frames, including DVCPRO and uncompressed
- Interframe media
  - stream format - for MPEG2

vframe Format

The vframe (short for variable-size frame) format is specific to VST. The video and audio data for each frame is stored contiguously in the media file. A separate index file contains header information that describes the encoding parameters of the video and audio data, and a frame map that stores the offsets of the video and audio data for each frame within the media file.

The vframe format is used for recording and playback of intraframe media, including uncompressed video as well as Rice-coded and JPEG-compressed video.

The *vtrvfutil* command-line utility provides various analysis and update functions for the vframe format. See the vtrvfutil man page for further information.

DIF Format

DIF is the 4:1 video compression frame format used by Panasonic's DVCPRO.

Stream Format

The stream format consists of a media file, which is simply the native media bitstream, and an index file, which maps random access cueing points to the appropriate offset in the bitstream.

The stream format is used for playback of MPEG2 media.

The *vtrmpegutil* command line utility provides various analogies and update functions for MPEG2 stream format assets. See the vtrmpegutil man page for more information.

Adding Clips to VST

Adding clips to VST has been partially automated. For all clip formats:

1. Transfer the media file into the filesystem, */usr/vtr/clips*.
2. For Vframe or stream format clips, transfer the index file for the clip into */usr/vtr/index*.

Transferring Clips to VST

There are several ways to transfer clips into VST. Which process you use depends on the type of filesystem used. There are two types of files systems:

- Non-real-time
- Real-time

To guarantee real-time I/O rates, you must use a real-time filesystem.

Non-Real-Time Filesystems

Transferring files to a non-real-time filesystem is as easy as using *ftp*, *cp*, or *rcp* locally. You can also use *ftpd* from a remote site.

Real-Time Filesystems

To transfer clips to a real-time filesystem, use the customized version of *ftpd* (server) called *vtrftpd*. It is in subsystem *vst_eoe.sw.ftpd*. Only this version of FTP can write to real-time filesystems locally.

The feature enhancement in *vtrftpd* is used when you:

- Use FTP (client) on a system connected to VST server.
- Use FTP (client) proxy on the VST server.

Both of these methods set up a TCP/IP connection with the *vtrftpd* server running on the VST system.

To write to the filesystem, use of the following methods:

- On the remote archive server, use FTP's *put* command to copy a clip to the clip cache of VST from a remote host.
- On the machine running VST, use a proxy (secondary control) connection, *vtrftpd*, as follows to copy a clip from the remote archive system to the local clip cache of VST:

```
ftp source-system
ftp> cd source-directory
ftp> proxy open localhost
ftp> proxy get filename /usr/vtr/clips/filename
ftp> cd index
ftp> proxy get indexname /usr/vtr/index/indexname
ftp> proxy bye
ftp> bye
```

localhost is the VST machine.

vtrftpd is not used when you only use ftp (client) on the VST server because the ftpd server on another system would not be the enhanced version. To copy a clip from the archive server to VST on the machine running VST, login to the archive system, run *ftp*, and use the *put* command.

Clip Alignment

Certain clips might need to be aligned in the filesystem for enhanced performance. In single-disk systems, media files are aligned only with the filesystem's block size so that only one I/O operation is needed to access the data.

In multi-disk, RAID, striped systems, the media files must also be aligned with the stripes.

When VST is used to record media, it automatically places the media data in the correct, aligned locations on the disk.

When media data is transferred to VST, it often must be aligned with the disk's blocks and stripes. Whether or not media data must be aligned on your disks depends on the media type of the media file:

- Vframe media data requires alignment.
- DIF or Interframe media data does not require alignment.

The media data (video and audio for each frame) for a Vframe media clip must be aligned on natural filesystem and disk drive boundaries to enable efficient read and write access to the clip.

Degree of Alignment

Frame-oriented media data in an intraframe clip is aligned along two boundaries:

- Minor alignment boundary
- Major alignment boundary

A single element of a frame (a video field or audio chunk) never crosses a minor or major alignment boundary. VST will not do a read or write operation to the clip media file which crosses a major alignment boundary.

Minor Alignment

The minor alignment matches the greater of the filesystem block size, or the system memory page size. On O2 workstations, the minor alignment is usually 4 KB, unless a larger filesystem block size was used to construct an XFS filesystem. On Origin, the minor alignment is usually 16 KB, unless a larger filesystem block size was used.

Major Alignment

The major alignment matches the stripe size of the disk volume that holds the clip cache filesystem.

If the clip cache resides on a single disk, no major alignment is required.

If the clip cache resides on a single RAID subsystem, major alignment is required for efficient I/O access to the media data. Either make a real-time filesystem on the RAID and set the real-time extent size of the XFS filesystem to the desired I/O operation size, or add a configuration line to */usr/vtr/config/vtrfsinfo.conf*. For example:

```
#/dev/root 2m
```

Note: *vtrfsinfo.conf* is not created by VST so you first must create the file.

If the clip cache resides on a striped XLV volume, the major alignment matches the stripe size of the XLV volume.

Realigning a vframe Clip

A vframe clip is automatically aligned if you use *vtrvfutil* to copy the clip, as follows:

```
% vtrvfutil OriginalClipName NewClipName
```

vtrufutil automatically stores the media files in */usr/vtr/clips/*.

To copy a vframe clip from outside the clip cache, use the following syntax:

```
% vtrvfutil -i file=MediaFile,index=IndexFile - NewClipName
```

vtrvfutil can also be used to realign a clip in-place, as follows:

```
% vtrvfutil -c realign ClipName
```

See the vtrufutil man page for a complete list of the options.

Notifying VST

VST detects the clips when the clip is first loaded and every time VST starts. The clips are then listed in mcclips.

If you place a clip in the clip filesystem, the first time you attempt to access the clip through VST, it attempts to auto-detect the clip's format and add it to the VST clip list. However, until you attempt to access the clip, it will not be visible in a list of clips you obtain from VST. To see the clip immediately, use the following command:

`# vtrclip add` *clipName*

Note: There might be a delay because adding clips always has a lower priority then playout / record.

You can also use the following mvcp command to notify VST of an added clip.

`CADD` *clipName*

However, if you install the *vst_eoe.sw_fsmon* subsystem, the VST filesystem Monitor will monitor the clip filesystem for clips that are added or deleted and automatically update the internal VST clip list. Sometimes, FSmon cannot autodetect clips added to VST when the clips require the use of an index file, for example, for MPEG and Rice-encoded clips. In this case, you must use the *vtrclip add* command to add the index file and notify VST.

Transferring a Clip Segment

vtrftpd honors in and out points on DIF clips for transfers from the real-time filesystem on the server. You can transfer the segment of a clip between in and out points instead of having to transfer the whole clip, saving transfer time and disk space in many cases.

If a clip has no in or out point set, *vtrftpd* uses these defaults:

- If the start point (beginning of the file) is invalid or missing, it is set to 00:00:00.00.
- If the in point is invalid or missing, it is set to the start point.
- If the out point is invalid or missing, it is set to the end of the file.

Overriding Clip Segment Transfer

If in and out points are set in a clip, but you want to transfer the entire clip, you can override this feature. To transfer an entire file that has in and out points set, enter the following at any point in the session:

```
ftp> site marks
```

This command is a toggle. To turn the clip segment transfer feature on again, enter the command again.

Removing Clips

There are three ways to remove clips from VST.

- VST Clip Manager (mcclips)

  For more information about using the VST Control panel to remove a clip, see the *VST Developer's Guide.*
- Command line

  You can completely remove a clip from VST using the following command:

  ```
  # vtrclip rm clipName
  ```

  clipName is the name of the clip file.
- MVCP command, *CRM*.

  For more information about the *CRM* command, see Appendix A, "Multiport Video Computer Protocol (MVCP) Command Summary."

Exporting VST Clips

vtrvfutil makes the clip readable by Silicon Graphics digital media tools, such as *dminfo*, *dmconvert*, and mediaplayer, or third-party tools that use the Silicon Graphics Movie Library.

You can use the *vtrvfutil* command to add Quicktime formatting information to a clip:

```
# vtrvfutil -c makeqt clipName
```

clipName is the name of the clip file.

Note: Clip files are not necessarily usable by other tools.

Using Clip Manager

This chapter describes how to use the Clip Manager graphical user interface (GUI) to manage Video Server Toolkit (VST) *clip*s. Clip Manager is a sample GUI application that you can customize.

The following topics are discussed:

- "Starting the Clip Manager" on page 57
- "Clip Manager Menus" on page 59
- "Obtaining Information About a Clip" on page 61
- "Renaming a Clip" on page 62
- "Deleting a Clip" on page 63
- "Setting the Protections for a Clip" on page 64

For more information about archiving clips, see Chapter 6, "Archiving Clips."

Starting the Clip Manager

To start the Clip Manager, enter the following, either from the workstation on the VST server or from a workstation on which the VST tools software[1] has been installed:

```
% /usr/vtr/bin/mcclips  [-v loglevel]  [hostname]
```

where

- *loglevel* sets the severity level of the messages that are written on STDOUT.

[1] To run the Clip Manager from a remote workstation, the vst_eoe.sw32.tools subsystem must be installed on a workstation that has IRIX 6.2 or later. See the *Video Server Toolkit Installation and Administration Guide* for more information.

Table 5-1 shows the log severity levels and codes, which are listed in decreasing order of severity

Table 5-1 Log Severity Levels

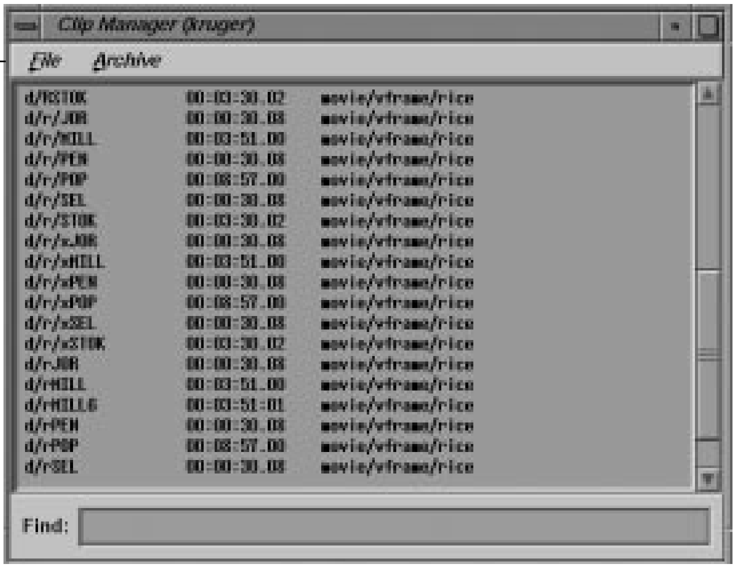
Priority	**Log Level**	**Description**
Emergency	-6	Panic condition
Alert	-5	Condition that should be corrected immediately, such as a corrupted system file
Critical	-4	Critical condition that has system-wide impact, such as a hard device error; immediate action required
Error	-3	Problem that needs correcting but does not require immediate action
Warning	-2	Possible problem but could be a transient problem that corrects itself
Notice	-1	Condition that might require attention, but is not an error condition
Info	0	Informational message
Debug*n*	*n*	Informational message that normally is of use to engineers for debugging; may be Debug1, Debug2, or Debug3, with Debug3 producing the most debugging information

Note: The *mcclips* program writes its log messages to the window from which it is invoked.

If the **-v** option is omitted, all messages with a severity level of Info and above are written to the log. If this option is present, *loglevel*, which can be a positive or negative number, identifies the minimum level of the messages that are written to the log.

- *hostname* is the name of the host on which VST is running. If this parameter is omitted, it is assumed that VST is running on the same host as the one from which the program is invoked.

The VST Clip Manager is displayed in a separate window, which is shown in Figure 5-1. The window shows the clips that are in VST. For each clip, it shows the name, the duration, and the format. (If the duration contains an "*" it means that no material has been recorded in the clip.)



```
d/RSTOK        00:03:30.02    movie/vframe/rice
d/r/JOR        00:00:30.08    movie/vframe/rice
d/r/MILL       00:03:51.00    movie/vframe/rice
d/r/PEN        00:00:30.08    movie/vframe/rice
d/r/POP        00:08:57.00    movie/vframe/rice
d/r/SEL        00:00:30.08    movie/vframe/rice
d/r/STOK       00:03:30.02    movie/vframe/rice
d/r/xJOR       00:00:30.08    movie/vframe/rice
d/r/xMILL      00:03:51.00    movie/vframe/rice
d/r/xPEN       00:00:30.08    movie/vframe/rice
d/r/xPOP       00:08:57.00    movie/vframe/rice
d/r/xSEL       00:00:30.08    movie/vframe/rice
d/r/xSTOK      00:03:30.02    movie/vframe/rice
d/rJOR         00:00:30.08    movie/vframe/rice
d/rMILL        00:03:51.00    movie/vframe/rice
d/rMILL6       00:03:51:01    movie/vframe/rice
d/rPEN         00:00:30.08    movie/vframe/rice
d/rPOP         00:08:57.00    movie/vframe/rice
d/rSEL         00:00:30.08    movie/vframe/rice
```

Figure 5-1 Clip Manager Window

Note: You can also start the Clip Manager by choosing Utilities > Clip Manager in the VST Media Control Panel menu bar.

Clip Manager Menus

The File pulldown menu in the menu bar of the Clip Manager window provides the following options:

- Info, to obtain information about a *clip*
- Rename, to rename a clip
- Delete, to delete a clip
- Protect, to set the protection levels for a clip

- Close, to close the Clip Manager window
- Exit, to close the Clip Manager window and exit the program
- Load, to load a clip into a unit controlled by Sony protocols

Except for the Close and Exit options, you must select a clip before requesting one of the options. You can select the clip by pointing to it with the mouse cursor and pressing the left mouse button.

You can also use the Find field to select a clip by entering any number of characters that match the values in either the name, the duration, or the format. For example, if you enter "xxx" in the Find field, the Clip Manager highlights the first clip it finds that contains "xxx." If you add "y" to the Find field, it searches for a clip that contains "xxxy," starting with the current clip.

Regardless of the method for selecting a clip, the selected clip becomes highlighted.

Note: You can access the clip-related functions in the File pulldown menu by selecting a clip and then pressing the right mouse button. You can also access the Info option by double-clicking the clip in the Clip Manager window.

The Archive pulldown menu in the menu bar provides the following options:

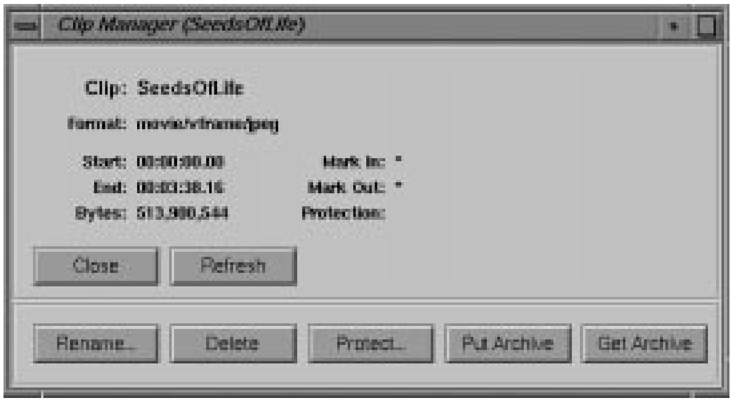
- Find, to get information about a clip in the StudioCentral 2.0 archive system
- Get New, to bring a new clip from the StudioCentral 2.0 archive system into VST
- Get, update an existing clip from the StudioCentral 2.0 archive system
- Put, to write a clip to the StudioCentral 2.0 archive system

Note: You can access the functions in this option menu by pressing the right mouse button and then selecting the Archive option in the pop up menu.

Obtaining Information About a Clip

To obtain information about a *clip*, follow these steps:

1. Select the clip in the Clip Manager window.
2. Choose File > Info from the menu bar. The clip information window, as shown in Figure 5-2, appears.



Clip: SeedsOfLife
Format: movie/vframe/jpeg
Start: 00:00:00.00   Mark In: *
End: 00:03:38.16   Mark Out: *
Bytes: 513,980,544   Protection:

Figure 5-2 The Clip Information Window

This window shows the in- and out-points of the clip, the edit points, the size of the clip, and the protection. An asterisk (*) indicates that the value is not set. For example, Figure 5-2 indicates that the edit points are not set.

The remaining sections in this chapter describe in detail the use of the buttons in this window.

3. To refresh the information in this window, click the *Refresh* button.

Renaming a Clip

To rename a clip, follow these steps:

1. Do one of the following:
   - Select the clip in the Clip Manager window and then choose File > Rename from the menu bar.
   - If the clip information window for the clip is displayed, click the *Rename...* button in the information window.

   The Rename Clip window, as shown in Figure 5-3, appears.

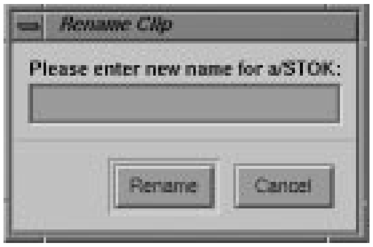


Figure 5-3 Rename Clip Window

2. Enter the new name of the clip.
3. Click the *Rename* button.

Deleting a Clip

To delete a clip, follow these steps:

1. Do one of the following:
   - Select the clip in the Clip Manager window and then choose File > Delete from the menu bar.
   - If the clip information window for the clip is displayed, click the *Delete* button in the information window.

   The Delete Clip window, as shown in Figure 5-4, appears.

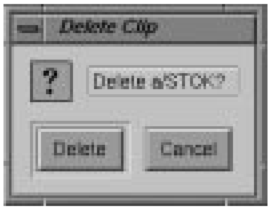


Figure 5-4 Delete Clip Window

2. Click the *Delete* button to delete the clip.

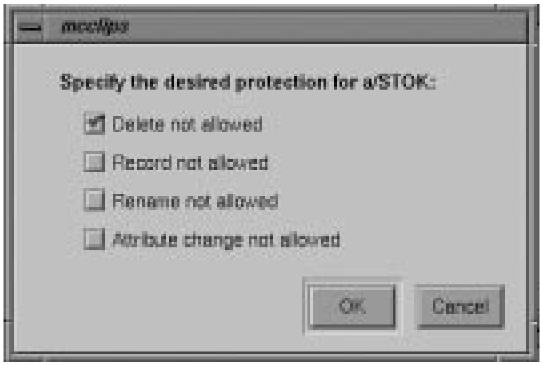
Setting the Protections for a Clip

By default, a clip can be deleted, recorded into, and renamed, and its *edit point* attributes can be changed. Therefore, if you want a clip to be protected from any of these changes, you must set the protections for that clip. This would be especially useful when multiple applications and / or *automation controller*s are using the VST.

To set the protections for a clip, follow these steps:

1. Do one of the following:
   - Select the clip in the Clip Manager window and then choose File > Protect from the menu bar.
   - If the clip information window for the clip is displayed, click the *Protect...* button in the information window.

   The Set Protections window, as shown in Figure 5-5, appears.



mcclips

Specify the desired protection for a/STOK:

- [✓] Delete not allowed
- [ ] Record not allowed
- [ ] Rename not allowed
- [ ] Attribute change not allowed

Figure 5-5 Set Protections Window

This window identifies the protections that can be set. Each protection is preceded by a check box. If there's a red check in the check box, the corresponding protection is selected. If there is no red check, the corresponding protection is not selected.

Note: The default is that a clip has no protections set. Therefore, you must set protections if you want the clip to have any.

2. Click the appropriate check boxes to indicate the protections that you want for this clip.

   Note: Each check box acts like a toggle switch. Click the check box once to select that protection. Click the check box a second time to deselect it.

3. Click the *OK* button to have the protections take effect.

Chapter 6

Archiving Clips

Asset management involves archiving, retrieving, deleting, and accessing media clips and the associated meta data that describes them. Because the Video Server Toolkit (VST) cache is limited in size, saving media files out to and retrieving files from an archival server is a common practice.

An archive system is a storehouse for information. It often serves multiple applications, such as asset creation, broadcasting, and compositing applications, as shown in Figure 6-1. VST is designed to work with one or more archive systems of the same type.

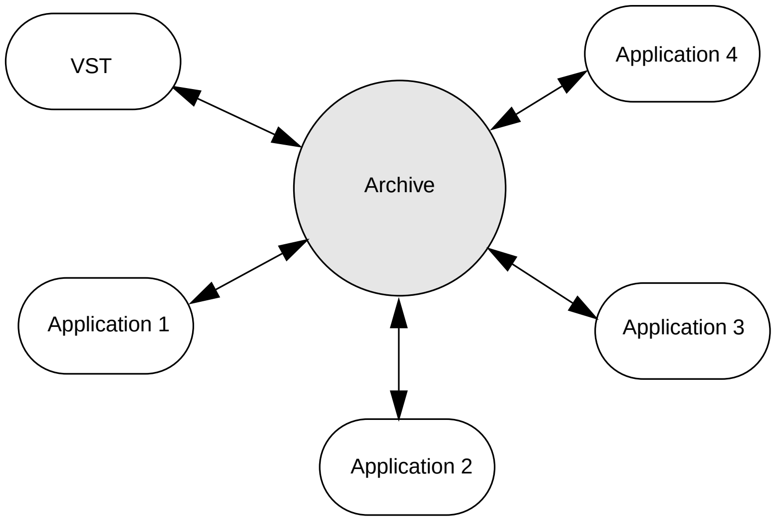


Figure 6-1 Archive System

VST works in conjunction with StudioCentral 2.0 (SC 2.0) to archive media and associated meta data. VST provides a set of asset management commands to interact with the archive.

For a more complete set of asset management tools, use the tools provided by the archive system. For more information about StudioCentral asset management tools, see the StudioCentral documentation.

This following sections describe the configuration of the archive system and the asset management tools you use with VST to interact with that system:

- "Overview of the Archival System" on page 68
- "About StudioCentral" on page 70
- "Using VST With the StudioCentral 2.0 Archive System" on page 71

Overview of the Archival System

VST archives:

- Media clips
- Meta data, which contains descriptive information about the media clips

Meta Data

Meta data contains information descriptive of the media clips associated with them. Information about the media clips includes such things as:

- Name
- Format
- Size
- Start time
- Duration

You use asset management tools to store and retrieve meta data. You might like to know, for example, the run time of a specific media file, or you might like to list the names of the media clips in the archive.

Archive and VST Configuration

The elements in the archive system are:

- VST server
- Archive system
- Content server

All of these services can run on the same machine, however, it is recommended to keep the archive on separate, networked machines.

Chain of Communication

The chain of communication when retrieving clips from the archive:

1. VST asks an archive system to access a media asset.
2. The archive system contacts the correct content server.
3. If the content server is different from the machine running VST, the media is copied to the machine running VST.

   If the content server is running on the machine running VST, a link to the requested media is created.

Figure 6-2 shows this communication path.

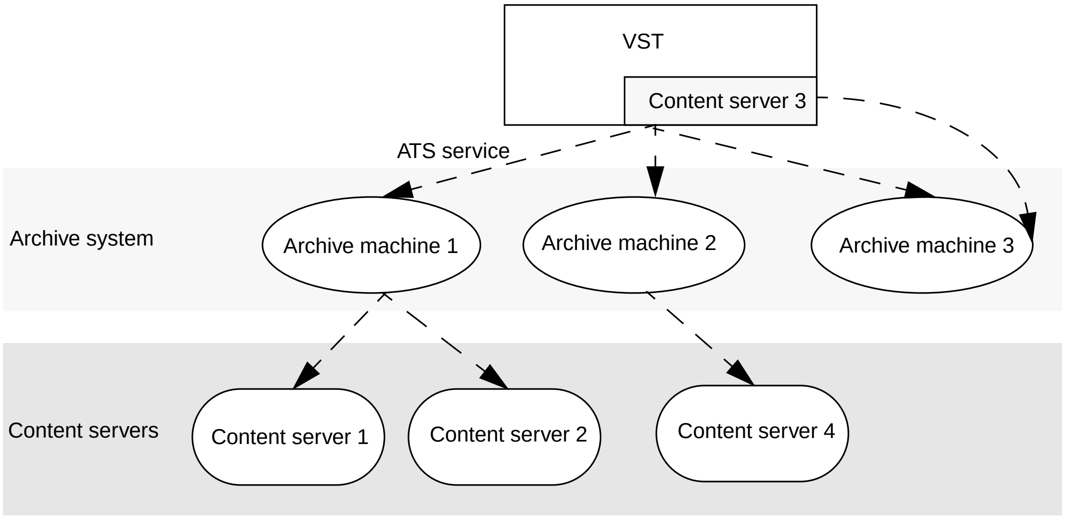


Figure 6-2 Archive Configuration

Figure 6-2 shows that VST can work with multiple archives. The servers that contain media content are usually not on the same system as the one running VST; but not necessarily, as shown by Archive Server 3.

About StudioCentral

VST can work with many archives. The archive system developed by SGI and supported by VST is StudioCentral, version 2.0 or later.

StudioCentral Digital Asset Management System (StudioCentral) is a library of C++ foundation classes that enables you to build multimedia-based applications with digital asset management capabilities.

For more information about StudioCentral, see the *StudioCentral Developer's Guide* (part number 007-3246-*nnn*).

Using VST With the StudioCentral 2.0 Archive System

Before VST can successfully perform any archiving operation, the following guidelines must be met:

- The Informix or Oracle database server should be installed.
- The proper StudioCentral 2.0 images should be installed.
- All the CAS datamodels should be installed.
- The Informix or Oracle database server should be up and running.

  Ideally the database server should automatically start up at boot time.
- StudioCentral should be properly configured.
- At least one StudioCentral content server should be up and running.

  Ideally the content server should automatically start up at boot time.
- *inetd* should be configured to accept connection on behalf of the StudioCentral ATS service.

Archiving Tasks

When VST is configured to use a StudioCentral 2.0 archive system, you can use the VST GUI (mcclips) to:

- Locate *clip*s. See “Locating a Clip in the StudioCentral 2.0 Archive System” on page 73
- Bring a clip into VST from the archive. See “Bringing In a New Clip From the Archive System” on page 74
- Store a VST clip in the archive. See “Using the Put Clip to Archive Window” on page 75

The remainder of this section shows how to use the VST GUI, mcpanel, to accomplish these tasks. However, you can also use the MVCP commands, explained in Table 6-1, to perform these tasks and others.

Table 6-1 Archive-Related MVCP Commands

Command	Description
AFND	Locate a clip by name in an available StudioCentral 2.0 archive system.
AFNG	Locate a pending or in-progress get-from-archive command for a clip.
AGET	Retrieve a clip from a StudioCentral 2.0 archive system.
ALSG	List the get-from-archive operations that are waiting or being processed.
ALSP	List the put-to-archive operations that are waiting or being processed.
APUT	Saves a clip to the archive system.

To learn more about using MVCP commands, see Appendix A.

Note: Only version 2.0 (or greater) of StudioCentral works with VST. Archival tasks require this application to be running.

Locating a Clip in the StudioCentral 2.0 Archive System

To display a list of media assets on StudioCentral, you must log into StudioCentral and use its tools.

To locate a clip in a StudioCentral 2.0 archive system, follow these steps:

1. Choose Archive > Find from the menu bar in mcpanel or from mcclips. The Find Clip in Archive window, as shown in Figure 6-3, appears.

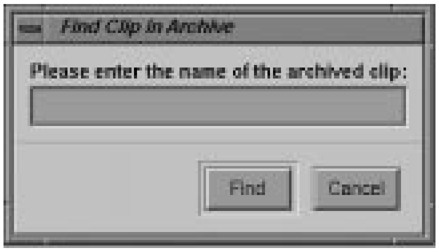


Figure 6-3 Find Clip in Archive Window

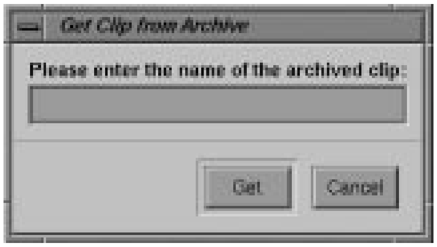
2. Enter the clip's name, which corresponds to the value of the archived asset's **ClipId** attribute.
3. Click the *Find* button.

   To determine whether the clip was found, see if it appears in the VST log.

Bringing In a New Clip From the Archive System

To bring in a new clip from the archive system, follow these steps:

1. Choose Archive > Get New from the menu bar. The Get Clip from Archive window, as shown in Figure 6-4, appears.



Please enter the name of the archived clip:

Figure 6-4 Get Clip from Archive Window: Getting a New Clip

2. Enter the clip's name, which is the value of the archived asset's **ClipId** attribute.
3. Click the *Get* button.

A Get command can fail when there is no port available on the VST system that supports the format of the clip.

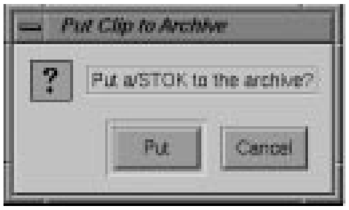
Note: If the clip exists in more than one archive system, the clip is brought in from the first archive system in which it is found. The clip can be brought in from a specified archive system using the MVCP command *AGET*.

Using the Put Clip to Archive Window

To write a clip to a the StudioCentral 2.0 archive system, follow these steps:

1. Do one of the following:
   - Select the clip in the Clip Manager window and then choose Archive > Put from the menu bar.
   - If the clip information window for the clip is displayed, click the *Put Archive* button in the information window.

   The Put Clip to Archive window, as shown in Figure 6-5, appears.



Put a/STOK to the archive?

Figure 6-5 Put Clip to Archive Window

2. Click the *Put* button to write the clip to the StudioCentral 2.0 archive system.

   For more information about the StudioCentral 2.0 archive system, see the *Video Server Toolkit Installation and Administration Guide*.

Note: The clip is written to the first StudioCentral 2.0 archive system. That is, if there is more than one StudioCentral 2.0 archive system, the clip is written to the first one. The clip can be put into an StudioCentral 2.0 archive system other than the first one by using the MVCP command *APUT*.

Checking Success of Storing Clip

Hardware, network, and StudioCentral failures can contribute to failures in storing clips in an archive. The failure. however, may not be reported. You might, for example, be able to AFND a clip on the archive because there is a "ghost" of the clip there, but not AGET it because the clip is really not there. If you find that you cannot AGET a clip, you know you need to use the Put Clip to Archive Window (or APUT) again to store the clip.

Virtual Clips

A virtual clip (vclip) does not contain media; a virtual clip is a list of in and out points that refer to one or more clip files. A virtual clip is similar in concept to an Edit Decision List or a Play List. When you play a virtual clip, you play all of the segments of all of the clips referenced by the virtual clip, as shown in Figure 7-1.

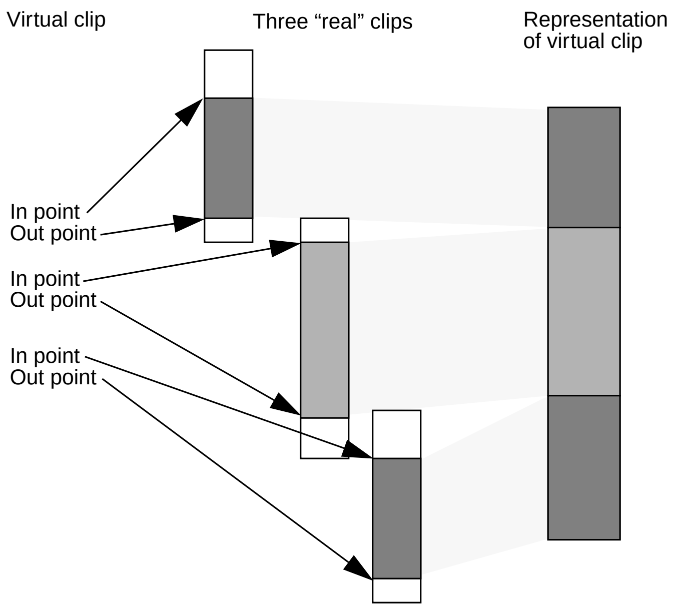


Figure 7-1 Virtual Clips

A virtual clip can also point at other virtual clips, which, in turn, point at clip files.

The remainder of the chapter explains the MVCP commands you use to manipulate vclips:

- "Virtual Clip Command Overview" on page 78
- "File Operations On Virtual Clips" on page 79
- "Working With Segments" on page 80
- "Working with Frames" on page 85

Virtual Clip Command Overview

Table 7-1 provides a summary of the MVCP commands used to manipulate virtual clips. The remainder of the chapter discusses these commands in more detail.

Table 7-1 MVCP Commands for Virtual Clips

Command	Description
CMK	Create a virtual clip.
COPN	Open a clip.
CSAV	Save a clip.
CCLS	Close a clip.
CUPS	Update clip segments.
CSLS	List clip segments.
CSRM	Remove clip segments.
CSCL	Clear clip segments.
CFNW	Insert new frames in a clip.
CFRM	Remove frames from a clip.
CFCL	Clear frames from a clip.

The first four commands are file operations for clips. The middle four operations pertain only to segmented clips, that is, virtual clips. The last three commands work on frames in virtual and non-virtual clips.

Segments

A segment is a portion of a larger clip. For example, in Figure 7-1, the virtual clip is composed of three segments. A segmented format allows a clip to be composed of segments. Currently, the only segmented format is the virtual clip (vclip).

The format of each of the segments in a virtual clip must be the same; for example, all of the segments of a virtual clip might be Rice encoded.

File Operations On Virtual Clips

This section describes the MVCP commands you use to create, open, save, close, and remove virtual clips.

Creating and Opening Virtual Clips

To create a virtual clip or to open an existing one, use the following MVCP commands, respectively:

```
CMK clipName “movie/vclip”
COPN clipName
```

- *clipName* is the name of the clip to create or open. (*COPN* opens virtual and non-virtual clips.)
- *formatName* must specify a segmented format. The only segmented format supported at this time is “movie / vclip”.

Created Vclips

A clip created with *CMK* is not visible in the clip cache nor usable in the system until you add segments to it using the *CUPS* command, as described in “Adding Segments to Vclips” on page 80.

Saving, Closing, and Deleting Virtual Clips

To save, close, or delete a virtual clip, use the following MVCP commands, respectively:

```
CSAV [clipName]
CCLS [clipName]
```

clipName is the name of the clip to save or close. If *clipName* is not specified, the most recently created or opened clip is saved or closed.

Note: *CSAV, CCLS, and CRM* work with virtual and non-virtual clips.

Working With Segments

The MVCP commands in this section work only with segment-formatted clips; currently the only format supported is “movie / vclip”.

Once you create or open a vclip, you add segments to or remove segments from it to revise the vclip.

Adding Segments to Vclips

The *CUPS* (update) command, defined as follows, adds segments to vclips:

```
CUPS clip src-op dest-op trk-mask in out src-clip src-trk-mask src-in
     src-out
```

- *clip*—is the name of the vclip to which you add a segment
- *src-op*—specifies how the segment in the vclip is operated on. See “src-op Options” on page 82 for more information.
- *dest-op*—specifies whether the segment added to the vclip is inserted (FINS) into the vclip or overwrites (FOVR) segments already in the vclip. Valid values are FINS and FOVR.
- *trk-mask*—must be an asterisk (*).
- *in*—is the in point in the vclip where the segment is to be added. If this information is absent, the new segment is appended to the end of the vclip.
- *out*—is the out point in the vclip where the added segment ends.

- *src-clip*—is the name of the clip the segment is coming from.
- *src-trk-mask*—must be an asterisk (*).
- *src-in*—is the in point in the clip where the segment is coming from. If this argument is unspecified, *src-in* is set to the in point of the source clip.
- *src-out*—is the out point in the clip where the segment is coming from. If this argument is unspecified, src-out is calculated from:
  - the src-in plus in / out duration, if the in / out duration is specified
  - the out point of the source clip, if the in / out duration is not specified

Figure 7-2 illustrates some of these arguments.

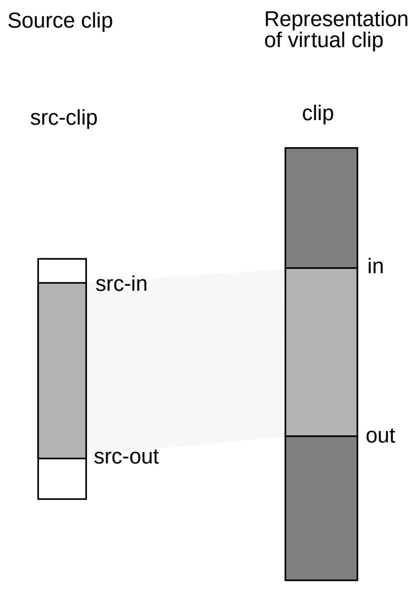


Figure 7-2 CUPS Arguments

The interval between *src-in* and *src-out* must equal the interval between *in* and *out*, otherwise an error is returned. If you supply only one of these intervals, *CUPS* automatically makes the other interval equal to it.

Using the *CUPS* command repeatedly enables you to populate your virtual clip with segments.

src-op Options

The *src-op* options specify:

- Whether the segment data (the in points and out points, for example) are copied into the vclip or simply pointed at by the vclip.
- Whether or not the segment referenced in the source clip is erased.

The valid values for *src-op* are:

- FCP—copy the segment data (the in and out points, for example) from the source clip to the target vclip, as shown in Figure 7-3.

  The source clip must be segmented. If the source clip changes, the target vclip is unaffected, which is not the case with the FLN option.
- FLN—link the segment data in the source clip to the vclip, as shown in Figure 7-3.

  Unlike the FCP option, the source clip does not have to be segmented and if the source clip changes, its changes affect the target vclip.
- FRM—copy one or more segments in the source clip to the target vclip and then remove the copied segments from the source clip.

  The source clip must be segmented.
- FCL—copy one or more segments in the source clip to the target vclip and then clear the copied segments from the source clip.

  The source clip must be segmented. Clearing the segments, in effect, makes them black in the source clip.

When a segment from a source clip is removed (FRM), the segments before and after the copied segment are joined. When a segment is cleared (FCL), the segment remains in the source clip but it is made black, as shown in Figure 7-4.

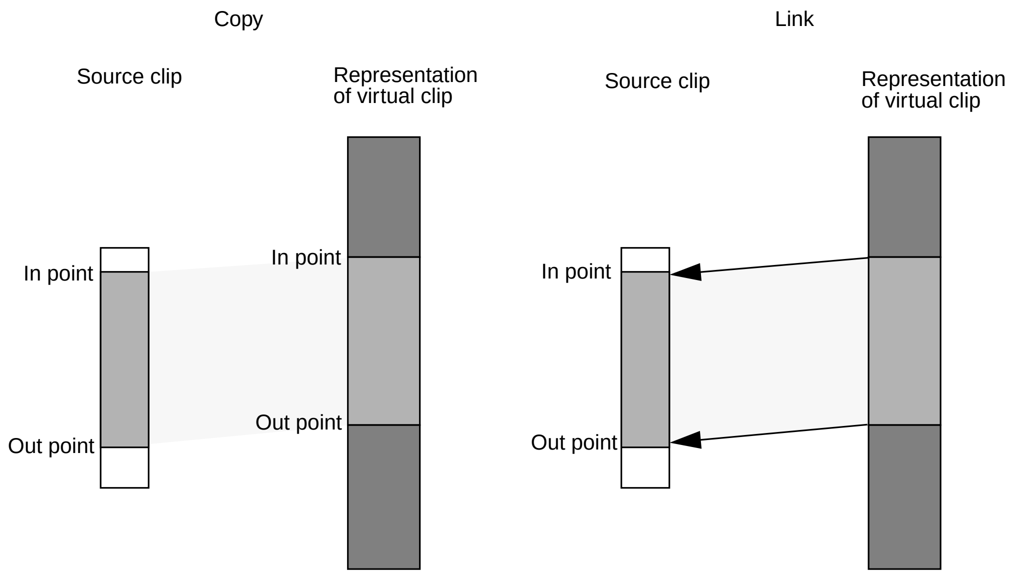


Figure 7-3 Copying vs. Linking; Where Segment Data is Stored

Listing Segments in a Vclip

To display pertinent information about the segments in a vclip, use the *CSLS* command:

```
CSLS [ clip [ track-mask [ in [ out ]]]]
```

- *clip*—is the name of the clip you are interested in.

  If *clip* is not specified, the most recently opened or created clip is used.
- *track-mask*—must be an asterisk (*).
- *in*—displays information about segments beginning after this (timecode) point in the vclip.

  If *in* is not specified, the information displayed begins with the first segment in the vclip.
- *out*—displays information about segments before this (timecode) point in the vclip.

  If *out* is not specified, the information displayed ends with the last segment in the vclip.

Use the *in* and *out* arguments to display information about segments in a subsection of the vclip.

Output

For each segment in a vclip, *CSLS* displays a line of information of the form:

```
trk in out clip src-trk src-clip src-in src-out
```

- trk—is always an asterisk (*)
- in—the in point of the segment in the vclip
- out—the out point of the segment in the vclip
- clip—the system-dependent name of a clip created automatically in the system used for reference counting. (This argument should be ignored.)
- src-trk—is always an asterisk (*)
- src-clip—the name of the clip in the clip cache where the segment comes from
- src-in—the in point of the segment in the source clip
- src-out—the out point of the segment in the source clip

Clearing and Removing Segments in Vclips

To clear or remove segments in a virtual clip, use the following MVCP commands, respectively:

```
CSCL clip track-mask timecode
CSRM clip track-mask timecode
```

- *clip*—is the name of the clip containing the segment to be cleared or removed.

  If *clip* is not specified, the most recently created or opened clip is used.
- *track-mask*—must be an asterisk (*)
- *timecode*—is the timecode of the first frame of the segment you want cleared or removed

When a segment is cleared (*CSCL*), it remains in the specified clip but its video is made black and its audio is removed. When a segment from a specified clip is removed (*CSRM*), the segments before and after the specified segment appear contiguous, as shown in Figure 7-4.

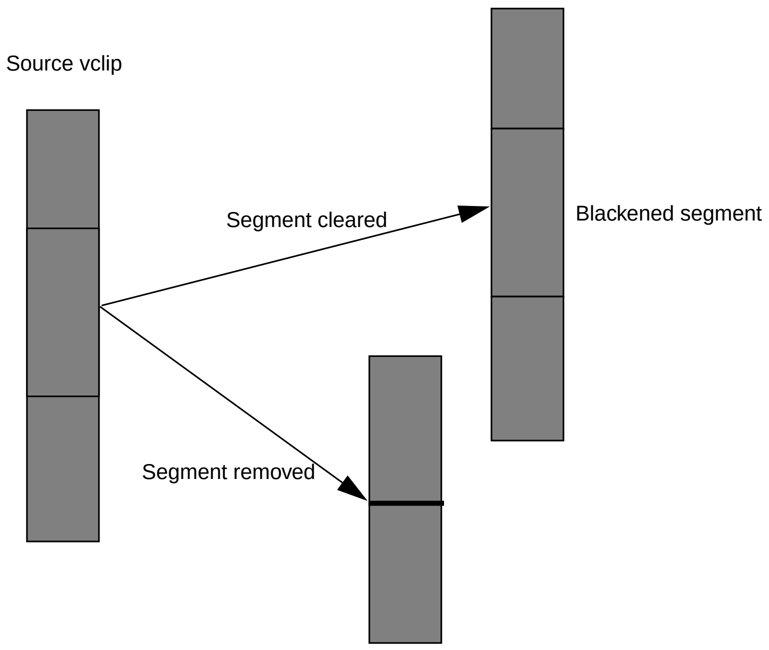


Figure 7-4 Clearing vs. Removing Segments

Working with Frames

Instead of adding or removing segments, you can use MVCP commands to add or remove frames in a vclip.

Inserting Empty Frames Into a Vclip

The *CFNW* command, defined as follows, inserts empty (black and silent) frames into a clip:

```
CFNW clip track-mask in out
```

- *clip*—is the name of the vclip into which you want to add one or more empty frames
- *track-mask*—must be an asterisk (*)

- *in*—is the in point in timecode in the vclip where the empty frames are to be inserted
- *out*—is the out point in timecode in the vclip where the inserted empty frames end

To use CFNW, the specified clip must have previously been opened or created using *COPN* or *CMK*, respectively, during the current MVCP session.

Clearing and Removing Frames in a Vclip

To clear or remove frames in a virtual clip, use the following MVCP commands, respectively:

```
CFCL clip track-mask in out
CFRM clip track-mask in out
```

- *clip*—is the name of the vclip from which you want to remove frames
- *track-mask*—must be an asterisk (*).
- *in*—is the in point in timecode in the vclip where the deletion is to start.
- *out*—is the out point in timecode in the vclip where the deletion ends.

When frames are cleared (*C*FCL), the frames remain in the specified clip but they are emptied (made black and silent). When the frames from a specified clip are removed (*C*FRM), the frames before and after the specified frames appear contiguous.

These commands are similar to FNW, FCLR, and FRM except CRCL, CFRM do not deal with units.

See Figure 7-4 for an illustration of clearing and removing.

4:2:2:4 Sampled Video

VST supports recording and playout of 4:2:2:4 sampled video with alpha. The alpha channel is used as a key channel in most production environments. VST also supports recording the 4:2:2 video and the key channel independently and later combining them into a single 4:2:2:4 clip using two DIVO boards.

Playing and Recording 4:2:2:4 sampled video is described in the following sections:

- “Setting VST Controls” on page 87
- “Workflow to Generate a Single 4:2:2:4 Clip” on page 89
- “Sample MVCP Scripts” on page 90

Setting VST Controls

Recording a specific type of media requires setting the appropriate VST controls so that VST records in the correct mode.

Playing 4:2:2:4 video does not require setting any VST controls; VST detects 4:2:2:4 video and changes the settings based on the media type automatically.

For all of the media and clips being recorded, you generally work with CCIR601 colorspace, which is set as follows:

```
vtr.media.video.input.colorspace ccir601
```

VST drives the DIVO board, by default, to use only the single link SDI mode (over Link A of the DIVO board). This mode works with 4:2:2 median and the key channel.

For 4;2:2:4 clips, both links (link A and link B) of the DIVO board need to be used. The DIVO needs to operate in dual-link-sdi mode (Standard Digital Interface), which is set as follows:

```
vtr.media.video.input.format sdi-dual-link
```

Controls to Set to Record 4:2:2

Set the following control to record 4:2:2:

```
vtr.media.video.input.packing R242_8
vtr.media.video.input.colorspace ccir601
vtr.media.video.input.compression.type none
vtr.media.clip.format default
vtr.media.video.input.format sdi
```

R242_8 specifies 8-bit packing format for 422 clips.

4:2:2 clips are recorded as uncompressed so that they can be edited.

Controls to Set to Record Alpha Channel

Set the following control to record alpha:

```
vtr.media.video.input.packing 4_8
vtr.media.video.input.colorspace ccir601
vtr.media.video.input.compression.type none
vtr.media.clip.format default
vtr.media.video.input.format sdi
```

4_8 specifies 8-bit packing format for alpha-only clips.

Controls to Set to Record 4:2:2:4

Set the following controls to record 4:2:2:4

```
vtr.media.video.input.format sdi-dual-link
vtr.media.video.input.packing R2424_8
vtr.media.video.input.compression.sampling 4224
vtr.media.video.input.colorspace ccir601
vtr.media.clip.format default
```

- sdi-dual-link refers to a mode using two standard digital interface (SDI) links for transport of 4224 or 4444 video.
- R242_8 specifies 8-bit packing format for 422 clips.
- 4224 specifies 4:2:2:4 sampling.

4:2:2:4 is generally compressed. The bandwidth of Rice compression of 4:2:2:4 sampled video is about 17 MB/sec.

Workflow to Generate a Single 4:2:2:4 Clip

The following procedure describes how to record 4:2:2:4 sampled video with alpha using the following hardware setup shown in Figure 8-1.

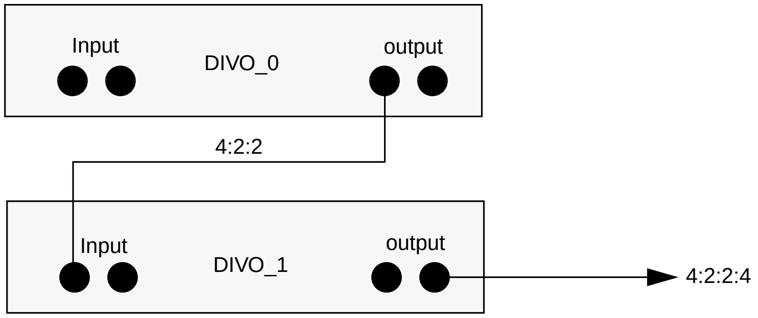


Figure 8-1 DIVO Configuration for Recording 4:2:2:4

1. Record uncompressed 4:2:2 sampled video on one SDI input of a DIVO.
2. Record the uncompressed alpha channel of the same video using one SDI input of a DIVO.
3. Use the wall clock to play the 4:2:2 and alpha synchronously through two DIVO boards where the output of one, playing the 4:2:2 video, is used as the input of the second DIVO board. Because the second DIVO board can play the alpha and record simultaneously, the second DIVO board combines the 4:2:2 and alpha channel into 4;2:2:4 sampled video.

   Careful attention must be paid to disk bandwidth. The clips must be located on a filesystem that supports a bandwidth of about 22 MB/sec for uncompressed 4;2:2.

The 4:2:2 and alpha are generally not compressed so that they can be edited. The 4:2:2:4 video is generally compressed. Before recording any of these videos, you must set appropriate VST controls, as described in “Setting VST Controls” on page 87.

A code example showing how to play and record 4:2:2, alpha, and 4:2:2:4 is given in “Sample MVCP Scripts” on page 90.

Sample MVCP Scripts

The following sample code explains how to perform the following tasks:

- “Recording 4:2:2” on page 90
- “Recording the Alpha Channel” on page 91
- “Playing Alpha and Recording 4:2:2:4” on page 94

Recording 4:2:2

Use the following script to record 4:2:2:

```
send "UADD DIVO_DVC_2 * SHAR"
expect {
   timeout exit
   "202 OK"
}
expect {
   timeout exit
   -re "U\[0-9\]+"
}
set U1 $expect_out(0,string)

send "SET $U1 MED vtr.media.video.input.colorspace ccir601"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA SET $U1 MED vtr.media.video.input.compression.type none"
expect {
   timeout exitf
   "200 OK"
}

send "/SEQA SET $U1 MED vtr.media.clip.format default"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA SET $U1 MED vtr.media.video.input.format sdic”
```

```
expect {
   timeout exit
   "200 OK"
}

send "/SEQA SET $U1 MED vtr.media.video.input.packing R242_8f"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA LOAD $U1 b/$CLIP.4220.raw IN CRTE"
expect {
   timeout exit
   "202 OK"
}
expect {
   timeout exit
   "$CLIP"
}

send "/SEQA CUER $U1 0 +$SECS:00"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA REC $U1"
expect {
   timeout exit
   "200 OK"
}

send_user "\nType return to record the alpha component:\n"
interpreter
```

Recording the Alpha Channel

Use the following script to record the alpha channel:

```
# Set up record of alpha component

send "/SEQA SET $U1 MED vtr.media.video.input.packing 4_8"
```

```
expect {
   timeout exit
   "200 OK"
}

send "/SEQA LOAD $U1 $CLIP.0004.raw IN CRTE"
expect {
   timeout exit
   "202 OK"
}
expect {
   timeout exit
   "$CLIP"
}

send "/SEQA CUER $U1 0 +$SECS:00"
expect {
   timeout exit
   "200 OK"
}

#----------------------------------------
# Set up play of 422 component

send "UADD DIVO_0 * SHAR"
expect {
   timeout exit
   "202 OK"
}
expect {
   timeout exit
   -re "U\[0-9\]+"
}
set U2 $expect_out(0,string)

send "/SEQA SET $U2 MED vtr.media.video.output.format sdi"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA SET $U2 MED vtr.edit.preroll 5:00"
expect {
   timeout exit
   "200 OK"
}
```

```
send "/SEQA SET $U2 MED vtr.edit.postroll 3:00"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA LOAD $U2 b/$CLIP.4220.raw"
expect {
   timeout exit
   "202 OK"
}
expect {
   timeout exit
   "$CLIP"
}

#----------------------------------------
# Go

send "/SEQA REVU $U2 0 +$SECS:00"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA UUWT $U1 $U2 SYNR"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA REC $U1"
expect {
   timeout exit
   "200 OK"
}

send_user "\nType return to setup the 4224 play and record:\n"
interpreter
```

Playing Alpha and Recording 4:2:2:4

Use the following script to play the alpha channel and record 4;2:2:4 on the same DIVO board:

```
# Set up play of alpha component

send "UADD DIVO_DVC_2 *"
expect {
   timeout exit
   "202 OK"
}
expect {
   timeout exit
   -re "U\[0-9\]+"
}
set U3 $expect_out(0,string)

send "/SEQA SET $U3 MED vtr.media.video.output.format sdi"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA LOAD $U3 $CLIP.0004.raw"
expect {
   timeout exit
   "202 OK"
}
expect {
   timeout exit
   "$CLIP"
}

send "/SEQA CUE $U3 0 +$SECS:00"
expect {
   timeout exit
   "200 OK"
}

#----------------------------------------
# Set up the record

send "/SEQA SET $U1 MED vtr.media.video.input.colorspace ccir601"
```

```
expect {
   timeout exit
   "200 OK"
}

send "/SEQA SET $U1 MED vtr.media.video.input.compression.type rice"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA SET $U1 MED vtr.media.clip.format default"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA SET $U1 MED vtr.media.video.input.format sdi-dual-link"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA SET $U1 MED vtr.media.video.input.packing R2424_8"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA SET $U1 MED vtr.media.video.input.compression.sampling
4224"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA LOAD $U1 $CLIP.4224.rice IN CRTE"
expect {
   timeout exit
   "202 OK"
}
expect {
   timeout exit
   "$CLIP"
}
```

```
send "/SEQA CUER $U1 0 +$SECS:00"
expect {
   timeout exit
   "200 OK"
}

send_user "\nType return to do the 4224 play and record:\n"
interpreter
# Go

send "/SEQA REVU $U2 0 +$SECS:00"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA UUWT $U3 $U2 SYNR"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA UUWT $U1 $U2 SYNR"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA PLAY $U3"
expect {
   timeout exit
   "200 OK"
}

send "/SEQA REC $U1"
expect {
   timeout exit
   "200 OK"
}

send_user "\nType return to exit:\n"
interpreter
```

DVB-ASI Time-Delay Server

VST includes an HDTV time-delay server feature that allows you to pause or stop a compressed MPEG-2 transport stream. This feature works in conjunction with the Viewgraphics Dynamo MediaPump DVB-ASI PCI card.

VST can record a DVB-ASI stream for a predefined length of time. You provide a time delay (expansion) in the output stream with a MVCP STOP command, or by a STOP-CUE-PLAY sequence. For example:

`CUE` *unit in-point*
@time `PLAY` *unit*

VST finds the closest possible position before the in point you specify, and starts playing. If the position VST finds is five frames before the in point, play starts five frames before the specified time. Thus the correct frame for the specified time plays.

When the output stream is stopped, it can be cued accurately to continue the playout. Content can be inserted locally, downstream of the decoder.

FailSafe Operations

The IRIS FailSafe software uses redundant servers to provide a high-availability system. The servers run Video Server Toolkit (VST) and communicate using a special serial connection as well as a private ethernet; they may share clips and index filesystems.

When FailSafe detects a failure on the primary server, IRIS FailSafe transfers the filesystems and processing functions to the secondary server.

To use FailSafe, make sure the subsystems, *vst_eoe.sw.fsmon* and *vst_eoe.sw.failsafe*, are installed.

IRIS FailSafe is discussed in detail in the *IRIS FailSafe Administrator's Guide* and the *IRIS FailSafe Programmer's Guide*.

Hardware Configuration

IRIS FailSafe is a software product that enables a pair of servers to be used in a redundant configuration. The servers are configured with the VST software and share the VST filesystems. The dual-server IRIS FailSafe configuration shown in Figure 10-1 provides redundancy. If the primary server fails for any reason, the secondary server mounts any shared filesystems with the clips and their index files. Then, using the local VST, the second server is ready to play the clips.

In an IRIS FailSafe configuration, the operating system on each server is configured for the VST. The disks on each server store the operating system and the shared RAIDs store the clips and index filesystems. The RAID is shared by physically attaching it to an Emulex LH5000 Digital Fibre hub and by connecting the servers to two other ports in this hub. The two servers along with the shared RAID(s) form an IRIS FailSafe cluster.

The servers also share a public IP alias or a name users can use to connect to the servers. If a server fails, the backup server takes over the shared RAIDs as well as this IP alias, which users still use to connect to the servers. To the user, a failover looks the same as a server that crashed and got rebooted very quickly.

The servers use a special serial connection to communicate. When the backup server detects a problem with the active server, IRIS FailSafe unmounts the filesystems from the active server and automounts them on the secondary server. VST on the secondary server detects this action and adds the clips to its tables so that it is ready to play them.

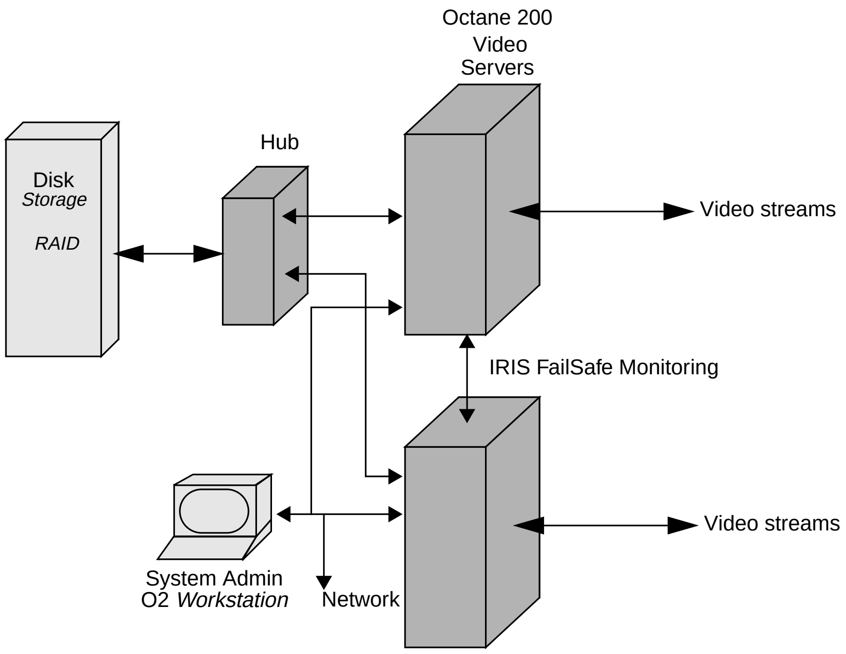


Figure 10-1 VST IRIS FailSafe Configuration

Shared Resources

The primary and secondary servers can share up to four Ciprico 7000 RAID systems using an Emulex LH5000 digital Fibre Hub, as shown in Figure 10-1. They also share an IP alias which always points to the currently-active server.

Server Failures

Failures occur if one of the following events are detected on the currently-active server:

- Power failure
- Public network card failure
- Operating system crash
- Unmounting of shared filesystems

When a failure is detected, the secondary server attempts to reboot the primary server using the serial cable. The secondary server also takes over the shared services, the shared RAIDS, and the IP alias. VST detects the newly-mounted filesystem using *fsmon* and loads the clips.

Troubleshooting IRIS FailSafe

In an IRIS FailSafe configuration, the primary and secondary servers use the states shown in Table 10-1.

Table 10-1 Primary and Secondary Server States

Event	**Primary Server Status / VST Status**	**Secondary Server Status / VST Status**	**Owner of Shared Services**
Normal operation	Normal Running	Normal Running	Primary
Power off primary server	Cannot be determined Not running	Degraded Running	Secondary
Power on primary server	Controlled-failback Running	Degraded Running	Secondary
ha_admin -rf (after power off on primary server, *ha_admin* executes on primary server)	Normal Running	Normal Running	Primary
Power off secondary server (before execution of *ha_admin -rf)*	Degraded Running	Cannot be determined Not running	Primary

Table 10-1 (continued) Primary and Secondary Server States

Event	Primary Server Status / VST Status	Secondary Server Status / VST Status	Owner of Shared Services
Power on secondary server	Degraded Running	Controlled-failback Running	Primary
ha_admin -rf (after power off on secondary server, *ha_admin* executes on secondary server)	Normal Running	Normal Running	Primary
Unmount shared filesystem (Primary)	Standby Running	Degraded Running	Secondary
Unmount shared filesystem (Secondary)	Standby Running	Degraded Running	Neither
ha_admin -rf (after unmounting, *ha_admin* executes on primary server)	Normal Running	Normal Running	Primary
Disconnect serial connection	Normal running	Normal Running	Primary
ha_admin -m start backup	Normal Running	Normal Running	Primary
ha_admin -fs primary (executed on secondary server)	Standby Running	Degraded Running	Secondary
ha_admin -rf primary after ha_admin -fs primary completed executing	Normal Running	Normal Running	Primary

Monitoring

The server availability status can be checked using the *ha_admin -a* command.

The status of the shared filesystem can be checked with the *df* command from either server.

The status of the proper aliasing of the servers and the network can be checked using the *netstat -i* command.

Use the IRIS FailSafe command-line interface to manage the Video Server Toolkit IRIS FailSafe system. For details, see the *IRIS FailSafe Administrator's Guide*.

Chapter 11

Completing Common Tasks Using MVCP Commands

This chapter is a grab bag of common tasks you routinely perform using MVCP commands. Each task is discussed in a tutorial fashion to introduce you to the way MVCP works. Once you master the basic tasks presented in this chapter, you can proceed to the other features offered by MVCP commands.

The tasks presented in this chapter are not sequential, but modular. There is a flow to the MVCP commands as presented; however, one command does not necessarily build on the one presented previous to it.

After completing a number of these tasks you will gain a feeling for the MVCP commands. Appendix A describes all of the MVCP commands.

Note: For an explanation of MVCP commands, see the mvcp man page.

This chapter discusses the following tasks:

- "Manual Access to Video Server Toolkit" on page 106
- "Creating and Deleting a Unit" on page 107
- "Loading, Creating, and Unloading a Clip" on page 108
- "Finding the Name of a Clip" on page 108
- "Setting Edit Points" on page 108
- "Cueing Decks to Play or Record" on page 109
- "Sequencing Commands" on page 109
- "Playing a Prerecorded Clip" on page 110
- "Setting and Listing Configuration Values" on page 111
- "Listing Video and Deck Control Ports" on page 112
- "Identifying the Audio Ports to Use" on page 112

- “Configuring Audio Recording” on page 112
- “Configuring Video Recording Compression” on page 113
- “Recording a Clip” on page 113
- “Editing Clips” on page 114
- “Displaying Your Logo” on page 115
- “Playing Clips from a Playlist” on page 116
- “Monitoring Unit State” on page 117
- “Monitoring the System” on page 118

Manual Access to Video Server Toolkit

Video Server Toolkit (VST) applications routinely open a TCP / IP connection to a host running VST on the MVCP port, normally 5250. The application sends MVCP commands to control VST.

The port value is set in the file */usr/vtr/config/control-in.conf*. For example, to set the port to 5250, use the following line in the file:

```
mvcp tcp 5250
```

Note: Do not change the port value from 5250 unless it is absolutely necessary.

You can, however, manually control VST by opening a telnet connection to a host running VST and then issuing MVCP commands to control it. For example:

```
152% telnet server 5250
Trying 130.62.156.178...
Connected to server.
Escape character is ‘^]’.

100 VTR Ready
```

Concluding a Session

To exit the telnet session, type the following command:

```
BYE
```

Creating and Deleting a Unit

A unit is a virtual VTR. It can play and record video and audio just like a VTR.

Units can be created using the following command:

```
UADD DIVO_0 * SHAR
```

The UADD command returns the name of the unit, *unitName*, for example:

```
UADD DIVO_0 * SHAR
202 OK
U1
```

U1, in this case, controls the DIVO_0 video board, which includes both an input video port and an output video port.

For an explanation of the UADD options, see page 138. For more information about deleting a unit, see page 166.

Deleting a Unit

Units can be deleted using the following command:

```
UCLS unitName
```

Multiple Connections to a Unit

Once a unit has been created, it can be controlled by a number of MVCP connections by opening it:

```
UOPN unitName
```

When multiple MVCP connections are made to one unit, the unit is not deleted until all of the connections have deleted it.

Warning: **Opening a unit owned by a Sony, Louth, or Odetics port using MVCP commands (for example, UOPN) causes unpredictable behavior.**

Loading, Creating, and Unloading a Clip

To load and unload a clip into a unit, use the following commands, respectively:

```
LOAD unitName clipName OUT CRTE
UNLD unitName
```

unitName is the name of the unit on which the clip is loaded.

The OUT option means that the clip, *clipName*, can only be played, not recorded onto. Other valid values include IN, which means the clip will be recorded onto, and BOTH, which means the clip can be played or recorded onto.

CRTE creates the clip. Without a CRTE argument, the clip does not exist in the system.

Finding the Name of a Clip

If you do not know the name of a clip, you can list all of the clips by issuing the clip list command:

```
CLS
```

Setting Edit Points

The IN and OUT edit points specify where the source video is to begin and end playing, and where the beginning and ending recording points are on the record deck, usually VST.

When a clip is played, by default the edit IN point is used as the starting point for PLAY.

To set edit points, use the *CEDP* command:

```
CEDP clipName inPoint outPoint
```

Note: The media outside of the in and out points is not actually erased; its just not played.

Cueing Decks to Play or Record

You can play and record on units without cueing them. There is, however, a good chance that the beginning of the playing or recording will not be clean: the frame count might be off by several frames or the audio might be garbled.

You can avoid these problems by cueing the units for playing or recording.

To cue a clip for playback, enter:

`CUE` *unitName*

To ca clip for recording, enter:

`CUER` *unitName*

Optional Arguments

The following optional CUE and CUER arguments specify the segment of media to play, the direction of play and how many times the segment is played:

```
CUE unitName <in-point> <out-point> <direction> <number-of-passes>
```

Values for *direction* include FWD (forward), BWK (backward), F/B (play forward and then play backwards), and B/F (play backward and then play forward).

Sequencing Commands

You can sequence more than one command to execute on a unit by using the append-sequential specification:

`/APP /SEQ` *command unitName*

This command specifies that the command, *command*, is appended (/APP) to the current list of commands queued for the unit, *unitName*, and the command will be executed after the previous command in the list completes (/SEQ). The alternative to waiting for completion is to preempt the previous command on the list using the flag, /IMM.

You can also:

- Prepend a command in the list of commands by using /PRE instead of /APP.
- Delete the command list and replace it with a command using /FLS (flush) instead of /APP.

For more information about command sequencing, see “Command Sequencing” on page 157.

Playing a Prerecorded Clip

To play a clip, use the following procedure:

1. Open a TCP/IP connection to a host machine running VST.

   If successful, VST responds:

   ```
   100 VTR Ready
   ```

2. Create a unit, which is a virtual videotape deck:

   ```
   UADD DIVO_0 * SHAR
   ```

   For an explanation of the UADD options, see “UADD *owner* *port* *mode* *port-physical-name*” on page 138.

3. Load the clip:

   `LOAD` *unitName clipName* `OUT`

   unitName is the name of the unit on which the clip is loaded.

   The OUT option means that the clip, *clipName*, can only be played, not recorded onto.

4. Cue the clip for playback:

   `CUE` *unitName*

5. Play the clip:

   `PLAY` *unitName speed*

   speed is the speed of the playback, for example, 1000 is normal play, -1000 is normal reverse play.

You can also play the clip in other modes, such as:

- *FF*—fast forward.
- *JOG*—advance or reverse one frame at a time.
- *SHTL*—(shuttle) is a variable speed fast forward or fast reverse.

For more information about the arguments for each of these commands, see “Unit Commands” on page 153.

Setting and Listing Configuration Values

VST configuration variables are called *controls*. The two major categories of controls are:

Device-specific—for which you use the SET and GET commands to specify and retrieve the control values for individual units.

System-wide—for which you use the SSET and SGET commands to specify and retrieve the control values for global, system values, for example, the log level.

There are two subsets of device-specific controls:

- Storage—for reading digital data off a disk or writing the data to a disk.
- Media—for communicating with the video port.

To set or get the configuration variables for a specific unit, you have to select the subset of controls you want to set by using STOR (storage) or MED (media). For example:

```
SET unitName MED vtr.media.video.input.compression.type DVCPRO
GET unitName MED vtr.media.video.output.*
```

These commands set the video compression type to DVCPRO, and return all of the video output controls for the specified unit.

To list all of the storage controls, use the asterisk (*) wildcard: GET unitName STOR *

For more information about the SET command, see page 165. For more information about the SSET command, see page 150

For more information about the GET command, see page 162. For more information about the SGET command, see page 150.

Listing Video and Deck Control Ports

To display the configuration of video and deck control ports, use the port list command:

```
PLS
```

Identifying the Audio Ports to Use

To identify which audio port to use by a given DIVO unit, use the SET command for a unit:

```
SET <unit> MED vtr.media.audio.input.port RAD1.AESIn
SET <unit> MED vtr.media.audio.output.port RAD1.AESOut
```

Alternately, you can configure a unit in */usr/vtr/config/device-defaults/**. For example, in DIVO_1 you would enter:

```
vtr.media.audio.input.port RAD1.AESIn
vtr.media.audio.output.port RAD1.AESOut
```

Configuring Audio Recording

To record audio using VST, you must set the following controls:

- Bits in audio sampling, 24 by default—vtr.media.audio.input.sample.width
- Sampling rate, 48,000 by default—vtr.media.audio.input.rate
- Audio port used—vtr.media.audio.input.port

The audio port can either be VideoIn, if the audio is embedded in the video signal, or the name of an audio port, for example, AnalogIn or AESIn.

For information about setting control values, see "Setting and Listing Configuration Values" on page 111.

Configuring Video Recording Compression

To record video using VST, you must set the compression type using *vtr.media.video.input.compression.type*.

Valid values include JPEG, for O2, or, for machines using DIVO boards:

- none—for uncompressed.
- rice—for lossless entropy-coding.
- DVCPRO— for high-quality DCT-based compression

For information about setting control values, see “Setting and Listing Configuration Values” on page 111.

There are other commands that you might set according to your media format. For a list of those settings, see “Workflow to Generate a Single 4:2:2:4 Clip” on page 89.

Recording a Clip

To record a clip, use the following procedure:

1. Open a TCP/IP connection to a host machine running VST.

   If successful, VST responds:

   ```
   100 VTR Ready
   ```

2. Create a unit, which is a virtual videotape deck:

   ```
   UADD DIVO_0 * SHAR
   ```

   For an explanation of the UADD options, see “UADD *media-port-name* *storage-port-name* *port-sharing-mode* [*owner-info*]” on page 136.

3. Configure VST for audio and video recording, as described in “Configuring Audio Recording” on page 112 and “Configuring Video Recording Compression” on page 113.

4. Load the clip:

   `LOAD` *unitName clipName* `BOTH CRTE`

   unitName is the name of the unit on which the clip is loaded.

   The BOTH option means that the clip, *clipName*, can be played or recorded onto. The CRTE option means that the clip should be created if it does not exist.

5. Cue the clip for recording:

   `CUER` *unitName*

6. Record onto the clip:

   `REC` *unitName*

Editing Clips

You can edit clips on two levels of granularity:

- Clip
- Frame

Editing Clips

The following MVCP commands provide basic editing functionality for a clip already loaded in a unit:

- CEDP—sets in and out edit points.

  ```
  CEDIT InPoint OutPoint
  ```
- CRM—removes a clip.

  ```
  CRM clipName
  ```
- CCP—copies a clip.

  ```
  CCP clipName newClipName
  ```
- CMV—renames a clip.

  ```
  CMV clipName newClipName
  ```
- CLN—creates a new clip that shares its contents with an existing clip.

  ```
  CLN clipName newClipName
  ```

When using CLN, changing one clip also changes the renamed clip because of their link.

For more information about setting in and out editing points, see “Setting Edit Points” on page 108.

Editing Frames

The following MVCP commands manipulate the frames within a clip that is already loaded in a unit:

- FRM—remove a frame. In film, the equivalent is cutting out frames of film and splicing the two parts of the film back together.

  ```
  FRM unitName inFrame outFrame
  ```
- FCLR—changes (clears) a frame to black but does not remove it.

  ```
  FCLR unitName inFrame outFrame
  ```
- FNEW—inserts a black frame into the clip.

  ```
  FNEW unitName inFrame outFrame
  ```
- FOVR—moves frames from one part of a clip and overwrites frames in another part of the clip.

  ```
  FOVR unitName sourceIn sourceOut destIn
  ```
- FINS—moves frames from one part of a clip and inserts them in another part of the clip.

  ```
  FINS unitName sourceIn sourceOut destIn
  ```

Note: Frame editing is not supported on all clip formats. Currently, only vframe clips can be frame-edited.

Displaying Your Logo

You can use the MVCP *SET* command with the following controls to display your company logo, or any image, when the video port is not playing a clip:

```
vtr.media.output.idle_mode image
vtr.media.video.output.image.type user
vtr.media.video.output.image.name <name of image>
```

Image files go in */usr/vtr/data/images.*

Playing Clips from a Playlist

The commands to execute a playlist can be performed over a single MVCP control connection. Some control implementations may find it easier to use a unique MVCP control connection for each unit. The commands and the order in which they are sent is identical in either case.

1. Create a unit on the media port.

```
UADD port
202 OK
U1
```

2. Create a second unit on the same media port.

```
UADD port
202 OK
U2
```

3. Load the first clip into U1.

```
LOAD U1 clip1 OUT
202 OK
clip1 movie/dif/dvcpro 108969984 108969984 00:00:00.00
 00:00:30.08 * * 29.97 19990415T004204.435814Z CL
```

4. Cue U1 with a mode that will return when the command is placed in the command queue.

```
/SEQA CUE U1
200 OK
```

5. Play U1 with a synchronization mode where a response will be returned only when the unit has started executing the command.

```
/SEQA /SYNR PLAY U1
200 OK
```

6. Load next clip into U2.

```
LOAD U2 clip2 OUT
202 OK
clip2 movie/dif/dvcpro 108969984 108969984 00:00:00.00
 00:00:30.08 * * 29.97 19990415T004130.833005Z CL
```

7. Cue U2 with a queued command.

```
/SEQA CUE U2
200 OK
```

8. Play U2 as with U1 above.

```
/SEQA /SYNR PLAY U2
200 OK
```

9. Load next clip into U1.

```
LOAD U1 clip3 OUT
202 OK
clip3 movie/dif/dvcpro 108969984 108969984 00:00:00.00
 00:00:30.08 * * 29.97 19990415T004148.636950Z CL
```

10. Cue U1 with a queued command.

```
/SEQA CUE U1
200 OK
```

11. Play U1 as above.

```
/SEQA /SYNR PLAY U1
200 OK
```

Monitoring Unit State

When executing a play list, it is common to also desire display of the state of the list execution. Using MVCP this can be accomplished via polling, but a more efficient solution is to utilize unit monitoring. Unit monitoring provides asynchronous events describing the change in state of a unit, such a execution state, loaded clips, or timecode location. Details of unit monitoring can be found in the MVCP documentation for the MON command. Typically a separate MVCP connection will be initiated for monitoring.

In the example play list algorithm above, a unit monitor could be started after the units are created to trace unit execution. This would allow a control application to trace which clip was being played and the timecode location of the unit in the clip. Note that the information provided by unit monitoring describes the unit state and locations. The actual video frame timecode leaving the server port will be some fixed number of frames behind that time due to codec delays. This delay is format dependent and can be found in the table below. The table shows the difference between the time reported by the unit and the actual video frame at the server port at a that time. For instance, with DVCPRO on record the unit status reports 3 frames behind the frame on the input of the server, and on play the unit status reports 7 frames ahead of the frame on the server output port.

Table 11-1 Time Reported by the Unit and the Actual Video Frame

Format	Record Unit State (frames)	Play Unit State (frames)
Uncompressed	-2	+2
RICE	-2	+2
DVCPRO	-3	+7
MPEG-2 Vela	Device supports only play.	21
O2 M-JPEG (development only)	2	2

Monitoring the System

VST provides the following ways to monitor the system:

- Status of units
- Continuous monitoring of a unit
- Listing statistics
- Error reporting

The following sections explain each of these reports in further detail:

- “Status” on page 119
- “Monitoring” on page 119
- “Statistics” on page 120
- “Error Reporting” on page 121

Status

You can display the status of one unit or all units using the following commands, respectively:

```
USTA unitName
ULS
```

Monitoring

For continuous monitoring of a unit, you use the MON command:

```
MON [unitName] [/ eventType]
```

If you omit a unit name, all of the units are monitored.

You can receive notification when any of the following events occurs on a unit in the clip cache, as appropriate:

- UADD—unit added
- URM—unit removed
- UCHG—unit state changed
- UCTL—unit control changed
- UERR—unit error
- CADD—clip added
- CRM—clip removed
- CEDP—edit points changed
- CCHG—clip media changed
- CMV—clip moved
- CCHP—clip protection changed

You can add one or more of these event types to the MON command after the slash (/) that separates the unit names from the event types.

If event types are not specified, notification of UCHG, URM, and UCTL events are returned. If a unit name is not specified, notification of each UADD event is returned.

MON prevents an MVCP connection from processing any further commands. To stop monitoring, you must either close the MVCP connection or issue another command on the connection at which time monitoring is terminated.

For more information about the MON command, see page 138.

Statistics

You can return statistics values for one or all components in a system using the list statistics command:

```
STLS [componentName [statisticsType]]
```

componentName is the name of the component you want statistics about. If omitted, statistics for all components are returned.

statisticsType is the type of statistics you want returned. If omitted, all statistics for the specified component are returned.

If successful, the STLS command returns a line of the following form:

componentName statisticsType statisticsValue...

To see the list of available statistics, type

```
STLS * *
```

Statistics on Statistics

You can return statistical values about a component's or all component's statistics using the following command:

```
STST [componentName [statisticsType]]
```

For example, the following command calculates all the statistics for components that contain "DIVO" in their names:

```
STST *DIVO*
```

If the command is successful, a single line is returned in the following format:

values samples min max sum mean stddev where

- *values* is the number of statistical values matching the pattern.
- *samples* is the total number of samples collected.
- *min* is the minimum value.
- *max* is the maximum value.
- *sum* is the sum of the values.
- *mean* is the mean of the values.
- *stddev* is the standard deviation of the values.

For more information about STST, see "STST [*component-pattern* [*statistic-pattern*]]" on page 151.

Error Reporting

VST reports three types of errors:

- MVCP command syntax errors
- Controller errors
- Unit Errors

MVCP Command Syntax Errors

All MVCP commands return error responses for syntax violations, for example, entering a letter instead of a number.

Controller Errors

All controller and non-unit errors, such as errors in renaming or deleting a clip, return a generic notification that something failed. To receive more specific information about the most recent global error that occurred for a specific controller, use the ERR command:

```
ERR
```

This command returns an error code and a short description.

Unit Errors

Unit errors are errors in the execution of unit commands, such as PLAY, REC, and FF. When looking at the status of a unit, you might find it in the error state, as described in “Status” on page 119. In that case, you might like to get more information about the error.

To return unit errors, use the UERR command:

```
UERR unitName
```

This command returns an error code and a short description.

Multiport Video Computer Protocol (MVCP) Command Summary

The base Video Server Toolkit (VST) software includes a protocol processor, which provides full-featured control of VST via a textual TCP/IP-based protocol called the Multiport Video Computer Protocol, or MVCP.

This appendix describes the MVCP commands.

Protocol Format

MVCP is a simple request/response protocol which is implemented over a TCP byte-stream connection (i.e., a stream socket). The protocol is similar in nature to the FTP control protocol in that requests consist of two- to four-character commands with a varying number of space- delimited arguments terminated by a carriage-return/line-feed.

Responses consist of a textually-represented numeric result code with an associated informational message terminated by a CR/LF. Success is indicated with a response code of the form 2xx. Unless otherwise stated, a command will return the result code 200 if the command is successful.

Unlike FTP, certain MVCP responses may also include a single response line or multiple response lines terminated by a single blank (CR/LF- only) line. The successful result code is 202 if a single response line is returned and 201 if a response list (one or more lines terminated by a blank line) is returned.

All MVCP command arguments and responses are space-delimited. Command or response arguments which contain spaces are surrounded by double quotation marks. In some cases, response arguments that do not contain spaces may be double-quoted, so the application should always be prepared to handle them.

Note: Future enhancements to MVCP may result in additional arguments being added to commands or responses. When new arguments are added to a command, omission of the new arguments will result in the behavior associated with the original command; hence, existing applications will continue to work in a compatible manner.

An application should not depend on the exact number of arguments on a response line returned by an MVCP command as additional arguments may be added as future enhancements to the protocol. An application should expect and process those arguments which it understands but should be prepared to ignore additional arguments which it does not expect and understand.

Unit Management

A single MVCP connection can control multiple VST units (each unit is a logical VTR transport capable of loading, cueing, and playing a clip). MVCP commands which pertain to a specific unit include the unit name as the first argument of the request while global commands, commands which do not pertain to a specific unit, do not include a unit name.

For example:

```
CINF clip1 (global: retrieve clip information)
LOAD U1 CLIP3.DIF OUT (unit: load clip into unit U1)
```

When the unit name is omitted or specified as '*' with a unit command, the unit most recently created is used. The unit name can be omitted only if the unit command has no required arguments.

Units can either be created (using the UADD command) or opened (using the UOPN command). When a unit is opened, it must have previously been created by another controller (which could be another MVCP control connection or another external control processor such as a station automation system or on-line editor). Of course, due care must be exercised when sharing control of a unit between two controllers. Interfering with a unit owned by one of the VST external protocol processors (e.g., Sony, Louth, Odetics) will lead to unpredictable behavior.

Establishing an Interactive MVCP Connection

To establish an interactive MVCP connection, use telnet to establish a control connection to the MVCP port on the VST host.

The following example establishes an interactive connection to the MVCP port (which is usually port 5250) on the VST host “originserver.” The MVCP *PLS* (List Ports) command is run and then the *BYE* command is used to terminate the control connection:

```
% telnet originserver 5250
Trying 133.144.166.34...
Connected to originserver.abc.com.
Escape character is '^]'.
100 VTR Ready
PLS
201 OK
vlan_1 BOTH "VLAN Deck Control" DECK
DIVO_0 BOTH "SGI XT-DIVO Digital Video Option" VID
DIVO_1 BOTH "SGI XT-DIVO Digital Video Option" VID
...
BYE
200 Goodbye
Connection closed by foreign host.
%
```

Rules for Using MVCP Commands

The following rules apply to the use of the MVCP commands:

- The commands are case-sensitive and must be entered exactly as shown in this chapter.
- All MVCP command arguments are space-delimited. Command arguments that contain spaces should be surrounded by double quotation marks.
- Each command must end with a carriage return and line feed.
- The command set is divided into two subsets. One subset contains the global commands, which do not pertain to a specific *unit*. The other subset contains the unit commands, which pertain to a specific unit. (See “Global Commands” on page 132 and “Unit Commands” on page 153 for detailed information about these command subsets.)

- MVCP commands that pertain to a specific *unit* contain the unit name as the first argument of the request. Global commands do not include a unit name. For example, the following is a global command that requests information about the *clip* named “NA40125D.” This command does not have a unit name:

  ```
  CINF NA40125D          (get clip information)
  ```

  The following is a unit command that loads the clip named “NA40125D” for output into the unit identified by “U1”:

  ```
  LOAD U1 NA40125D OUT          (load clip into unit U1)
  ```

- MVCP responds to each command with a response header line, which is terminated with a carriage return and line feed. All MVCP responses are space-delimited. Response arguments that contain spaces are surrounded by double quotation marks. (See “Response Codes” on page 128 for information.)

Note: Future enhancements to MVCP may result in additional arguments being added to commands or responses. The additional arguments will be added in such a way that the commands or responses will be backward-compatible with the existing commands or responses, so that existing applications will continue to work correctly.

Command Sets

The protocol command set is divided into two subsets. One subset includes the global commands, those commands which do not pertain to a specific unit. The other subset includes the unit commands.

In general, global commands affect the global state of VST and thus all control connections (through MVCP or other protocols). However, certain commands affect only the connection on which the commands are executed.

Displaying MVCP Commands

One way to learn MVCP commands is to see how they are used in the applications included in VST, such as mcstat, mcpanel, and mcclips. To display in the console window the MVCP commands as they are sent to VST and the MVCP responses as they are received from VST, start the applications with the **-v3** option:

```
# mcpanel -v3
```

Command Triggers

More precise control of command execution can be accomplished by specifying the time at which a given command should begin execution. This feature is supported only for certain commands such as PLAY, REC, and STOP.

Note: On video devices, command timing is ignored when the unit is not in play or record mode.

Time-of-day triggering

To specify a command time, at the beginning of the command line, include an at-sign (@) followed by the desired time-of-day. Several formats for specifying time are understood:

The timecode form, HH:MM:SS:FF may be used to specify the time relative to midnight local time calculated using current frame rate (which defaults to 29.97 and can be set with FRAT). For instance, 14:14:00:00 specifies that the command should start at exactly 2:14pm local time.

Optionally, the timecode may also include a date by prepending the timecode with yyyymmddT (for example, 19980828T12:34:00:02).

The ISO 8601 date/time form, yyyymmddThhmmss.ssssssZ, may be used to specify the command time.

Finally, the time-of-day form, SEC.USEC, may be used to specify the time using a more traditional UNIX timebase. SEC is the number of seconds since the standard Epoch, Jan 1, 1970. USEC is microseconds.

Example:

```
LOAD U1 a/COMM OUT
/SEQA CUE U1
/SEQA @17:31:00:02 PLAY U1
```

Note: f the system is receiving house timecode, command timing will be based on the incoming time; otherwise, the system time will be used.

Response Codes

The MVCP processor responds to all commands with a single response header line. Some commands also return either a single response data line or multiple response data lines. When multiple data lines are returned, they are terminated by a single blank line.

The response header line has the following format:

xxx *message_text*

where

- *xxx* is a three-digit decimal response code.
- *message_text* is a textual message describing the response.

This response header line may be followed by one or more data lines, depending on the response code.

Each of the following is an example of a response header line:

```
200 OK
410 Invalid clip time
500 Server error
```

The following is an example of a response header line that is followed by two data lines: In this example, a blank line follows the second data line.

```
ULS
201 OK
U1 mvcp/originserver mvp BOTH * DONE IDLE * 0 *
U2 mvcp/originserver mvp BOTH * DONE IDLE * 0 *
```

Caution: Additional fields may be added as future enhancements to response lines. The additional fields will be added in such a way that the responses will be backward-compatible so that existing applications will continue to work correctly.

The response codes are divided into the following categories:

- 2xx, successful command execution
- 4xx, command format or setup errors
- 5xx, command execution errors

Some error codes have more than one error message. The message depends on the error.

Response Text

```
200 OK Success with no additional data
201 OK Success with N data lines followed by a blank line
202 OK Success with one data line

400 Command invalid
401 Port name missing
402 Unit name missing
403 Clip not found
403 Unit not found
403 Unit not open
404 Access mode missing or invalid
405 Clip name missing
405 New clip name missing
406 Command not supported
407 Load mode missing or invalid

410 Invalid clip time
411 Event function missing or invalid
412 Clock time missing or invalid
413 Numeric argument missing or invalid
414 Invalid direction
415 <not used>
416 Insertion id missing or invalid
417 Event insertion failed
418 Invalid play speed
418 Invalid speed/count
419 Invalid number of passes

420 Must specify start time
421 Bad create flag
422 Invalid command sync
423 Invalid protection
424 Missing or invalid sort order
425 Missing or invalid time
426 Clip monitor not active
427 Invalid parameter format
428 Node type missing or invalid
429 Invalid event type

432 Too many units specified
433 Invalid timestamp format
434 Frame-rate missing
434 Unable to add clip
435 Filename missing
```

```
436 f1f2 has to be in CAP
436 Still-frame mode invalid
436 Frame interleave mode invalid
437 Cannot specify both in and out as relative
438 Unit already open
439 Sync modifier not supported for this command

440 Invalid frame-rate
448 Too many arguments
457 User name missing
458 Password missing
460 Must provide USERname first

500 General error (message varies)
501 Unable to copy clip
501 Unable to find clip in archive
501 Unable to find pending get-from-archive request
501 Unable to issue delete-from--archive request
501 Unable to issue get-from-archive request
501 Unable to issue put-to-archive request
501 Unable to link clip
501 Unable to rename clip

510 General error (message varies)
510 Invalid clip time
511 General error (message varies)
540 Invalid frame-rate
548 Too many arguments
```

OK Response

After issuing a command, the system may respond, “OK.” This response means that the command has been parsed, not that it has been executed. For example, if you:

```
LOAD Unit clipName
```

without a mode or CRTE argument, and clip does not exist, the command returns an “OK,” even though a CRTE is required.

Whether or not the command will succeed depends on things such as:

- What type of media port is being controlled.
- Whether or what type of clip is loaded.
- What state the unit is in.
- What state the hardware is in.

It is impossible for MVCP to know anything beyond the syntactic validity of a unit command.

One way of getting a response when the command has been executed is to issue the command with /SYNC. For example, if you:

```
/SYNC LOAD Unit clipName
```

an error message is returned immediately.

Using P2 Commands with MVCP Commands

You cannot mix MVCP and P2 commands. You must either control a port using only MVCP commands (LOAD / CUER / REC), or the P2 protocol (AUTOEDIT or CUE / PLAY / EDIT_ON / EDIT_OFF).

There is one exception: you can use the following MVCP command to load a new clip onto a port being controlled through P2:

```
SSET <control-port> vtr.control.clip.name <clip-name>
```

where *control-port* can be vtr_1, vtr_2, etc.

Global Commands

Global commands affect the entire system, as opposed to unit commands described in “Unit Commands” on page 153 that only effect specified units.

There are many different kinds of global commands:

- “Access Control” on page 134
- “Ports” on page 135
- “Units” on page 136
- “Archive Management” on page 139
- “Clip Management” on page 143
- “System Controls” on page 150
- “Statistics” on page 150
- “Miscellaneous” on page 152

Table A-1 identifies the global MVCP commands that are documented in this section.

Table A-1 Global MVCP Commands

Command	**Function**
AFND	Locate a clip in an available a StudioCentral 2.0 archive system
AFNG	Locate a pending or in-progress get-from-archive command for a clip
AGET	Retrieve a clip from a StudioCentral 2.0 archive system
ALSG	List the get-from-archive operations that are waiting or being processed
ALSP	List the put-to-archive operations that are waiting or being processed
APUT	Store a clip to a StudioCentral 2.0 archive system
ARM	Delete a clip from a StudioCentral 2.0 archive system
ARMG	Cancel all pending or in-progress get-from-archive operations
BYE	Terminate the current control connection
CADD	Add a clip that has been inserted into the clip cache through an external means

Table A-1 (continued) Global MVCP Commands

Command	**Function**
CCHP	Add specified protections to, or remove them from, a clip
CCP	Create a new clip by copying it from an existing clip
CCST	Get the current status of the VST Clip Cache
CEDP	Set the edit points for a clip
CGP	Get clip protections
CIMG	Copy an image to a file
CINF	Get information about a clip
CLN	Create a new clip that shares the clip media content of another clip
CLS	Get a list of all the clips in the VST clip cache
CLSA	List the clips that have been added to the clip cache since the last time the CLSA command was issued or since the CMON command that created this clip monitor was executed
CLSR	List the clips that have been removed from the clip cache since the last time the CLSR command was issued or since the CMON command that created this clip monitor was executed
CMIN	Get the number of clips that have been added to, or removed from, the clip cache
CMON	Initiate monitoring of the clip cache
CMV	Rename a clip
CRM	Delete a clip from the clip cache
CRMA	Delete all clips currently residing in the clip cache
ERR	Get the code and description of the last global error that occurred for a controller
FRAT	Set the frame rate used in translating timecodes for command timing
GTOD	Get the current system time
MON	Place control connections into event monitoring mode
PASS	Sets the password for access control
PLS	Get the list of supported media ports

Table A-1 (continued) Global MVCP Commands

Command	Function
SGET	Retrieves the values of system controls for the subsystem(s)
SORD	Set the sort order that's used when lists are returned
SSET	Sets system controls for the subsystem
STLS	List statistics
STOD	Set the system time
STST	Calculate various statistics
STZ	Reset statistics
UADD	Create a new unit
ULS	Get a list of the existing VST units
USER	Sets the user for access control

Access Control

This section lists those global commands that deal with system access.

USER *username*

The USER command sets the *username* for access control purposes.

The USER command applies only to the current MVCP connection.

PASS *password*

The PASS command sets the *password* for access control purposes and must follow the corresponding USER command.

The PASS command applies only to the current MVCP connection.

Ports

This section lists those global commands that deal with ports.

PLS

The PLS (List Ports) command returns the list of supported media ports. If successful, the response code is 201 and one response line for each port is returned. The format of each line is:

```
*name* *mode* "*description*" *type* *port-physical-name*
```

Where:

- *name* is the name of the port.
- *mode* is the port's input/output mode (IN, OUT, or BOTH).
- *description* is a description of the port.
- *type* is the type of the port, one of NET (network), VID (video), DECK (deck control), or DISK (disk storage).
- *port-physical-name* is the physical name of the media port.

For example:

```
PLS
201 OK
vlan_1 BOTH "VLAN Deck Control" DECK
DIVO_0 BOTH "SGI XT-DIVO Digital Video Option" VID
DIVO_1 BOTH "SGI XT-DIVO Digital Video Option" VID
DIVO_2 BOTH "SGI XT-DIVO Digital Video Option" VID
DIVO_3 BOTH "SGI XT-DIVO Digital Video Option" VID
DIVO_4 BOTH "SGI XT-DIVO Digital Video Option" VID
DIVO_5 BOTH "SGI XT-DIVO Digital Video Option" VID
DIVO_6 BOTH "SGI XT-DIVO Digital Video Option" VID
DIVO_7 BOTH "SGI XT-DIVO Digital Video Option" VID
```

Units

This section lists those global commands that affect all units in the system.

UADD *media-port-name* *storage-port-name* *port-sharing-mode* [*owner-info*]

The UADD (Add Unit) command creates a new unit. The name of the media port accessed by the unit is specified by *media-port-name*. The storage port accessed by the unit is specified by *storage-port- name* (use '*' to specify the default storage system).

Certain media ports must be opened without a storage port (e.g., deck-control ports). Specify 'null' for the storage port to create a unit which does not have a storage port.

The *port-sharing-mode* specifies how access is shared between multiple units accessing the same media port and takes one of the following values: EXCL, SHAR, or CONC.

Exclusive access (EXCL) means only one unit may exist which uses the media port at any given time. If a unit already exists for that port, the UADD will fail.

Shared access (SHAR) means multiple units may be created which all access the same port; however, only one unit may actually use the hardware at any given time. Shared access is only available on media ports which support it (in their interface module).

Concurrent access (CONC) means multiple units may use the media port at the same time. This mode is used most commonly on multiplexed networking ports (such as ATM).

The *owner-info* is optional and sets the owner info for the new unit. The owner info is included in certain status commands such as UINF, UGIN, and ULS.

If the unit is successfully created, the response code is 202 and a single response line is returned containing the name of the newly created unit.

Note: An application must not make any assumptions about the name of the unit including the format of the name. Unit naming is subject to change in future releases.

ULS

The ULS (List Units) command returns a list of the existing VST units. A snapshot of the state of each unit is included.

If the ULS command is successful, the response code is 201 and one response line for each unit is returned followed by a blank line. The format of each unit state is:

```
*name* *owner* *port* *mode* *clip* *status* *function* *location*
    *speed* *frame-rate* *command-id*
```

Where:

- *name* is the name of the unit.
- *owner* is the name of the controller that created the unit.
- *port* is the name of the unit's media port.
- *mode* is the mode of the media port (IN, OUT, or BOTH).
- *clip* is the name of the loaded clip ("*" if no clip is loaded).
- *status* is the status of the current function (BUSY is the initial state, RUN is the running state, DONE is the completed state, ERR is the error state).
- *function* is the current function: IDLE, LOAD, UNLD (Unload), CUE, CUER (Cue for record), PLAY, STEP, SHTL (Shuttle), REC (Record), PAUS (Pause), STON (StandbyOn), STOP, FF (Fast Forward), REW (Rewind), REVU (Review), EDIT (Edit), RHRS (Rehearse).
- *location* is the current clip location in the format hours:minutes:seconds:frames. In drop-frame mode, the final colon (:) is replaced by a period (.).
- *speed* is the current playback speed (1000 = normal 1x speed).
- *frame-rate* is the frame-rate (in frames / sec) of the current clip. 525-line timing is specified in its approximate form, 29.97.
- *command-id* is the id of the command currently being processed by the unit.

For example:

```
ULS
201 OK
U1 mvcp/originserver mvp BOTH * DONE IDLE * 0 *
U2 mvcp/originserver mvp BOTH * DONE IDLE * 0 *
```

MON [*unit-name* ...] [/ *event-type* ...]

The MON (Monitor) command places the current control connection into event monitoring mode. In this mode, a single response line is returned whenever a monitored event occurs. If one or more units are specified, unit events for only the specified units are returned; otherwise, unit events for all units are returned.

A list of one or more event types may be specified (preceded by a single forward slash). The event types are UADD (unit added), URM (unit removed), UCHG (unit state change), ULOC (unit location change), UCTL (unit control change), UERR (unit error), CADD (clip added), CRM (clip removed). Only the specified types of events are returned.

If no event-type list is specified, UCHG, URM, UERR, and UCTL events are returned, and if no units are specified, UADD events are also returned.

Event monitoring is terminated by closing the control connection.

The format of the event response line is one of the following:

UADD *owner* *port* *mode* *port-physical-name*

- *owner* is the name of the controller that created the unit.
- *port* is the name of the unit's media port.
- *mode* is the mode of the media port (IN, OUT, or BOTH).
- *port-physical-name* is the physical name of the media port controlled by the unit.

CADD *clip* *format* *size* *resident-size* *start* *end* *in* *out* *frame-rate*

- *clip* is the name of the clip.
- *format* is the format of the clip.
- *size* is the size of the clip content in bytes.
- *resident-size* is the size of the content that is currently resident on the clip cache disk system.
- *start* is the timecode of the first frame of the clip.
- *end* is the timecode of the frame after the last frame of the clip.
- *in* is the current mark-in point of the clip.

- *out* is the current mark-out point of the clip.
- *frame-rate* is the frame-rate (in frames / sec) of the current clip.
- 525-line timing is specified in its approximate form, 29.97.

UOPN *unit-name*

The UOPN (Unit Open) command opens an existing unit and makes it controllable by this MVCP connection.

If the unit is opened successfully, the response code is 202 and a single response line is returned containing the name of the opened unit.

Warning: Opening a unit owned by a Sony, Louth, or Odetics port using MVCP commands (for example, UOPN) causes unpredictable behavior.

Archive Management

This section lists those global commands that deal with archiving clips.

AFND *clip*

The AFND (Find Clip in Archive) command attempts to locate the clip specified by *clip* in an available archive system. If successful, the response code is 201, and a response line is returned for each archive system in which the clip is found. The response format is:

```
*archive-type* *archive-host*
```

Where:

- *archive-type* is the type of archive system.
- *archive-host* is the specific host name of the archive system containing the specified clip.

For example:

```
AFND NA1001
201 OK
mediahub mhhost
```

AFNG *clip*

The AFNG (Find Archive Get) command attempts to locate a pending or in-progress archive get command for the clip specified by *clip*. If found, the response code is 202, and a single response line is returned in the following format:

```
*clip* *atype* *ahost* *requester* *requested* *started* *eta*
```

Where:

- *clip* is the name of the clip.
- *atype* is the type of archive system.
- *ahost* is the specific host name of the archive system.
- *requester* is the name of the controller requesting the clip.
- *requested* is the time the retrieval was requested.
- *started* is the time the retrieval was started.
- *eta* is the time the retrieval is expected to complete.

AGET *clip* [*archive-clip-name* *archive-host*]

The AGET (Get from Archive) command enqueues a get-from-archive operation to retrieve the clip specified by *clip* from an attached archive system. If *archive-clip-name* is not specified or the default *archive-clip-name*, '*', is specified, *clip* will be used.

If *archive-host* is specified, VST attempts to retrieve the clip from only that specific archive. Otherwise, the clip is retrieved from the first archive in which it can be located.

If a get-from-archive operation is already pending for the clip, AGET does not add a new one.

AGET always returns immediately with response code 200.

Archive operations are processed in-order by the VST Archive Manager which can process a configurable number of concurrent operations for each attached archive system.

If the clip cannot be successfully retrieved from the archive, the failure will be logged in the VST status log. In addition, a clip monitor or event monitor will see the failing clip as having been removed from the clip cache.

ALSG The ALSG (List Archive Gets) command lists the get-from-archive operations that are waiting or being processed. The response code is 201, and a single response line is returned for each archive request in the following format:

```
*clip* *atype* *ahost* *requester* *requested* *started* *eta*
```

Where:

- *clip* is the name of the clip.
- *atype* is the type of archive system.
- *ahost* is the specific host name of the archive system.
- *requester* is the name of the controller requesting the clip.
- *requested* is the time the archive operation was requested.
- *started* is the time the archive operation was started.
- *eta* is the time the archive operation is expected to complete.

ALSP

The ALSP (List Archive Puts) command lists the put-to-archive operations that are waiting or being processed. The response code is 201, and a single response line is returned for each archive request in the following format:

```
*clip* *atype* *ahost* *requester* *requested* *started* *eta*
```

Where:

- *clip* is the name of the clip.
- *atype* is the type of archive system.
- *ahost* is the specific host name of the archive system.
- *requester* is the name of the controller requesting the clip.
- *requested* is the time the archive operation was requested.
- *started* is the time the archive operation was started.
- *eta* is the time the archive operation is expected to complete.

APUT *clip* [*archive-clip-name* [*archive-host*]]

The APUT (Put to Archive) command enqueues a put-to-archive operation to store the clip specified by *clip* to an attached archive system. If *archive-clip-name* is not specified or the default *archive-clip-name*, '*', is specified, *clip* will be used.

If *archive-host* is specified, the clip is stored into that specific archive. Otherwise, the clip is stored into the default archive.

If a put-to-archive operation is already pending for the clip, APUT does not add a new one.

If the specified clip does not exist, APUT returns an appropriate error response code. Otherwise, APUT immediately returns response code 200.

Archive operations are processed in-order by the VST Archive Manager which can process a configurable number of concurrent operations for each attached archive system.

If the clip cannot be successfully stored into the archive, the failure will be logged in the VST status log.

ARM *archive-clip-name* [*archive-host*]

The ARM (Delete from Archive) command enqueues a delete-from-archive operation to delete the clip specified by *archive-clip-name* from an attached archive system. If a delete-from-archive operation is already pending for the clip, ARM does not add a new one.

ARM always immediately returns response code 200.

Archive operations are processed in-order by the VST Archive Manager which can process a configurable number of concurrent operations for each attached archive system.

ARMG

The ARMG (Cancel Archive Gets) cancels all pending or in-progress get-from-archive operations.

ARMG always immediately returns response code 200.

Clip Management

This section lists those global commands that deal with clip management.

CADD *clip* [*format*]

The CADD (Add Clip) command adds a new clip that has been inserted into the clip cache through an external means. The name of the new clip is specified by *clip*. The format of the clip is specified by *format*. If *format* is not specified, the clip file's *clip.format* attribute will be used, if it exists, or VST will attempt to automatically detect the format of the clip.

The clip media file must be placed in the appropriate location in the clip cache before issuing the CADD command. If the clip format requires an index, the index file must also be placed in the appropriate index directory before issuing the command.

Note: CADD is no longer required to make a clip available to other VST commands (such as loading it into a unit). VST will automatically attempt to locate and add a clip whenever a controller references the clip.

However, CADD may be used to add a clip to VST's internal clip tables such that it will appear in the clip listing returned by CLS. CADD will also generate the appropriate clip-add event messages for controllers that are monitoring the clip cache.

CCHP *clip* {{*+*|*-*}*protection-type* ...}

The CCHP (Change Clip Protection) command adds to and / or removes from the clip specified by *clip* the protections specified by the *protection-type* arguments.

The types of protection include ATTR (Attribute Protect), MV (Rename Protect), REC (Record Protect), and RM (Delete Protect). For example, the command "CCHP NA1001 +RM -ATTR" sets the protection on NA1001 such that the clip cannot be deleted but can have its attributes (such as its edit points) changed.

If successful, the response code is 200.

CCP *clip* *new-clip*

The CCP (Copy Clip) command creates an new clip named *new-clip* by copying the clip specified by *clip*. After the copy is created, there is no association between the new clip and the original clip.

If successful, the response code is 200.

Note: CCP does not realign a clip as it is being copied. For clip formats which require clip alignment that is compatible with the file system on which it is stored (such as the VST VFrame format), if CCP is used to copy a clip between two different file systems, the file systems must have identical major and minor alignments.

CCST

The CCST (Clip Cache Status) command returns the current status of the VST Clip Cache. The response code is 202 and a single response line is returned in the following format:

```
*num-clips* *bytes-used* *bytes-avail* *bytes-avail-contiguous*
```

Where:

- *num-clips* is the number of clips resident in the clip cache.
- *bytes-used* is the number of bytes used on the storage systems which hold the clip cache.

- *bytes-avail* is the number of free bytes available on the storage systems which holds the clip cache.
- *bytes-avail-contiguous* is the number of free bytes available on the storage system which has the greatest amount of free space.

CEDP *clip* *mark-in* *mark-out*

The CEDP (Set Clip Edit Points) command sets the edit points for the clip specified by *clip*. The *mark-in* and *mark-out* arguments are specified in HH:MM:SS:FF format. The new edit points will not be seen by any unit until the clip is loaded (or reloaded). If the clip is already loaded into a unit, the original edit points will apply.

Specifying '*' for *mark-in* or *mark-out* removes the respective edit point.

If the command is successful, the response code is 200.

CGP *clip*

The CGP (Get Clip Protection) command returns the current protection of the clip specified by *clip*.

If successful, the response code is 202, and a single response line is returned which contains a list of the protections currently enabled for the clip. The protections are ATTR (Attribute Protect), MV (Rename Protect), REC (Record Protect), and RM (Delete Protect).

CIMG *clip* *timecode* *interleave* *filename* [*format*]

The CIMG (Create Clip Image) command extracts the image data associated with the frame specified by *timecode* of the clip specified by *clip* and writes the image to the file specified by *filename*.

interleave specifies how to construct the image from the two fields of the frame: F1 (odd field only), F2 (even field only), F1F2 (both fields interleave), F1F1 (odd field line-doubled), F2F2 (even field line-doubled).

format specifies the image format to use. Possible values are "rice", "rgb", "yuv", "jpeg", and "tiff" (or others as supported by the Image Format Library). If *format* is not specified, the format is inferred from the filename extension (".rice", ".rgb", ".yuv", ".jpg", ".tiff").

For example:

```
CIMG bigclip 00:01:00:02 F1F2 x.jpg jpeg
200 OK
```

CINF *clip*

The CINF (Clip Info) command returns the attributes of the clip specified by *clip*. If the clip currently exists in the clip cache, the response code is 202 and a single response line is returned in the following format:

- *clip* *format* *size* *resident-size* *start* *end* *in* *out* *frame-rate*
- *clip* is the name of the clip.
- *format* is the format of the clip.
- *size* is the size of the clip content in bytes.
- *resident-size* is the size of the content that is currently resident on the clip cache disk system.
- *start* is the timecode of the first frame of the clip.
- *end* is the timecode of the frame after the last frame of the clip.
- *in* is the current mark-in point of the clip.
- *out* is the current mark-out point of the clip.
- *frame-rate* is the frame-rate (in frames / sec) of the clip. 525-line timing is specified in its approximate form, 29.97.

CLN *clip* *new-clip*

The CLN (Link Clip) command creates a new clip named *new-clip* which shares the clip media content of the clip named by *clip*. The clip attributes (such as edit points) of the new clip may be set independently of the original clip.

If the original clip is deleted, the new clip still retains the content of the original clip until the new clip is also deleted.

This command is useful for creating clips which refer to segments of other clips.

If successful, the response code is 200.

CLS The CLS (List Clips) command returns a list of all the clips in the VCP- Recorder clip cache. The response code is 201 and one response line is returned for each clip in the cache. The format of the response line is:

- *clip* *format* *size* *resident-size* *start* *end* *in* *out* *frame-rate*
- *clip* is the name of the clip.
- *format* is the format of the clip.
- *size* is the size of the clip content in bytes.
- *resident-size* is the size of the content that is currently resident on the clip cache disk system.
- *start* is the timecode of the first frame of the clip.
- *end* is the timecode of the frame after the last frame of the clip.
- *in* is the current mark-in point of the clip.
- *out* is the current mark-out point of the clip.
- *frame-rate* is the frame-rate (in frames/sec) of the clip. 525-line timing is specified in its approximate form, 29.97.

CLSA

The CLSA (List Added Clips> command lists the clips that have been added to the clip cache since the last time the CLSA command was issued (or since the CMON command which created this clip monitor was executed).

Before the CLSA command may be issued by a controller, the CMON (Clip Monitor) command must be issued to initiate monitoring of the clip cache for this controller.

If successful, the response code is 201 and one response line is returned for each newly added clip which contains the clip's name. A blank line terminates the list of clips.

CLSR

The CLSR (List Removed Clips> command lists the clips that have been removed from the clip cache since the last time the CLSR command was issued (or since the CMON command which created this clip monitor was executed).

Before the CLSR command may be issued by a controller, the CMON (Clip Monitor) command must be issued to initiate monitoring of the clip cache for this controller.

If successful, the response code is 201 and one response line is returned for each removed clip which contains the clip's name. A blank line terminates the list of clips.

CMIN

The CMIN (Clip Monitor Info) command returns the number of clips that have been added to and / or removed from the clip cache and will be returned by the CLSA and CLSR commands respectively.

The response code is 200, and a single response line is returned in the following format:

```
*num-clips-added* *num-clips-removed*
```

Where:

- *num-clips-added* is the number of clips that have been added.
- *num-clips-removed* is the number of clips that have been removed.

CMON

The CMON (Clip Monitor> command initiates monitoring of the clip cache. The CLSA and CLSR commands are used to retrieve, respectively, the clips that have been added to or removed from the clip cache.

If the CMON command is issued for a second or subsequent time, the current list of added and removed clips is discarded and monitoring is initialized again.

The response code is 200.

CMV *clip* *new-clip*

The CMV (Move Clip) command renames the clip specified by *clip* to a new name specified by *new-clip*.

If successful, the response code is 200.

Note: CMV cannot be used to move clips between file systems; use CCP instead.

CRM *clip*

The CRM (Delete Clip) command deletes the clip specified by *clip*. If any units currently have the clip loaded, actual deletion of the clip will be deferred until all units have unloaded the clip.

If the command is successful, the response code is 200.

CRMA

The CRMA (Delete All Clips) command deletes all clips currently residing in the clip cache. Clips which are currently being retrieved from an archive system may or may not be deleted depending on the progress of the retrieval.

If the command is successful, the response code is 200.

System Controls

This section lists those global commands that deal with system controls.

SGET *subsystem-pattern* *control-name-pattern*

The SGET (System Get Control) command retrieves the values of system controls for the subsystem(s) specified by *subsystem-pattern*. The possible values for *control-name-pattern* are subsystem-dependent and are described elsewhere. If the subsystem or control patterns contains wildcards, the values of all controls that match the specified patterns will be returned.

If successful, response code is 201, and one response line is returned for each matching control in the following format:

```
*subsystem-name* *control-name* "*control-value*"
```

SSET *subsystem-name* *control1-name* *control1-value* ...

The SSET (System Set Control) command sets system controls for the subsystem specified by *subsystem-name*. For each control, a name and a value must be provided. At least one control name / value pair must be specified. If the control value contains any spaces or tabs, the value must be enclosed in double quotes.

The possible values for *control-name* and *control-value* are subsystem-dependent and are described elsewhere.

Statistics

This section lists those global commands that deal with statistics gathering.

STLS [*component-pattern* [*statistic-pattern*]]

The STLS (List Statistics) command lists the component name, statistic name, and current value of each statistical value matching the specified patterns.

If the command is successful, the response code is 201, and a response line is returned for each matching statistical value in the following format:

```
*component-name* *statistic-name* *value* ...
```

Where:

- *component name* is the name of the instance of the component that is generating the statistic.
- *statistic name* is the name of the statistical value.
- *value* is the current value of the integer or floating-point statistic. The value of certain types of statistics (e.g., histogram) may include more than one number.

STST [*component-pattern* [*statistic-pattern*]]

The STST (Statistics Statistics) command calculates various statistics over all of the statistical values matching the specified patterns.

If the command is successful, the response code is 202, and a single response line is returned in the following format:

```
*values* *samples* *min* *max* *sum* *mean* *stddev*
```

Where:

- *values* is the number of statistical values matching the pattern.
- *samples* is the total number of samples collected.
- *min* is the minimum value.
- *max* is the maximum value.
- *sum* is the sum of the values.
- *mean* is the mean of the values.
- *stddev* is the standard deviation of the values.

STZ [*component-pattern* [*statistic-pattern*]]

The STZ (Statistics Reset) command resets the values of all the statistics matching the specified patterns.

Miscellaneous

This section lists all global commands not coverecd in the previous sections

BYE

The BYE command terminates the current control connection.

ERR

The ERR command returns the code and description for the last global error that occurred for this controller. Errors that occur on units are retrieved using the UERR command. This command returns errors for all Clip Management commands and other commands which do not pertain to a specific unit.

The response code is 202, and a single response line is returned in the following format:

```
*code* "*description*"
```

Where:

- *code* is the error code.
- *description* is the error description.

FRAT *frame-rate*

The <FRAT> (Frame Rate) command sets the frame rate used in translating timecodes for command timing. The *frame-rate* is specified as frames per second. Supported values are 24, 25, 29.97, and 30.

The FRAT command applies only to the current MVCP connection.

GTOD

The GTOD (Get Time-of-Day) command returns the current VST system time. The response code is 202, and a single response line is returned with three forms of the current time (time code, ISO 8601, and Unadjusted System Time):

hh:mm:ss:ff *yyyymmddThhmmss.ssssssZ* *UST*

For example:

```
GTOD
202 OK
14:24:01.11 19980105T222400.890307Z 94038459071434
```

SORD *order-type*

The SORD (Set Sort Order) command sets the type of ordering used when lists are returned. The possible values of *order-type* are NAME, which sorts lists by clip name, and TIME, which sorts lists by creation time.

STOD *time*

The STOD (Set Time-of_Day) command sets the VST system time as specified by *time* which is specified either as a time code (hh:mm:ss:ff) or in the ISO 8601-compatible format (yyyymmddThhmmss.ssssssZ).

Unit Commands

The unit commands all have as their first argument the name of unit to which the command is to be applied.

Table A-2 identifies the MVCP *unit* commands that are described in this section. .

Table A-2 MVCP Unit Commands

Command	Function
CUE	Cue for playback the clip currently loaded in a unit
CUER	Cue for recording the clip currently loaded in a unit
EDIT	Cue for recording and then begin recording
FCLR	Erase the audio and video from specified frames in a clip
FF	Fast forward the unit
FINS	Move frames within a clip
FNEW	Insert blank frames within a clip

Table A-2 (continued) MVCP Unit Commands

Command	Function
FOVR	Overwrite frames within a clip
FRM	Remove frames from within a clip
GET	Get the values of controls
GOTO	Jump a unit's transport to a specified location
JOG	Move a unit forward or reverse by the number of frames
LIMS	Modify the edit limits being used by the current playback or record function
LOAD	Load a clip into a unit
PAUS	Pause a unit
PLAY	Begin playback on a unit
REC	Begin recording on a unit or resume normal recording after a PAUS command
REVU	Do the equivalent of a cue for playback and then begin playing
REW	Fast reverse the unit
RHRS	Cue for playback and then begin playing, with the media port switched to end-to-end mode for playback
RSUM	Resume playback or recording
SET	Set controls for the unit
SHTL	Shuttle a unit at a specified speed
STON	Sets the speed of the unit specified.
STON	Halts playback but does not decue the unit.
STOP	Stop playback or recording on a unit
UCLS	Close an opened or created unit
UERR	Get the code and description of the last error that occurred on a unit
UFLS	Flush the command queue for a unit
UGIN	Get the owner and port information for a unit

Table A-2 (continued) MVCP Unit Commands

Command	**Function**
UINF	Get the owner and port information for a unit
UINT	Interrupt the command currently being processed by a unit
ULOC	Return the current transport location
UNLD	Unload the clip currently loaded in a unit
UOPN	Open an existing unit and make it controllable
USTA	Get the status of a unit
USYN	Set the default synchronization mode for a unit specified
UUWT	Synchronize command execution between two units
UWAT	Wait for the completion of the last command that was issued to a unit

Before you can use these *unit* commands, you must either create the unit or open it, according to the following:

- When you want to use a unit that does not already exist, you create the unit using the global *UADD* command.

  When you create the unit, you identify the media *port* and you specify the port access mode, which determines how access is shared among multiple units that access the same media port. You can specify exclusive access, shared access, or concurrent access of the media port.

  When you create the unit it is automatically opened.

- When you want to share a unit that has already been created, you open the unit using the global *UOPN* command.

  When you open a unit, it must have previously been created by another control port. Units can be shared with either another MVCP control connection or with another external control processor, such as a station automation system.

  Caution: Extreme care must be exercised when sharing control of a unit between two controllers. Interfering with a unit owned by one of the automation protocol processors (for example, a Louth controller) leads to unpredictable behavior.

Unit Command Modes

The VST units execute asynchronously with the control processors that are controlling them. How the MVCP control processor interacts with the units it controls and the client application that is issuing the MVCP commands is determined by the command synchronization processing. By default, when a command is issued to a unit, the unit's command queue is immediately flushed of any commands which are waiting to be executed by the unit, and the command preempts the previous command that was issued to the unit, even if that command has not completed executing. Also by default, the MVCP control processor returns a response to the client as soon as the command has been queued for the unit, so the OK response to a command means only that the command was successfully queued, not that the command completed successfully or has even started executing.

Synchronization Mode

The synchronization mode determines when the MVCP control processor returns a command response to the MVCP client. The available synchronization modes are: ASYN (async), SYNI (sync-init), SYNR (sync-run), and SYNC (sync-complete). Async (ASYN) mode is as has been described: the control processor responds as soon as the command is queued.

Sync-init (SYNI) mode delays the response until the unit has reached the initialization state on the command. This does not mean that the unit has begun to process the command, and in fact it may have to wait for a shared resource (such as the media port) to become available before it can continue.

Sync-run (SYNR) mode delays the response until the unit has reached the "running" state on the command. This means that the unit is actively processing the command. For instance, the running state for a PLAY command means that video is actually being played.

Sync-complete (SYNC) mode delays the response until the unit has reached the "complete" state on the command. This means that the unit will do no further processing for this command. If the command is CUE, the complete state is reached when the unit has been fully cued and is ready to being playback. If the command is PLAY, the complete state is reached when playback has finished.

If no error occurs in the unit before the desired sync state has been reached, the response code is 200 (or 201, or 202, as appropriate). If an error occurs before the unit reaches the desired state, a 5XX error response code will be returned.

The default command synchronization mode for a unit may be changed using the USYN command. Or, the default may be overridden on a individual command basis by prepending a forward slash (/) and the sync mode to the unit command. For example, the command "PLAY U5" uses the default sync mode, while the command "/SYNC PLAY U5" specifies that the command response should not be sent until the PLAY command has completed executing.

Command Sequencing

Command sequencing refers to the way in which consecutive commands are issued to and processed by the target unit. There are two variables which determine how a command is issued and processed: the preemption mode and the queuing mode.

Preemption

The preemption mode determines whether a command will preempt the previous command or wait for the previous command to reach a certain status before being executed by the unit. Preemption is controlled by both the "previous" command and the "next" command.

The "previous" command may be issued with a qualifier that defers execution the "next" command until the "previous" command has reached a certain status. The "next" command may be issued with a qualifier that defers its execution until the "previous" command has reached a certain status.

The preemption modes available for the "previous" command are NNO (no deferral), NINI (defer next until Init), NRUN (defer next until Running), NCMP (defer next until Complete).

The preemption modes available for the "next" command are PNO (no deferral), PINI (defer until previous Init), NRUN (defer until previous Running), NCMP (defer until previous Complete). POVR may also be used to override the defer-next preemption mode of the "previous" command.

Note: The IMM and SEQ qualifiers have been superceded by the new preemption qualifiers, but are still supported for compatibility. IMM corresponds to PNO and SEQ corresponds to PCMP.

Queuing

The queuing mode determines whether a command is placed at the beginning of the unit command queue (making it the next command to be executed), placed at the end of the command queue (making it the last command), or whether the command queue is flushed before adding the new command. The available queuing modes are prepend (PRE), append (APP), and flush (FLSH).

The default command sequencing is flush / no-defer-next / no-defer- previous, meaning that when an MVCP command is issued, the unit command queue is flushed and the command preempts whatever command is currently being executed by the unit.

The default command sequencing mode for a unit may be changed using the USYN command. Or, the default may be overridden on a individual command basis by prepending a forward slash (/) and the sequencing mode to the unit command. For example, the command "PLAY U5" uses the default sequencing mode, while the command "/APP PLAY U5" specifies that the command should be appended to the unit's command queue.

The default preemption and queuing modes are overridden individually. For example, "/APP /PCMP PLAY U5" places the PLAY command at the end of the command queue and the command does not begin executing until the previous command has completed.

Three common sequencing combinations can be abbreviated:

- /SEQA is equivalent to /APP /PCMP.
- /IMMP is equivalent to /PRE /PNO.
- /IMMF is equivalent to /FLSH /PNO.

Unit Commands

This section lists the commands that affect specific units.

CUE [*unit-name* [*in* [*out* [*direction* [*passes*]]]]]

The CUE (Cue For Play) command cues for playback the clip currently loaded in the unit specified by *unit-name*. If *in* is specified, the clip is cued at the specified frame. If *in* is missing or specified as '*', the mark-in point stored with the clip is used, or if mark-in is not set, the first recorded frame of the clip is used.

If *out* is specified, the clip is cued with the specified out point, meaning playback will terminate at the specified frame. If *out* is missing or specified as '*', the mark-out point stored with the clip is used, or if mark-out is not set, no out point is used.

If *out* is specified, *in* must be specified.

If either *in* or *out* is specified, the other may be specified as a duration by adding a '+' prefix character. For example "1:00:01:00 1:00:06:00", "1:00:01:00 +5:00", and "+5:00 1:00:06:00" all refer to the same edit range.

The optional *direction* argument specifies the playback direction: FWD is forward, BWD is backward, F/B is forward followed by backward, B/F is backward followed by forward. The default direction is forward (FWD).

The optional *passes* argument specifies how many passes through the clip are made. The default is 1 pass. Specify passes as 0 to repeat indefinitely (use the STOP command to stop).

If *passes* is specified as -1, the unit is cued in free-range mode (only on media devices that support free-range cueing). In free-range mode, the *in* point is used only as the initial location but does not define the lower limit of playback. The lower limit is defined by the vtr.media.clip.limit.start control, if set, or the start of the clip if the clip limit control is not set.

In free-range mode, the upper limit of playback is defined by the specified out-point. If the out-point is not set, the upper limit is defined by the vtr.media.clip.limit.end control, if set, or the end of the clip if the clip limit control is not set.

CUER [*unit-name* [*in* [*out*]]]

The CUER (Cue For Record) command cues for recording the clip currently loaded in the unit specified by *unit-name*. If *in* is specified, the clip is cued at the specified frame. If *in* is missing or specified as '*', the unit cues to the mark-in point stored with the clip or if mark-in is not set.

If *out* is specified, the clip is cued with that out-point, meaning recording will terminate at the specified frame. If *out* is missing or specified as '*', recording will continue until the unit is stopped. if *out* is specified, *in* must be specified.

If either *in* or *out* is specified, the other may be specified as a duration by adding a '+' prefix character. For example "1:00:01:00 1:00:06:00", "1:00:01:00 +5:00", and "+5:00 1:00:06:00" all refer to the same edit range.

EDIT [*unit-name* [*in* [*out*]]]

The EDIT (Edit) command performs an auto-edit for the edit range *in* *out*. The unit prerolls for the duration specified by the setting of the vtr.edit.preroll control and postrolls for the duration specified by the vtr.edit.postroll control.

FCLR *unit-name* *in* *out*

The FCLR (Clear Frames) command clears (erases) the frames of the clip loaded into the unit specified by *unit-name* from the frame specified by *in* (inclusive) to the frame specified by *out* (exclusive). The video and audio associated with the cleared frames is removed, but the frames themselves remain. This contrasts with FRM which removes the frames, closing the hole in the clip. The clip must be loaded for input (IN) or input/output (BOTH).

FF [*unit-name*]

The FF (Fast Forward) command fast forwards the unit specified by *unit-name*. The fast forward speed is device-dependent.

FINS *unit-name* *source-in* *source-out* *dest-in*

The FINS (Insert Frames) command moves the frames in the range *source-in* to *source-out* of the clip loaded into the unit specified by *unit-name*, inserting them at the point specified by the timecode *dest-in*. The frames are removed from the original location, and the duration of the clip remains the same. The clip must be loaded for input (IN) or input/output (BOTH).

FNEW *unit-name* *in* *out*

The FNEW (Insert New Frames) command inserts blank frames into the clip loaded into the unit specified by *unit-name* between the frame specified by *in* (inclusive) and *out* (exclusive). FNEW opens a hole in the clip, and the duration of the clip will increase. The clip must be loaded for input (IN) or input/output (BOTH).

FOVR *unit-name* *source-in* *source-out* *dest-in*

The FOVR (Overwrite Frames) command moves the frames in the range *source-in* to *source-out* of the clip loaded into the unit specified by *unit-name*, overwriting the frames starting at the timecode specified by *dest-in*. The frames are removed from the original location. The duration of the clip will decrease, though if the source and target overlap, the duration will decrease by a fewer number of frames than are represented by the source range. The clip must be loaded for input (IN) or input/output (BOTH).

FRM *unit-name* *in* *out*

The FRM (Remove Frames) command removes the frames of the clip loaded into the unit specified by *unit-name* from the frame specified by *in* (inclusive) to the frame specified by *out* (exclusive). This command removes the frames altogether, moving the frames after the removed frames down in the timeline to close the hole. This contrasts with FCLR which simply erases the video and audio associated with the frames but does not remove the frames themselves.

The clip must be loaded for input (IN) or input/output (BOTH).

GET *unit-name* *dev-type* *control-name-pattern* ...

The GET (Get Control) command retrieves the values of device controls for the unit specified by *unit-name*. The *dev-type* specifies whether the controls are queried in the media (MED) or storage (STOR) device assigned to the unit.

The possible values for *control-name-pattern* are device- dependent and are described elsewhere. If the pattern contains wildcards, the values of all controls that match the specified pattern will be returned.

If successful, response code is 201, and one response line is returned for each matching control in the following format:

```
*control-name* "*control-value*"
```

The following example gets the values of the device controls that begin with “vtr.media.clip” for unit U1:

```
GET U1 MED vtr.media.clip*
201 OK
vtr.media.clip.limit.end "*"
vtr.media.clip.preset.start "01:00:00:00"
vtr.media.clip.limit.start "*"
vtr.media.clip.format "movie/vframe"
```

GOTO *unit-name* *timecode*

The GOTO (Goto) command jumps the unit transport specified by *unit-name* to the location specified by *timecode*. The unit transport continues the function that is was executing starting at the target of the Goto command.

STEP [*unit-name* [*frames*]]

The STEP (Step) command steps the unit specified by *unit-name* by the number of frames specified by *frames* (1 frame, if not specified). Positive numbers step forward. Negative numbers step backward. If the distance specified by *frames* takes the unit past the current edit limits, the unit will stop (or pause, if the unit is configured to pause instead).

Some media ports require that the unit already be in a playback state when STEP is issued.

LIMS *unit-name* *in* [*out* [*direction* [*passes*]]]

The LIMS (Set Edit Limits) command modifies the edit limits being used by the current playback or record function. Which edit parameters may be changed is device-dependent. In general, only the out-point may be changed as a way to stop playback or recording at a specific point even if the unit was cued without a out-point.

LOAD *unit-name* *clip* [*load-mode*]

The LOAD (Load Clip) command loads the clip specified by *clip* into the unit specified by *unit-name*. The *load-mode* indicates whether the clip is being loaded for input (IN), output (OUT), or both input and output (BOTH). The default is output (OUT).

If successful, the response code is 202 and a single response line is returned in the following format:

- *format* *size* *resident-size* *start* *end* *in* *out* *frame- rate*
- *format* is the format of the clip.
- *size* is the size of the clip content in bytes.
- *resident-size* is the size of the content that is currently resident on the clip cache disk system.
- *start* is the timecode of the first frame of the clip.
- *end* is the timecode of the frame after the last frame of the clip.
- *in* is the current mark-in point of the clip.
- *out* is the current mark-out point of the clip.
- *frame-rate* is the frame-rate (in frames/sec) of the clip. 525- line timing is specified in its approximate form, 29.97.

PAUS [*unit-name*]

The PAUS (Pause) command pauses the unit specified by *unit- name*. The unit must be in a playback or record state. The RSUM, PLAY, STEP, SHTL, FF, or REW commands are used to resume playback. The RSUM or REC commands are used to resume recording.

If the unit is playing, the video output will be a still frame at the paused clip location.

PLAY [*unit-name* [*speed*]]

The PLAY command begins (or resumes) playback on the unit specified by *unit-name*. If *speed* is not specified, normal playback speed, 1000, is used. Some media ports may support other playback speeds.

Some media ports must be explicitly cued before starting playback. For those devices, PLAY cannot be used to resume playback after a STOP command is issued. The unit must be re- cued.

REC *unit-name*

The REC (Record) command begins recording on the unit specified by *unit-name*. REC can also be used to resume normal recording after a PAUS command. Some media ports must be explicitly cued before starting recording. For those devices, REC cannot be used to resume recording after a STOP command is issued. The unit must be re- cued.

REVU *unit-name* *in* *out*

The REVU (Review) command performs a edit review for the edit range *in* to *out*. The unit prerolls for the duration specified by the setting of the vtr.edit.preroll control and postrolls for the duration specified by the vtr.edit.postroll control.

REW *unit-name*

The REW (Rewind) command rewinds the unit specified by *unit- name*. The rewind speed is device-dependent and may be settable with a control.

RHRS *unit-name* *in* *out*

The RHRS (Rehearse) command performs an auto-edit for the edit range *in* *out*, but during the actual edit range switches the output to E-to-E mode rather than recording. The unit prerolls for the duration specified by the setting of the vtr.edit.preroll control and postrolls for the duration specified by the vtr.edit.postroll control.

RSUM [*unit-name*]

The RSUM (Resume) command resumes the playback or recording function that was paused by a PAUS command on the unit specified by *unit-name*.

SET *unit-name* *dev-type* *control1-name* *control1-value* ...

The SET (Set Control) command sets device controls for the unit specified by *unit-name*. The *dev-type* specifies whether the controls are to be set in the media (MED) or storage (STOR) device assigned to the unit.

For each control, a name and a value must be provided. At least one control name / value pair must be specified. If the control value contains any spaces or tabs, the value must be enclosed in double quotes.

The possible values for *control-name* and *control-value* are device-dependent and are described elsewhere.

The following example sets the value of a storage control for unit U1 so that frames are automatically cleared from the *clip* after being played:

```
SET U1 STOR vtr.storage.fs.clear_after_play true
200 OK
```

SHTL *unit-name* *speed*

The SHTL (Shuttle) command shuttles the unit specified by *unit- name* at the speed specified by *speed*. A speed of 1000 is normal 1x speed. The speed scale is linear, so a speed of 100 is 1 / 10th normal speed and a speed of 10000 is 10x speed.

Positive speeds play forward. Negative speeds play backward.

The actual shuttle speeds available are device-dependent.

SSPD *unit-name* *speed*

The SSPD (Set Speed) command sets the speed of the unit specified by *unit-name* to the speed specified by *speed*. SSPD is used to change speeds without changing the current unit transport function (either PLAY or SHTL).

STON [*unit-name*]

The STON (Standby On) command halts playback but does not stop the unit. This releases the output port for use by another unit, but allows the unit to resume playback quickly when a new playback command arrives.

STON is supported by only some media ports.

STOP [*unit-name*]

The STOP (Stop) command stops playback or recording.

For some media ports, playback or recording cannot be resumed until the unit is re-cued with a CUE or CUER command, respectively.

UCLS [*unit-name*]

The UCLS (Unit Close) command closes an opened or created unit. This controller's access will be terminated, and if no other controllers have the unit open, the unit will be deleted.

If the command is successful, response code 200 is returned.

UERR *unit* *error-code* "*error-message*"

- *unit* is the name of the unit.
- *error-code* is the code of the error.
- *error-message* is the textual error message.

UERR [*unit-name*]

The UERR (Unit Error) command returns the code and description for the last error that occurred on the specified unit.

If the command is successful, the response code 202 is returned followed by a data line:

```
*code* "*description*"
```

Where:

- *code* is the error code of the last error.
- *description* is a textual description of the error.

UFLS [*unit-name*]

The UFLS (Flush Unit) command flushes the command queue for the unit specified by *unit-name*.

UGIN *unit-name*

The UGIN (Get Unit Info) command returns the owner and port information for the unit specified by *unit-name*. The specified unit does not need to be opened by the current control connection (the UINF returns the identical information for an opened unit).

If the unit exists, the response code is 202 and a single response line is returned with this format:

```
*owner* *port-name* *port-mode* *port-physical-name*
```

Where:

- *owner* is the name of the controller that created the unit.
- *port-name* is the name of the media port controlled by the unit.
- *port-mode* is the input/output mode supported by the unit. The possible values are IN, OUT, and BOTH.

port-physical-name is the physical name of the media port controlled by the unit.

UINF [*unit-name*]

The UINF (Get Unit Info) command returns the owner and port information for the unit specified by *unit-name*. The unit must be opened (or created) by the current controller.

The response code is 202 and single response line is returned in the following format:

```
*owner* *port-name* *port-mode* *port-physical-name*
```

Where:

- *owner* is the name of the controller that created the unit.
- *port-name* is the name of the media port controlled by the unit.
- *port-mode* is the input/output mode supported by the unit. The possible values are IN, OUT, and BOTH.
- *port-physical-name* is the physical name of the media port controlled by the unit.

UINT [*unit-name*]

The UINT (Unit Interrupt) command interrupts the command currently being processed by the unit specified by *unit-name*. The command will be terminated with error EINTR.

ULOC *unit* *location*

- *unit* is the name of the unit.
- *location* is the current clip location in the format hours:minutes:seconds:frames. In drop-frame mode, the final colon (:) is replaced by a period (.).
- UCTL *unit* *control-name* "*control-value*"
- *unit* is the name of the unit.
- *control-name* is the name of the control.

control-value is the new value of the control.

ULOC [*unit-name*]

The ULOC (Unit Location) command returns the current transport location for the unit specified by *unit-name*. The response code is 202 and a single response line is returned in the following format:

```
*clip-loc* *vitc* *ltc* *UTC-time* *UST-time*
```

Where:

- *clip-loc* is the clip location, which roughly corresponds to a CTL (control track) timecode.
- *vitc* is the VITC (vertical interval timecode) of the frame.
- *ltc* is the LTC (longitudinal timecode) of the frame.
- *UTC-time* is the UTC time when the unit was at the specified location. This time can be used to account for application or network latency in time reporting. This time is reported in the ISO 8601-compatible format: yyyymmddThhmmss.ssssssZ.
- *UST-time* is the UST (unadjusted system time) time when the unit was at the specified location. This time can be used to account for application or network latency in time reporting.

UNLD [*unit-name*]

The UNLD (Unload Clip) command unloads the clip currently loaded in the unit specified by *unit-name*. If successful, the response code is 200.

URM *unit*

- *unit* is the name of the unit.
- UCHG *unit* *clip* *status* *function* *location* *speed* *frame- rate* *command-id*
- *unit* is the name of the unit.
- *clip* is the name of the loaded clip ("*" if no clip is loaded).
- *status* is the status of the current function (BUSY is the initial state, RUN is the running state, DONE is the completed state, ERR is the error state).

- *function* is the current function: IDLE, LOAD, UNLD (Unload), CUE, CUER (Cue for record), PLAY, STEP, SHTL (Shuttle), REC (Record) , PAUS (Pause), STON (StandbyOn), STOP, FF (Fast Forward), REW (Rewind), REVU (Review), EDIT (Edit), RHRS (Rehearse).
- *location* is the current clip location in the format hours:minutes:seconds:frames. In drop-frame mode, the final colon (:) is replaced by a period (.).
- *speed* is the current playback speed (1000 = normal 1x speed).
- *frame-rate* is the frame-rate (in frames / sec) of the current clip. 525-line timing is specified in its approximate form, 29.97.
- *command-id* is the id of the command currently being processed by the unit.

USTA [*unit-name*]

The USTA (Unit Status) command returns the status of the unit specified by *unit-name*. The unit my be opened (or created) by the current controller.

If successful, the response code is 202, and a single response line is returned in the following format:

- *clip* *status* *function* *location* *speed* *frame-rate* *command-id*
- *clip* is the name of the loaded clip ("*" if no clip is loaded).
- *status* is the status of the current function (BUSY is the initial state, RUN is the running state, DONE is the completed state, ERR is the error state).
- *function* is the current function: IDLE, LOAD, UNLD (Unload), CUE, CUER (Cue for record), PLAY, STEP, SHTL (Shuttle), REC (Record) , PAUS (Pause), STON (StandbyOn), STOP, FF (Fast Forward), REW (Rewind), REVU (Review), EDIT (Edit), RHRS (Rehearse).
- *location* is the current clip location in the format hours:minutes:seconds:frames. In drop-frame mode, the final colon (:) is replaced by a period (.).
- *speed* is the current playback speed (1000 = normal 1x speed).
- *frame-rate* is the frame-rate (in frames / sec) of the current clip. 525-line timing is specified in its approximate form, 29.97.
- *command-id* is the id of the command currently being processed by the unit.

USYN [*unit-name*]

The USYN (Set Unit Synchronization) command sets the default command synchronization mode for the unit specified by *unit- name*. The mode is set as specified by the sync-mode qualifiers which precede the command name. See the section UNIT COMMAND SYNCHRONIZATION below for more information.

Once the USYN command has been used to set the default sync mode, all unit commands which do not specify a sync mode will use this default.

UUWT *unit-name* *wait-unit-name* *sync-mode* [*wait-id*]

The UUWT (Unit-Unit Wait) command provides a mechanism for synchronizing command execution between two units. The unit specified by *unit-name* waits until the unit specified by *wait-unit-name* reaches the execution status specified by *sync-mode* for the command specified by *wait-id*.

For the possible values of *sync-mode*, see the section UNIT COMMAND SYNCHRONIZATION below. Both units must be opened by the current control connection.

If *wait-id* is not specified, the unit waits for the command at the end of the target unit's command queue when the UUWT starts execution in the unit (not when the UUWT is issued to the unit).

The target command id can be obtained by using the /CID qualifier on the target unit command.

UWAT [*unit-name* [*sync-mode*]]

The UWAT (Unit Wait) command waits for the last command issued to the unit specified by *unit-name* according to the synchronization mode specified by *sync-mode* or the default sync mode if the *sync-mode* argument is not provided.

For the possible values of *sync-mode*, see the section UNIT COMMAND SYNCHRONIZATION below.

Glossary

9-Pin

The Sony protocol for communicating with video devices. 9-Pin is the same as RS-422.

ADAT

The Alesis ADAT Optical I/O interface is an 8-channel, 24-bit digital audio interface. It is important to distinguish between the ADAT Optical format, a 24-bit digital audio I/O protocol, and the ADAT tape decks themselves. SGI workstations support the ADAT Optical interface, in addition to AES digital I/O, either built in or via a low-cost option card.

AES

(Audio Engineering Society) AES Stereo Digital Audio Input/Output. This connection provides a stream of digital audio data that complies with the AES Digital Audio format.

archive system

A repository for storing and distributing digital media data. A StudioCentral 2.0 archive system is one that a Video Server Toolkit has been configured to use. Video Server Toolkit can store *clip*s in, and retrieve them from, a StudioCentral 2.0 archive system only.

asset

Unit of storage in a StudioCentral 2.0 archive system. Each asset consists of descriptive information such as the title and duration; digital media data, if the asset has content; and an index, if required by the content format. For example, each movie, commercial, trailer, thumbnail, and so on, stored in a StudioCentral 2.0 archive system is an asset. Assets may consist of only descriptive information if those assets are used to group other assets.

automation controller

Computers that control broadcast devices. Automation controllers provide features such as playing and recording *clip*s according to a predefined schedule, providing statistics about actual events, previewing schedules, controlling broadcast equipment, and so on.

ATS

MediaHub Asset Transfer Service. The Asset Transfer Service daemon (atsd) can be used to access the meta data and media contents of the Groups and Atoms contained in a MediaHub server without using the full DAS or StudioCentral API's.

Automation Systems

Broadcast Automation Systems (such as the Louth ADC- series) are used extensively by broadcast studios to control multiple video devices. Scheduling of video playback and recording, in conjunction with pre-assigned switcher effects can all be scheduled through a single interface.

CCIR 601

A digital coding standard for television that is applicable to both the NTSC as well as PAL / SECAM technologies. The standard describes the encoding parameters for the 4:2:2 member of the family (where 4:2:2 is the ratio in which the luminance and chrominance sampling frequencies are related). One CCIR 601 video stream (no alpha) is about 22 MB / sec.

clip

The unit of storage in Video Server Toolkit. Each clip consists of descriptive information such as the title and duration; digital media data, if the clip has content; and an index, if required by the content format.

clip cache

XFS filesystems in which Video Server Toolkit stores *clip*s. The clip cache can reside on a normal XFS filesystem that can be shared with other uses, or a real-time filesystem created on a set of striped disks or RAID units.

cue point

Timecodes that are used to move around within a *clip* and to control the portion of the clip that is played. An in-point, the duration, and an out-point are each specified using the *hh:mm:ss:ff* format, where *hh* is the hours, *mm* is the minutes, *ss* is the seconds, and *ff* is the frame number. In drop-frame mode, the final colon is replaced by a period (*hh:mm:ss.ff*).

For example, if a clip with a cue in-point of 00:00:30.00 is cued for playing in the forward direction, it is cued at 30 seconds.

DAS

MediaHub Digital Asset Store.

DiaQuest

Deck control software made by DiaQuest.

DIF

The compression format used by DVCPRO. A DIF file, for example, is a file containing a clip compressed by DVCPRO.

DIVO

Digital Video Option, available on Origin servers. DIVO provides digital video *port*s through which digital media data is played and recorded by Video Server Toolkit.

DIVO_DVC

A DIVO board altered to work specifically with DVCPRO products.

DMBuffer:

Digital Media data transport subsystem. DMBuffers are used for sharing and exchanging time-sensitive visual data between compression devices and algorithms, video input/output, graphics rendering and texturing, and the host processor(s).

DSO

Dynamic shared object. An object that one program can share with another.

DVCPRO

A digital video compression format provided by Panasonic. The format provides 4:1 video compression.

edit point

Persistent timecode values that are stored with a *clip*. Edit points are used to automatically initialize the *cue point*s when the clip is loaded. An in-point, the duration, and an out-point can each be specified using the *hh:mm:ss:ff* format, where *hh* is the hours, *mm* is the minutes, *ss* is the seconds, and *ff* is the frame number. In drop-frame mode, the final colon is replaced by a period (*hh:mm:ss.ff*).

For example, if a clip has an edit in-point of 00:00:30.00, its cue in-point is initialized to 30 seconds when the clip is loaded.

Edit points may also be called “edit marks.”

Fibre Channel

The Fibre Channel Standard defines a high-speed data transfer interface that can be used to connect workstations, mainframes, supercomputers, storage devices and displays. The standard addresses the need for very fast transfers of large volumes of information. Typical high-end Fibre Channel devices carry up to 1 Gb/s data rates.

GRIO

Guaranteed Rate I/O. GRIO is included in IRIX and is used by Video Server Toolkit to guarantee disk bandwidth for recording and playback while allowing non-priority access to the clip cache for other operations.

Horita

A company that makes, among other components, time code readers. Its identifier in configuration files is hsip.

hsip

See Horita.

Little Red

A time code reader made by Miranda. Its identifier in configuration files is littlered.

Lossless Coding

A two-to-one compression format that does not reduce picture quality. It is a DIVO-601 internal format. *See also*, Rice.

Louth

The Louth Video Disk Communications Protocol, defined by Louth Automation, provides full-featured control of the Video Server Toolkit using RS-232, RS-422, and TCP/IP.

mcpanel

VTR emulation application for Video Server Toolkit.

MediaBase

An application used for browsing/streaming MPEG-1, MPEG-2 (and lower bit rate formats) over intranets, streaming Server on SGI workstations, and browsing clients on all platforms. It is compatible as browsing application for MediaHub and StudioCentral.

MediaHub

Archive component of the VCP. MediaHub is built upon StudioCentral and allows assets to be shared between Video Server Toolkit and other VCP software.

media port

Refers to any port through which digital media or control data is passed. That is, the term refers to either a video or a deck control port. *See also*, port.

M-JPEG

Motion-JPEG (Joint Photographic Experts Group). Video Compression technology based upon DCT.

MMGR

MediaHub Migration Manager. The Migration Manager is an Orbix service that performs Hub-to-Hub transfers and Hub deletes of DAS assets.

MPEG-2

Broadcast satellite industry standard format for compressed video (1 to 15 MB/sec at 4:2:0). 4:2:2 (Studio Profile) format is from 8 to 40 MB/sec.

MVCP

Multiple-Unit Video Computer Protocol. A protocol defined by SGI that provides full-featured control of Video Server Toolkit through TCP/IP.

MVP

Multi-port Video Processor for the Silicon Graphics O2 system. The MVP driver supports the O2 video input and output as well as the screen capture devices. It was designed and written to the device-dependent specification of the Video Library (VL) replacement for O2 workstation, DVL (Direct Video Library, that is, no video daemon).

Odetics

The Odetics protocol is a video disk control protocol similar in purpose to the Louth board, which gives Video Server Toolkit control over Odetics devices.

P2

P2 is the Panasonic name for the Sony protocol.

port

A point at which an external device connects to Video Server Toolkit. Video Server Toolkit defines the following types of ports:

- Video ports, used by video input and output devices. *DIVO* video ports are named *DIVO_n* (for example, DIVO_2), the O2 workstation video port is named mvp, and Vela decoder ports are named *vela_n* (for example, vela_2).
- Deck control ports, which are used by V-LAN transmitters. Deck control ports are named vlan_"n" (for example, vlan_0).

The term *media port* refers to either a video or a deck control port.

pre-roll

During recording, both source and recording machines can be rewound, generally three frames, so that the beginning of the recording starts when both machines are running at the correct speed. As a result, edits are more frame-accurate.

Rice

A lossless bit reduction (compression) encoding scheme that is supported on the Silicon Graphics *DIVO* video option.

RS-422

Is the Sony protocol for communicating with video devices.

SMPTE 259M

A broadcast digital video signal standard. All high end digital video formats as well as many peripheral devices have adopted this standard. 259M is a universal standard permitting long cable runs regardless of the size of the facility.

Sony

A media company that uses it's protocol, a standard by default, to control media machines, such as VTRs.

StudioCentral

Is a software development environment for building applications and tools for digital asset management solutions. StudioCentral provides the foundation for the acquisition, creation, production, and distribution of digital assets.

unit

A software mechanism that functions like a logical video tape recorder transport and is capable of loading, cueing, playing, and recording digital *clip*s. The unit manages a media *port*, which may be shared with another unit.

A unit may also called a *logical unit*.

Video Server Toolkit

Video Server Toolkit is an element of the Origin Video Computing Platform from SGI. Video Server Toolkit is the clip serving platform element of VCP. The core Video Server Toolkit software provides management of a simple database of clips (the Clip Cache), a control API for managing and operating the Video Server Toolkit, and a core library which supports various External Interface Modules.

VDCP

Video Disk Control Protocol. RS-422 based protocol used by the Louth Automation ADC series.VDCP is the basis for control protocols for other manufacturers (such as Alamar), as well. Video Server Toolkit can parse VDCP through serial ports or TCP / IP sockets.

Vela Research

Manufacturers of MPEG-2 Hardware & Software. Their Quad-SCSI decoder is supported by Video Server Toolkit on the SGI platform.

StreamCaster

A multi-channel digital broadcast play out application that runs on SGI servers. It is designed to play out more than 100 channels of stored MPEG-2 compressed digital video, audio, and data over ATM.

VFRAME

Variable-frame optimized audio / video file format. As the name implies, it is frame-, rather than stream-oriented, and has an separate index file associated with each media file. This is the format used by Video Server Toolkit for all 601 (including lossless coded) streams played out via DIVO-601, as well as M-JPEG on the O2 workstation.

Video Computing Platform

A software platform enabling developers to construct high-performance, scalable video and audio applications on SGI systems.

VLAN

Video Local Area Network. A VLAN network allows a computer application to control and synchronize all connected VTRs, switchers, DATs, mixers and DVEs.

VTR

A videotape recorder, which is a device that records and plays videotapes.

VVTR

Video Server Toolkit server. The Video Server Toolkit server is the main executable of the Video Server Toolkit platform software.

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