IBM

IBM VideoCharger 101

An introduction to VideoCharger for use
with AIX and Windows NT

Installation and integration with
Content Manager 7.1

VideoCharger solution
architecture

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IBM VideoCharger 101

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> **Take Note!**
>
> Before using this information and the product it supports, be sure to read the general information in Appendix E, "Special notices" on page 229.

Second Edition (March 2001)

This edition applies to Version 7.1 of the IBM VideoCharger licensed program, Program Number 13P0340, for use with Windows NT or AIX.

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Preface

This IBM Redbook will help you plan, install and configure the IBM VideoCharger product on both AIX and Windows NT platforms. It covers the integration of VideoCharger with the IBM Content Manager Version 7.1.

This redbook also provides a broad understanding of encoding video, using various codes and transport methods; discusses performance on both AIX and NT platforms; and provides some sample configurations.

This book applies to Version 7.1 of the IBM VideoCharger licensed program, Program Number 13P0340, for use with Windows NT or AIX.

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Chapter 1. Introducing IBM VideoCharger

No matter what your business — education, commerce, industry or sales — when you need to get the word out, why not think digital video? Video and audio, together with images, text and graphics, can convey complex information and processes with ease. Whether you are seeking a cost effective solution for corporate training and communications, or an education aid for distant learning programs, create a lasting impression that is effective for your applications and Content Management solutions with the power of **IBM VideoCharger** (VideoCharger).

Instead of waiting for audio or video data to download to your hard drive, VideoCharger uses standards-based technologies that enable you to integrate multimedia into your products and services. These streamed files, often called assets, can range from short clips, such as advertising spots, to full-length films. Using VideoCharger coupled with the IBM Content Manager, you have a complete solution for managing all multimedia content, including storage management, search and access, rights management, and distribution.

More details about VideoCharger are available on our Web site:

```
http://www.software.ibm.com/data/videocharger
```

Also refer to the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871.

1.1 VideoCharger overview

The IBM VideoCharger delivers high-quality, real-time audio and video streams to multiple viewers over corporate intranets or the Internet, using conventional Web browsers, such as Netscape Navigator and Microsoft Internet Explorer, or stand-alone players.

Using the latest standards-based technologies, VideoCharger consolidates multimedia content onto a single server or a cluster of servers to deliver Video/Audio-on-Demand to multiple users.

The IP multicast feature allows VideoCharger to be used as a broadcast type server in the Internet environment. This allows a single video or audio stream to be sent to multiple users.

1

VideoCharger comes with a comprehensive Web based administration and configuration facility, plus the capability of content and system management, including loading, searches, and queries.

VideoCharger is available on both Windows NT and AIX platforms.

Integration with IBM Content Manager provides a complete solution for managing all multimedia content, including storage management, search and access, rights management, and distribution.

VideoCharger solutions include collaboration and distributed education.

1.2 VideoCharger server introduction

The IP multicast feature allows VideoCharger to be used as a broadcast type server in the Internet environment. This allows a single audio or video stream to be sent to multiple users, reducing the bandwidth requirements on the network.

In video parlance, the video is "pushed" by the server over the network to the client. This approach is different from that used by most file servers today, where the data is "pulled" by the client issuing successive "reads" to the server. The push architecture is similar to a broadcast environment, in which a video stream is started by a play command and will continue until stopped.

IBM VideoCharger Version 7.1 adds support for QuickTime 4.0, Apple Computer's industry standard software for both Windows and Macintosh platforms for creating, editing, and publishing digital media. VideoCharger enhanced the QuickTime environment by providing streaming of QuickTime 4.0 files. Existing QuickTime files can be stored on VideoCharger and streamed without the need to convert to another format or transcode. VideoCharger's support of QuickTime also provides a wide choice of low bit rate codecs (over 40 codecs are provided) to meet customers' needs. VideoCharger can now stream industry standard formats from low bandwidth formats for streaming to 28.8K modems, up through MPEG-2 at 8 Mbps. The QuickTime player provides a new look, with intuitive user controls and one-click access to Internet content. QuickTime 4.0 support is available as a free upgrade to VideoCharger Version 7.1 for AIX and NT.

For the Intranet environment, VideoCharger provides support for higher quality (and higher bit rate) videos. In this environment, both MPEG-1 and MPEG-2 content can be supported at rates up to 8 Mb/s. This flexible support for higher quality video will allow a multitude of applications to be enhanced with video in the intranet environment.

A variety of encoding formats are supported. For delivery of the video stream, Real-Time Transport Protocol (RTP), Transmission Control Protocol (TCP), Hypertext Transfer Protocol (HTTP), or IP multicast can be used. RTP, TCP, and HTTP are used to send individual streams to the respective clients. IP multicast can be used to broadcast a single stream to multiple recipients. On AIX, ReSerVation Protocol (RSVP) and Path Maximum Transmission Unit (MTU) are provided to better support streaming audio and video over IP networks.

Table 1 summarizes key IP protocol support for the VideoCharger.

Table 1. IP protocol support

IP Protocol	RFC (Request for Comments)	Notes
RTP	1889	Most common and efficient, but typically restricted by firewalls
RSVP	Draft-ietf-rsvp	AIX only
IP Multicast	1112	Used to broadcast single stream to multiple users
Path MTU	1191	AIX only
TCP Extensions for High Bandwidth content loading	1323	With full packet acknowledgment. Less efficient than RTP, but crosses firewalls
HTTP		Streamed from HTTP server interface

The system also provides admission control, which prevents the bandwidth requirements of applications currently running from being compromised as new requests arrive. Admission control means that the system keeps track of the bandwidth used, and prevents system resources from being overextended.

On AIX, VideoCharger is scalable from a single system to multiple systems supporting hundreds of streams.

1.3 VideoCharger components

Figure 1 shows the VideoCharger components and how the components interact to serve assets to a client. On AIX, the components can be on a single machine, or on multiple machines. On Windows NT, the Data Pump, Controller, and Presentation Formatter Server are on a single machine.
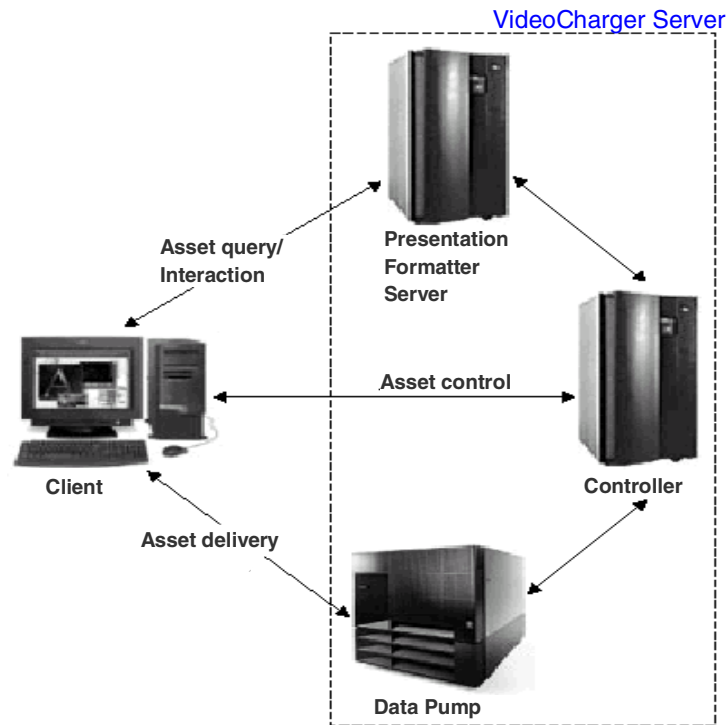
Figure 1. VideoCharger components interaction

1.3.1 Presentation Formatter Server

The Presentation Formatter Server runs the presentation formatters that control how clients view information on available assets, and selects specific assets for viewing. This server also runs an **httpd daemon** to enable communication between the Web browser and the VideoCharger.

For AIX: Many Web servers are supported as **http daemons**. We validated the following: IBM Internet Connection Server for AIX, Netscape FastTrack Server, Domino V4.6.2 and Apache V1.3.6. The daemon can be linked with an existing HTTP server running on any combination of hardware and operating system.

For Windows NT: Internet Information Server (IIS) is supported for the Windows NT Server. Netscape and Domino servers were also validated in this project. Microsoft Peer Web Services (also called Personal Web Server) is supported for Windows NT workstations as well.

VideoCharger comes with three predefined presentation formatters:

1.3.1.1 Video Selection

Video Selection allows a client to link to specific assets directly from an HTML page. When using this method, you must create a page with an explicit link to each video stored on the VideoCharger. This simple approach does not require that any additional asset information is stored in the Application Server. Only basic attributes (for example, encoding type, frame rate, and play rate) are available, and are supplied on the initial HTML page. Use of this presentation formatter is best when there are only a few assets and they are not added or deleted often.

1.3.1.2 Video-on-Demand

Video-on-Demand (VOD) allows the client to select a video from a dynamically generated list. This avoids having to update a list of links each time an asset is added or deleted.

1.3.1.3 Multicast Video Guide

Multicast Video Guide allows an administrator to schedule video broadcasts to a group of clients. This presentation formatter allows clients to view a list of currently scheduled broadcasts. Clients can join or leave the multicast session whenever they choose.

You can either use these formatters, modify them, or write your own using Application Programming Interface calls provided with VideoCharger.

1.3.2 Data Pump

The Data Pump stores the multimedia files (assets) and delivers them to the client. The Data Pump plays the file to a client across a network.

For AIX: Scalability comes from adding Data Pumps to the system. Each Data Pump, equipped with its own set of disks and network adapters, can serve between 10 and 300 megabits per second (Mbps) of aggregate streams (10 to 1950 streams) and add over one terabyte of data storage (700 hours of 1.5 Mbps video content), depending on your configuration. Each additional Data Pump mirrors the data stored on the original Data Pump, which increases asset availability.

For NT: On NT, there can be only one Data Pump. Therefore, NT will be limited in the number of streams it can deliver.

1.3.3 Controller

The Controller is the coordinator of the system. The Controller is made up of two parts, the Control Server and the Application Server.

The Control Server is the main control point for the setup and delivery of an asset to the client. On AIX, this includes the selection of Data Pumps and command processing. By controlling the number of audio/video streams, the Control Server ensures that quality of service is maintained across the system. The Control Server provides the following control functions:

- Play
- Stop
- Pause
- Rewind
- Forward

The Control Server also provides resource management, including admission control and load balancing, for both playing streams and loading content. In addition, it stores a catalog of multimedia assets available on the Data Pumps (AIX) or Data Pump (Windows NT).

The Application Server handles communication with the client that is requesting an asset. For example, the Application Server receives requests from the client, and can issue VCR commands to control individual streams.

1.4 How the components interact to stream assets

To help you understand how these components interact to stream assets, let us take the case of Video-on-Demand. This process was shown in Figure 1 on page 4.

The Client Web browser requests an HTML page containing links to a presentation formatter from the Presentation Formatter Server.

If the selection is not narrowed by search criteria, the list of available assets is simply presented to the client. Otherwise, the Presentation Formatter Server returns a page where he can select the search function, initiating a search of available assets.

The Presentation Formatter Server receives the request and runs the Video-on-Demand (VOD) Presentation Formatter. This formatter dynamically creates a search form and returns the form to the client by way of the Presentation Formatter Server.

The client completes the search field(s) and sends the data back to the Presentation Formatter Server, which runs the VOD Presentation Formatter.

This formatter completes the search and builds an HTML page to return the search results to the client; then the Presentation Formatter Server returns this page to the client.

The client selects an asset from the HTML page, and this selection is received by the Presentation Formatter Server, which runs the Video Selection Presentation Formatter. The Video Selection Presentation Formatter passes the selection request to the Controller, where an HTML metafile is created containing the pertinent information regarding the selected asset. This metafile is returned to the client by way of the Presentation Formatter Server.

The client's Web browser receives the HTML metafile and, based on the encoding type of the video, launches the VideoCharger client code, which invokes a multimedia player on the client system to play the asset.

The VideoCharger client code initiates a session with the Application Server portion of the Controller to start the playback. Once the asset is playing, the client code uses this session to control the playback using VCR-style functions. The Controller contacts the appropriate Data Pump to initiate a data delivery session with the client. Once the session is connected, the asset can be started immediately or at the request of the client. It is the Data Pump which actually streams the data to the client.

The Client receives the data into its network subsystem, where the data is passed to the multimedia player for presentation.

1.5 Storing assets: A file system optimized for multimedia

Striping is a method for storing the content of a multimedia file across all of the disks in a file system. Striping provides the following benefits:

- Increases the aggregate bandwidth of your file system by spreading reads for a file system across multiple disks.

- Spreads the load evenly across all disks by using the combined throughput of all disks. One disk is no more active than the others.

- Provides support for large amounts of data and larger files.

- Allows concurrent reads from the same file, which is very important when you are supporting multiple clients.

For AIX: At the heart of the VideoCharger is a high-performance file system optimized for storage and delivery of video and audio. With the VideoCharger, your multimedia assets are placed in the file system for storage and retrieval using striping.

For Windows NT: With the VideoCharger, your multimedia assets are placed in the NT File System (NTFS) for storage and retrieval. NTFS provides the option of configuring multiple disks into a striping group.

1.6 Multimedia archive

The IBM 3466 Network Storage Manager can act as a video/multimedia archive for storage management and recall of video objects produced by VideoCharger. As a video archive, the facilities of ADSM are made available for management of large, medium, and small video objects. The IBM 3466 can store over 13 TB of uncompressed data. Together with communication options, such as ATM, FDDI, Ethernet 10-100 Mb/s and Token Ring and automated tape handling, the IBM 3466 can provide a combination of broad archive flexibility, vast storage access, and high availability of video assets.

This Multimedia Archive is a fully integrated and complete server that complements VideoCharger Server by storing up to 13.4 TB of content. With the Multimedia Archive, assets not required for immediate viewing are available without importing or recreating from the original source. The Multimedia Archive is pre-configured, except for network and password information specific to your location.

Chapter 2. Installation of VideoCharger server

This chapter outlines up-to-date details on how to configure VideoCharger on both NT and AIX platforms. Here, you will find:

- Installation tasks
- Information on checking prerequisites
- Configuration examples for different Web servers
- Shortcut setup scripts which you can use for your own system

Refer to the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871, for the general procedures for installation and planning.

2.1 Overview

Table 2 lists the key tasks to install and configure VideoCharger.

Table 2. Key setup tasks for AIX and NT

	AIX	NT
1	Apply all Operating System fixes	
2	Install DCE 3.1 clients for AIX or higher	NIL
3	Install Web server[a]	
4	Configure the operating system like paging size, TCP/IP, language environment	Configure paging size and TCP/IP
5	Install VideoCharger	
6	Install all the latest fixes for VideoCharger	
7	Configure Multimedia File System, VideoCharger for AIX users, DCE client and Web server	Configure NTFS, VideoCharger for NT users and Web server
8	Configure VideoCharger through Web page	
9	Test run your system	
10	Performance tuning	

a. Web servers like Apache, IBM HTTP Server, IBM Internet Connection Server (ICS) and Netscape Web servers all have AIX and NT versions. Microsoft IIS or Peer Web Service can also be used for NT. If you use Apache, IBM HTTP Server or IBM Lotus Domino Go Webserver (ICS), you have the advantage of auto-configuration during VideoCharger for AIX installation. Similarly, using Microsoft IIS or Peer Web Service will enable auto-configuration during VideoCharger for NT installation.

2.2 VideoCharger for AIX

Unless otherwise specified, you need to perform most of the tasks as the root user. In addition, the discussion assumes a Video-Server-All system to be the target system.

2.2.1 Before you start

Check the following software and hardware requirements.

Hardware requirements:
- RS/6000 POWER2 or PowerPC uniprocessor system, SMP, or SP system.
- At least 128 MB of system memory.
- A dedicated disk (that is, a disk defined in the system, but not included in any volume group), and a disk controller for the multimedia file system (MMFS), either SCSI or SSA
- Network adapter cards, either Micro Channel or Peripheral Component Interconnect (PCI)

Software requirements:
- AIX 4.3.2 or higher
- A Web server
  - Apache 1.3.9 or higher
  - IBM HTTP Server 1.3.6.2 or higher
  - IBM Internet Connection Server 4.2.1 or higher
  - IBM Lotus Domino Go Webserver for AIX (ICS)
  - Netscape FastTrack Server
- License Use Management Runtime Code `ifor_ls.base.cli` 4.3.2 or higher (previously know as Network License System or NetLS)
- License Use Management Runtime Libraries `bos.rte.ifor_ls` 4.3.2 or higher

- DCE 3.1 Client software or higher

- `bos.net.tcp.server` fileset from the `bos.net` package

Optional software:
- AIX Java Development Kit (JDK) 1.1.2 or higher, if you have a
  VideoCharger Archive in your configuration and are using the
  IBM-supplied presentation formatter(**iscpfhom**) to play assets directly
  from the Archive(offline assets).The AIX JDK is available from the AIX
  installation CD-ROMs and from the following Web site:
  `http://www.ibm.com/java/jdk/download`

- IBM DB2 Universal Database Version 6.1 or higher

- IBM Content Manager Version 6.1 or higher

- VideoCharger Extender for DB2 Universal Database

In the following sections, the software requirements will be discussed in more
detail.

FTP requirements:
FTP connections require a valid FTP server, that supports the `size`
command, on the client machines.

For examples:
- AIX FTP daemon

- Microsoft FTP for Windows NT 4.0 Server with Service Level 5

- Microsoft FTP for Windows NT 4.0 Workstation Option Pack Level 4

- Hummingbird's FTP service
  (`http://www.hummingbird.com/products/nc/ftp/index.html`)

- War FTP daemon (available as freeware)

- Microsoft FTP service for Windows 2000

Attention: Microsoft FTP service for Windows 4.0 Workstation with Service
Level 5 will *not* work.

2.2.2 Step 1: Applying operating system fixes

You can run VideoCharger for AIX on AIX versions 4.3.2 or higher. However,
in the case of AIX version 4.3.2, you need to apply fixes to your operating
system in order to install and run VideoCharger for AIX correctly.

To determine your operating system level, you can use the following two methods:

1. Issue the `oslevel` command at the console, and the output should display **4.3.2,** which means that your AIX is version 4.3.2.

2. Issue the command `lslpp -L |grep bos |more`. This command lists all filesets installed in the system whose names contain the word **bos** (**b**ase **o**perating **s**ystem). The output should resemble the following, and you can see that the base operating system is mainly version 4.3.2 by reading the second column.

```
bos.msg.en_US.docregister.com
bos.64bit                4.3.2.4    C    Base Operating System 64 bit
bos.acct                 4.3.2.2    C    Accounting Services
bos.adt.base             4.3.2.0    C    Base Application Development
bos.adt.lib              4.3.2.0    C    Base Application Development
bos.content_list         4.3.2.0    C    AIX Release Content List
bos.diag.com             4.3.2.3    C    Common Hardware Diagnostics
bos.diag.rte             4.3.2.5    C    Hardware Diagnostics
bos.diag.util            4.3.2.1    C    Hardware Diagnostics Utilities
bos.docregister.com      4.3.2.0    C    Docregister Common
bos.docsearch.client.com 4.3.2.0    C    DocSearch Client Common Files
bos.docsearch.rte        4.3.2.0    C    DocSearch Runtime
bos.help.msg.en_US.com   4.3.2.0    C    WebSM/SMIT Context Helps - U.S.
bos.help.msg.en_US.smit  4.3.2.0    C    SMIT Context Helps - U.S.
bos.html.en_US.topnav.navigate
bos.iconv.com            4.3.2.2    C    Common Language to Language
bos.iconv.ja_JP          4.3.2.0    C    EBCDIC & ASCII Language
bos.iconv.ucs.ZH_CN      4.3.0.0    C    Unicode Converters for
bos.iconv.ucs.com        4.3.2.0    C    Unicode Base Converters for AIX
bos.loc.iso.en_US        4.3.2.0    C    Base System Locale ISO Code Set
bos.mp                   4.3.2.7    C    Base Operating System
bos.msg.en_US.diag.rte   4.3.2.0    C    Hardware Diagnostics Messages -
bos.msg.en_US.docregister.com
```

Note that the output from `oslevel` sometimes may not agree with what you find from `lslpp -L |grep bos|more`. All you need to do is to carefully compare what level of fileset you are required to have with the one already installed in your system.

For AIX version 4.3.2

In general, you should apply AIX fixes so that your operating system is always at the latest level. For instance, on AIX 4.3.2, the minimum levels for some of the operating system filesets are shown in Table 3.

Table 3. Minimum requirements for AIX 4.3.2 system level

AIX 4.3.2 filesets	Version
bos.adt.include	4.3.2.2
bos.atm.atmle	4.3.2.4
bos.diag.rte	4.3.2.2
bos.mp	4.3.2.5
bos.net.nfs.client	4.3.2.3
bos.net.tcp.client	4.3.2.2
bos.rte.tty	4.3.2.4
bos.up	4.3.2.5
devices.chrp.base.rte	4.3.2.1
devices.common.IBM.atm.rte	4.3.2.2
devices.common.IBM.ethernet.rte	4.3.2.1
devices.pci.14103e00.rte	4.3.2.2
devices.pci.14107c00.com	4.3.2.4
devices.pci.23100020.rte	4.3.2.4

You can obtain your latest AIX base operating system fileset from the following URL:

```
ftp://ftp.software.ibm.com/aix/fixes/v4/os/
```

For AIX version 4.3.3

The following list is the **bos** level on AIX 4.3.3, at the time of writing this redbook.

```
bos.acct                 4.3.3.0   C    Accounting Services
bos.adt.include          4.3.3.0   C    Base Application Development
bos.adt.lib              4.3.3.0   C    Base Application Development
bos.diag.com             4.3.3.0   C    Common Hardware Diagnostics
bos.diag.rte             4.3.3.0   C    Hardware Diagnostics
bos.diag.util            4.3.3.0   C    Hardware Diagnostics Utilities
bos.docregister.com      4.3.3.0   C    Docregister Common
bos.docsearch.client.Dt  4.3.3.0   C    DocSearch Client CDE Application
bos.docsearch.client.com 4.3.3.0   C    DocSearch Client Common Files
bos.docsearch.rte        4.3.3.0   C    DocSearch Runtime
bos.help.msg.en_US.com   4.3.3.0   C    WebSM/SMIT Context Helps - U.S.
bos.help.msg.en_US.smit  4.3.3.0   C    SMIT Context Helps - U.S.
bos.html.en_US.topnav.navigate
bos.iconv.com            4.3.3.0   C    Common Language to Language
bos.iconv.ucs.com        4.3.3.0   C    Unicode Base Converters for AIX
bos.loc.iso.en_US        4.3.3.0   C    Base System Locale ISO Code Set
```

```
bos.mp                       4.3.3.0    C    Base Operating System
bos.msg.en_US.diag.rte       4.3.3.0    C    Hardware Diagnostics Messages -
bos.msg.en_US.docregister.com
bos.msg.en_US.docsearch.client.Dt
bos.msg.en_US.docsearch.client.com
bos.msg.en_US.mp             4.3.0.0    C    Base Operating System MP
bos.msg.en_US.net.tcp.client
bos.msg.en_US.rte            4.3.3.0    C    Base Operating System Runtime
bos.msg.en_US.txt.tfs        4.3.1.0    C    Text Formatting Services
bos.net.ncs                  4.3.3.0    C    Network Computing System 1.5.1
bos.net.nfs.client           4.3.3.0    C    Network File System Client
bos.net.tcp.client           4.3.3.0    C    TCP/IP Client Support
bos.net.tcp.server           4.3.3.0    C    TCP/IP Server
bos.net.tcp.smit             4.3.3.0    C    TCP/IP SMIT Support
bos.rte                      4.3.3.0    C    Base Operating System Runtime
bos.rte.Dt                   4.3.0.0    C    Desktop Integrator
bos.rte.ILS                  4.3.3.0    C    International Language Support
bos.rte.SRC                  4.3.3.0    C    System Resource Controller
bos.rte.X11                  4.3.0.0    C    AIXwindows Device Support
bos.rte.aio                  4.3.3.0    C    Asynchronous I/O Extension
bos.rte.archive              4.3.3.0    C    Archive Commands
bos.rte.bind_cmds            4.3.3.0    C    Binder and Loader Commands
bos.rte.boot                 4.3.3.0    C    Boot Commands
bos.rte.bosinst              4.3.3.0    C    Base OS Install Commands
bos.rte.commands             4.3.3.0    C    Commands
bos.rte.compare              4.3.3.0    C    File Compare Commands
bos.rte.console              4.3.3.0    C    Console
bos.rte.control              4.3.3.0    C    System Control Commands
bos.rte.cron                 4.3.3.0    C    Batch Operations
bos.rte.date                 4.3.3.0    C    Date Control Commands
bos.rte.devices              4.3.3.0    C    Base Device Drivers
bos.rte.devices_msg          4.3.3.0    C    Device Driver Messages
bos.rte.diag                 4.3.3.0    C    Diagnostics
bos.rte.edit                 4.3.3.0    C    Editors
bos.rte.filesystem           4.3.3.0    C    Filesystem Administration
bos.rte.iconv                4.3.3.0    C    Language Converters
bos.rte.ifor_ls              4.3.3.0    C    iFOR/LS Libraries
bos.rte.im                   4.3.3.0    C    Input Methods
bos.rte.install              4.3.3.0    C    LPP Install Commands
bos.rte.jfscomp              4.3.1.0    C    JFS Compression
bos.rte.libc                 4.3.3.0    C    libc Library
bos.rte.libcfg               4.3.3.0    C    libcfg Library
bos.rte.libcur               4.3.3.0    C    libcurses Library
bos.rte.libdbm               4.3.3.0    C    libdbm Library
bos.rte.libnetsvc            4.3.0.0    C    Network Services Libraries
bos.rte.libpthreads          4.3.3.0    C    pthreads Library
bos.rte.libqb                4.3.3.0    C    libqb Library
bos.rte.libs                 4.3.3.0    C    libs Library
bos.rte.loc                  4.3.3.0    C    Base Locale Support
bos.rte.lvm                  4.3.3.0    C    Logical Volume Manager
bos.rte.man                  4.3.3.0    C    Man Commands
bos.rte.methods              4.3.3.0    C    Device Config Methods
bos.rte.misc_cmds            4.3.3.0    C    Miscellaneous Commands
bos.rte.misc_cmds            4.3.3.0    C    Miscellaneous Commands
bos.rte.net                  4.3.3.0    C    Network
bos.rte.odm                  4.3.3.0    C    Object Data Manager
bos.rte.printers             4.3.3.0    C    Front End Printer Support
bos.rte.security             4.3.3.0    C    Base Security Function
bos.rte.serv_aid             4.3.3.0    C    Error Log Service Aids
bos.rte.shell                4.3.3.0    C    Shells (bsh, ksh, csh)
bos.rte.streams              4.3.3.0    C    Streams Libraries
bos.rte.tty                  4.3.3.0    C    Base TTY Support and Commands
bos.sysmgt.loginlic          4.3.3.0    C    License Management
```

```
bos.sysmgt.nim.client      4.3.3.0    C    Network Install Manager - Client
bos.sysmgt.serv_aid        4.3.3.0    C    Software Error Logging and Dump
bos.sysmgt.smit            4.3.3.0    C    System Management Interface Tool
bos.sysmgt.sysbr           4.3.3.0    C    System Backup and BOS Install
bos.sysmgt.trace           4.3.3.0    C    Software Trace Service Aids
bos.terminfo.com.data      4.3.0.0    C    Common Terminal Definitions
bos.terminfo.dec.data      4.3.0.0    C    Digital Equipment Corp. Terminal
bos.terminfo.ibm.data      4.3.3.0    C    IBM Terminal Definitions
bos.terminfo.pc.data       4.3.2.0    C    Personal Computer Terminal
bos.terminfo.rte           4.3.3.0    C    Run-time Environment for AIX
bos.txt.spell              4.3.3.0    C    Writer's Tools Commands
bos.txt.spell.data         4.3.0.0    C    Writer's Tools Data
bos.txt.tfs                4.3.3.0    C    Text Formatting Services
bos.txt.tfs.data           4.3.2.0    C    Text Formatting Services Data
```

2.2.3 Step 2: Installing DCE 3.1 client

VideoCharger for AIX requires the DCE Remote Procedure Call (RPC) function to enable client-server communication. Currently, VideoCharger for AIX should work with DCE v.3.1 or higher. However, you also need to maintain your DCE client at a certain version level.

You need the following DCE minimum components:

- dce.client
- dce.compat
- dce.sysmgt
- dce.doc

Referring to Table 4, you can find the supported levels of DCE 3.1 which are tested to work correctly with VideoCharger for AIX.

Table 4. Minimum requirements for DCE 3.1 client

DCE 3.1 filesets	Version
dce.bundles.Bnd	3.1.0.0
dce.client.core.rte	3.1.0.0
dce.client.rte	3.1.0.1
dce.client.rte.admin	3.1.0.1
dce.client.rte.cds	3.1.0.1
dce.client.rte.config	3.1.0.1
dce.client.rte.pthreads	3.1.0.0
dce.client.rte.rpc	3.1.0.1
dce.client.rte.security	3.1.0.1
dce.client.rte.time	3.1.0.1

DCE 3.1 filesets	Version
dce.client.rte.web	3.1.0.1
dce.client.rte.zones	3.1.0.0
dce.client.smit	3.1.0.1
dce.doc.en_US.ascii	3.1.0.0
dce.doc.en_US.html	3.1.0.1
dce.doc.en_US.pdf	3.1.0.0
dce.doc.rte.ascii	3.1.0.0
dce.msg.en_US.client.core.rte	-
dce.msg.en_US.client.rte	3.1.0.1
dce.msg.en_US.client.smit	3.1.0.1
dce.msg.en_US.compat.client.core.smit	-
dce.msg.en_US.compat.sysmgmt.snmpagt.smit	-
dce.msg.en_US.compat.sysmgmt.ems.smit	-
dce.msg.en_US.pthreads.rte	-
dce.msg.en_US.sysmgmt.ems.rte	-
dce.msg.en_US.sysmgmt.ems.smit	-
dce.msg.en_US.sysmgmt.snmpagt.rte	-
dce.msg.en_US.sysmgmt.snmpagt.smit	-
dce.msg.en_US.sysmgmt.webadmin.rte	-
dce.msg.en_US.web.admin.rte	-
dce.msg.en_US.web.secure.rte	-
dce.sysmgmt.ems.rte	3.1.0.1
dce.sysmgmt.ems.smit	3.1.0.0
dce.sysmgmt.snmpagt.rte	3.1.0.1
dce.sysmgmt.snmpagt.smit	3.1.0.0
dce.sysmgmt.webadmin.rte	3.1.0.1

If you need to get the latest DCE 3.1 filesets, you can download them from the following URL:

```
http://www.software.ibm.com/network/dce/support/fixes/dceaix.html
```

2.2.4 Step 3: Installing the Web server

You have a variety of choices for the Web server. Here are a list of download sites:

IBM HTTP server

```
http://www.software.ibm.com/webservers/httpservers/download.html
```

Apache

```
http://www.apache.org/dist/
```

Netscape Enterprise/FastTrack Webserver

```
http://www.iplanet.com/downloads/index.html
```

Follow the installation instructions provided by the Web server you chose, and install it.

Note: If you are not experienced with Web servers and would like to get VideoCharger for AIX up and running as quickly as possible, we suggest that you use the IBM HTTP server so that the VideoCharger for AIX installation will perform basic configuration work on the Web server for you.

2.2.5 Step 4: Configuring AIX

Configuring AIX includes these tasks:

1. Set your paging space to a total of twice the amount of real memory. To determine your real memory, use the `lsattr -HE -l sys0 -a realmem` command. The output should look like the following:
   ```
   attribute value description user_settable
   realmem 524288 Amount of usable physical memory in Kbytes False
   ```

   This means that you have 512 Mb of real memory. Therefore, your paging space should be set to at least 1024 Mb. You can use `chps` or `smitty pgsp` fast path to access the Paging Space menu to change the paging space.

2. TCP/IP configured and running. You can use the `smitty tcpip` fast path to access the basic TCP/IP configuration menu.

3. Configure your language environment to reflect the language setting of `en_US`. Currently, this is mandatory but will be fixed in the future. To verify that your language setting is correct, issue `locale` at the console. The output should look like the following:

```
# locale
LANG=en_US
LC_COLLATE="en_US"
LC_CTYPE="en_US"
LC_MONETARY="en_US"
LC_NUMERIC="en_US"
LC_TIME="en_US"
LC_MESSAGES="en_US"
LC_ALL=
```

If the output does not show **en_US**, you need to do the following steps to
change it:

- Enter `smitty`.

- Enter **System Environments** -> **Manage Language Environment** ->
  Change/Show Primary Language Environment -> **Select Set of
  Cultural Convention, Language, and Keyboard**

- Press F4 to select from a list of language setting. Choose **ISO8859-1 -
  English (United States) - English (United States) - English (United
  States) keyboard** and press Enter.

- Enter a value for the field **INPUT device/directory for software**
  (for example, /dev/cd0).

- You may need to reboot the system after the change.

- Re-run the command `locale` to verify that the language environment is
  set correctly.

2.2.6 Step 5: Installing VideoCharger for AIX

You can now start installing VideoCharger for AIX. Refer to the detailed
documentation in the *IBM VideoCharger Administrator's Guide and
Reference Version 7 Release 1,* SC27-0871.

Here is the installation procedure of VideoCharger for AIX.

1. Accept the license agreement for VideoCharger for AIX using License Use
   Management (LUM)

2. Install the VideoCharger for AIX

3. Register VideoCharger for AIX

Attention: Restart your system, after successful installation of VideoCharger
software.

2.2.7 Step 6: Installing the latest fixes of VideoCharger for AIX

Go to the following Web site to get the latest fixes for VideoCharger for AIX:

```
ftp://ftp.software.ibm.com/ps/products/videocharger/fixes/
```

At the time of writing this redbook, the latest level of VideoCharger for AIX was at the following levels:

```
avs.applsrv.client.adt      7.1.0.0   C   Video Server Application Server
avs.applsrv.client.com      7.1.0.0   C   Video Server Application Server
avs.applsrv.client.player   7.1.0.0   C   VideoCharger Player application
avs.applsrv.client.rte      7.1.0.0   C   Video Server Presentation
avs.applsrv.client.sample.content
avs.applsrv.server.rte      7.1.0.0   C   Video Server Application Server
avs.com                     7.1.0.0   C   Video Server Common Support
avs.cs.client.rte           7.1.0.0   C   Video Server Controller Client
avs.cs.server.rte           7.1.0.0   C   Video Server Controller Runtime
avs.de.rsvp                 7.1.0.0   C   Video Server RSVP Support
avs.de.rte                  7.1.0.0   C   Video Server Data Exporter
avs.de.sysmgt               7.1.0.0   C   Video Server Data Exporter
avs.html.en_US.ivs.admin    7.1.0.0   C   Video Server Administrator's
avs.html.en_US.ivs.client   7.1.0.0   C   Video Server Player User's Guide
avs.html.en_US.ivs.prog     7.1.0.0   C   Video Server Programmer's Guide
avs.ivs.Bnd                 7.1.0.0   C   Internet Video Server Bundle
avs.loc.en_US.sysmgt.html.ivs
avs.mm                      7.1.0.0   C   Media Manager
avs.msg.en_US.applsrv.client.com
avs.msg.en_US.applsrv.server.rte
avs.msg.en_US.cs.client.rte
avs.msg.en_US.cs.server.rte
avs.msg.en_US.de.rte        7.1.0.0   C   Video Server Data Exporter
avs.msg.en_US.de.sysmgt     7.1.0.0   C   Video Server DE Manage. Messages
avs.msg.en_US.mm            7.1.0.0   C   Media Manager Messages - U.S.
avs.msg.en_US.sysmgt.html.com
avs.msg.en_US.sysmgt.multicast.rte
avs.msg.en_US.sysmgt.rte    7.1.0.0   C   Video Server Sys. Management
avs.rtspd                   7.1.0.0   C   Video Server RTSP Daemon
avs.sysmgt.html.com         7.1.0.0   C   Video Server System Management
avs.sysmgt.html.ivs         7.1.0.0   C   Video Server System Management
avs.sysmgt.multicast.rte    7.1.0.0   C   Video Server IP Multicast
avs.sysmgt.rte              7.1.0.0   C   Video Server System Management
```

You should carefully read the readme.txt file that came with the fileset fixes to know what has been fixed by the code.

2.2.8 Step 7: Various configurations

After successful installation of VideoCharger for AIX, you need to configure various components which interact with VideoCharger for AIX.

The following sections have a few notes about configuration:

- 2.2.8.1, "VideoCharger administration user and content loading user" on page 20
- 2.2.8.2, "Web server" on page 21

- 2.2.8.3, "Multimedia File System (MMFS)" on page 24
- 2.2.8.4, "Configuring a DCE 3.1 client" on page 24

For more information, refer to the detailed documentation in the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871.

2.2.8.1 VideoCharger administration user and content loading user

A VideoCharger for AIX administration user **vsadmin** and content loading user **vsloader** are automatically created during the installation of VideoCharger. The default settings are shown in Table 5.

Table 5. Default settings for VideoCharger users

	vsadmin	vsloader
Purpose	The user is authorized to start/stop VideoCharger, and to perform content management and system configuration through Web gateway programs	The user is authorized to do content loading and asset staging activities
UID/password	50001/vsibm	50002/vsibm
GID/Name	50001/vsadmin	50002/vsasset
Home Account	/home/vsadmin	/home/vsloader

You may wish to change the default passwords of these userids for security reasons. Step 4 must be done even if you are keeping the default password ('vsibm'). Use the following procedure to set the passwords for an AIX user.

1. Issue `pwdadm userid`.
2. At the password prompt, type the new password and press Enter.
3. At the password verification prompt, type the new password again and press Enter.
4. Issue `pwdadm -c userid` (REQUIRED).

In these commands, the `userid` should be `vsadmin` or `vsloader`. The `-c` option indicates that the user should be able to use the newly set password immediately without being prompted to change the password during the next logon.

In addition to setting the password for `vsadmin`, you need to create an .rhosts file under its home account that enables your Data Pump(s) to communicate

with the Controller. The file must exist on each Data Pump, even if the Data Pump is running on the same physical machine as the Controller.

To create and edit the .rhosts file:

1. Login as `vsadmin` at the Data Pump, or do an `su - vsadmin` if you are root.

2. Enter the following commands:

```
echo ControllerName root >> $HOME/.rhosts
echo ControllerName vsadmin >> $HOME/.rhosts
echo ControllerName.domain_nane root >> $HOME/.rhosts
echo ControllerName.domain_name vsadmin >> $HOME/.rhosts
chmod 640 $HOME/.rhosts
```

In these commands, *ControllerName* is the host name of the Controller without the domain (for example, 'vcharger6'), and *ControllerName.domain_name* is the fully qualified host name (for example 'vcharger6.stl.ibm.com'). If no domain exists, the two lines with *ControllerName.domain_name* do not have to be entered.

The following is the sample file of `/home/vsadmin/.rhosts`

```
vcharger6 root
vcharger6 vsadmin
vcharger6.stl.ibm.com root
vcharger6.stl.ibm.com vsadmin
```

3. Exit the current session.

2.2.8.2 Web server

To configure the Web server, complete the following actions:

1. Create administration and content-loading users for the Web server. Although vsadmin and vsloader are created as the AIX system user, all the Web servers have their own user databases that are separate from the system user database. Therefore, you need to use the Web server specific tools to create the users.

2. Modify the group membership of system user nobody so that the CGI program can access certain system resources.

3. Add links to the CGI-bin programs to provide access to the VideoCharger configuration and Administration forms, and the Presentation Formatters.

4. Add the CGI-bin program directories as valid CGI directories.

5. Add protection for the directories containing the CGI-bin programs.

6. Change the time-out value to 60 minutes to accommodate loading of large assets.

VideoCharger automatically configures the following Web servers during the install process:

- Apache 1.3.9 or higher
- IBM HTTP Server 1.3.6.2 or higher
- IBM Internet Connection Server 4.2.1 or higher
- IBM Lotus Domino Go Webserver for AIX (ICS)

VideoCharger can only configure Apache if it is installed in the /usr/local/apache directory.

The configuration tasks for Netscape FastTrack Server are documented in the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871.

Normally, Web servers run under the user ID `nobody`. The Web server must belong to both `vsadmin` and `vsasset` groups to access VideoCharger programs. When VideoCharger configures the Web server, it automatically issues the `chgrpmem` command. So if you run your Web server under a different user ID or have a Web server that VideoCharger does not configure automatically, this setup will not be done.

For those who are not familiar with Web server, the IBM HTTP Server configuration example is provided here for your reference. In fact, the IBM HTTP Server is powered by Apache, and therefore they share common configuration tools and directives.

Usually, you need to only configure the setting for Web administration passwords for your Web Server.

Setting Web administration passwords for the IBM HTTP Server 1.3.x
To create the password file `vspasswd` for your IBM HTTP Server, login as root and complete the following commands:

1. Enter `/usr/HTTPServer/bin/htpasswd -c /var/avs/config/vspasswd vsadmin` to create the password file and prompt for your `vsadmin` password.

2. Enter `/usr/HTTPServer/bin/htpasswd /var/avs/config/vspasswd vsloader` to prompt for your `vsloader` password.

3. Enter `chmod 664 /var/avs/config/vspasswd` to set the permissions on the password file.

The following is the sample file of `/var/avs/config/vspasswd`.

```
vsadmin:Bhp0imNG7nqIg
vsloader:33LWheAVYEYeM
```

Setting Web administration passwords for Apache
To create the password file `vspasswd` for Apache, use the following commands at the AIX prompt (you must be logged in as root):

1. Enter `htpasswd -bc /var/avs/config/vspasswd vsadmin` *password* to specify your `vsadmin` password.

2. Enter `htpasswd -b /var/avs/config/vspasswd vsloader` *password* to specify your `vsloader` password.

Setting Web administration passwords for IBM Internet Connection Server (ICS) and IBM Lotus Domino Go
To create a password file `vspasswd` for IBM Internet Connection Server, use the followings commands at AIX prompt:

1. Enter `/usr/sbin/htadm -passwd /var/avs/config/vspasswd vsadmin` *password* to specify your `vsadmin` password.

2. Enter `/usr/sbin/htadm -passwd /var/avs/config/vspasswd vsloader` *password* to specify your `vsloader` password.

Setting passwords for the Netscape FastTrack Server
In Netscape FastTrack Server, both vsadmin and vsloader can perform configuration, administration, and content-loading tasks. You can set and change passwords and IDs for Netscape FastTrack Server through **Access Control** on the Netscape Server Selector main menu.

Starting and stopping the Web server
The following are the commands for starting and stopping the Web server. After you have configured the passwords of Web server, you should restart Web server.

	Lotus Domino Go and IBM ICS	Apache and IBM HTTP
Start the Web server	`startsrc -s httpd`	`apachectl start`
Stop the Web server	`stopsrc -s httpd`	`apachectl stop`

	Lotus Domino Go and IBM ICS	Apache and IBM HTTP
Check status	`lssrc -s httpd`	`apachectl status`

2.2.8.3 Multimedia File System (MMFS)

Refer to the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871, for information on configuring the Multimedia File System.

2.2.8.4 Configuring a DCE 3.1 client

The VideoCharger components rely on DCE remote procedure call (RPC) functionally to enable client to server communication:

1. Issue `smitty mkdce` at the command prompt as root, then select the following menus:

   ```
   Configure DCE/DFS Clients
   1 full configuration for this machine
   ```

2. Enter information for the following fields:

   CLIENTS to configure

   > Specify `List`, then `rpc`.

   CELL Name

   > Specify your local host name, such as `/.../unique_cell_name`.

   Machine's DCE HOSTNAME

   > Specify your local host name

   MASTER SECURITY Server

   > Specify your local host name

3. Use the default values listed for all other fields and press Enter.

4. When the configuration completes, press Enter to continue.

5. Click **Cancel** to return to the main DCE menu.

6. Select **DCE/DFS Start options**. A menu similar to the following appears:

   ```
   Start DCE now                       Yes
   Start DCE at system restart         No
   Clear DCE files at system reboot    No
   ```

7. Change the value for "**Start DCE at system restart**" to *yes*.

8. Click **OK**.

9. Exit from SMIT.

2.2.9 Step 8: Configuring VideoCharger for AIX

Refer to the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871, for instructions on using the VideoCharger configuration forms for Initial Setup.

2.3 VideoCharger for NT

Unless otherwise specified, you are assumed to perform all the tasks with an administrator privilege set under NT (that is, your login session is someone who belongs to the administrator group).

2.3.1 Before you start

Check the following software and hardware requirements:

Hardware requirements:
- IBM PC-compatible system
- A 200 MHz Intel Pentium Processor (or equivalent)
- At least 64 MB of system memory, and an additional 32 MB for each encoder card you will be using
- Dedicated disk for the Windows NT file system (NTFS)
- SCSI disks are recommended. IDE can be used with a small number of streams. A dedicated disk controller is also recommended.
- Network adapter cards. Peripheral Component Interconnect (PCI) is recommended for better performance. Industry Standard Architecture (ISA) can also be used.

   Optional hardware (if you want encoding capabilities):
   - Optibase Forge (MPEG-2 half res and MPEG-1)
   - Optibase Fusion (MPEG-2 full res and MPEG-1)
   - Optibase MovieMaker (MPEG-1 only)
   - FutureTel PrimeView

Software requirements:
- Windows NT Server Version 4 or Windows NT Workstation Version 4 with service pack 5 (or higher), or Windows 2000 Server or Advanced Server.

   Note: Service pack 5 must be installed on Windows NT after all other prerequisites are installed.

- Any Web server; Internet Information Server (IIS) Version 3 or higher is recommended for NT Server, and Personal Web Server 3.02 for NT Workstation.

Optional software:
- IBM Content Manager Version 7.1 or higher

- IBM DB2 Universal Database Version 6.1 or higher

- FutureTel PrimeWare Version 4.0.1 or higher, or FutureTel PrimeView MPEG System Driver 3.4 or higher

2.3.2 Step 1: Applying operating system fixes

For either Windows NT Server Version 4 or Windows NT Workstation Version 4, you must apply service pack 5 (or higher). Remember that sometimes you need to re-apply the service pack if you install some components from the original NT CD media.

2.3.3 Step 2: Installing Web server

If you are not experienced with Web servers, we suggest that you install Microsoft Option Pack 4.0, as the Internet Information Server (IIS) that is bundled with it. The advantage is that the VideoCharger for NT installation process will automatically do the Web server configuration for you.

If you want to use a different Web server, please see 2.2.4, "Step 3: Installing the Web server" on page 17, which gives the locations where you can get different servers. Install the server as instructed. In addition, subsequent discussions will use the default install directory as a reference.

2.3.4 Step 3: Configuring NT

Please consult the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871, for details about your memory requirement and network requirements for NT. In addition, if you would like to do real-time encoding, make sure that the software drivers for the supported encoder card are properly installed and configured. Refer to the manual that came with the encoder card for installation and configuration instructions.

NTFS formatted drive for content storage
You need to supply a directory which serves as the content storage for all the video assets. This directory must be located in a partition formatted with NTFS. Some recommendations for preparing the NTFS formatted partition are:

- SCSI hard drives are preferable to IDE hard drives. You can see the poor performance of IDE drives in 3.6.3, "Scenario 1: VideoCharger for Windows NT" on page 71.

- If you have an IBM Netfinity ServerRAID adapter, we recommend that you enable the hardware RAID option, rather than the software RAID option of NT.

- RAID 0 (Disk Striping) is not a good choice (in terms of data recovery) if one of the stripe disks should fail. Consider using RAID 5 (striping with parity) so that you can recover your data if a single disk fails.

- If you use the NT software striping option, do not create the stripe sets using disks of different sizes. This is because NT uses the size of the smallest disk to create equal-sized unformatted partitions. For example, if you use a 3.2GB and 6.4GB disk to create a stripe set, even if you include the two whole empty disks, NT will create a 6.4GB of stripe drive using 3.2GB of space from each drive. In addition, hard drives of different sizes usually have different performance characteristics, and therefore a steady disk throughput is not guaranteed.

- When formatting your drive to NTFS, consider using a bigger block size (for example, 4Kb) if your video assets are large.

- Volume set is not equivalent to Stripe set. Volume set only enables you to create logical drives across multiple partitions which do not offer the striping feature.

2.3.5 Step 4: Installing VideoCharger for NT

Refer to the detailed documentation in the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871.

Here are a few notes about the installation:

1. If the installation program does not find any Microsoft Web server (IIS or Peer Web Services) installed on the system, it will prompt an alert, but you can still install the code. However, your system is not configured with the following items:

   - Administration user **vsadmin** is not created on the system.

   - No Web server autoconfiguration is done.

2. If you install VideoCharger for NT on an NT Server configured as Primary Domain Controller, user **vsadmin** may be created during install time, even if you do not have Microsoft Web server installed on the system.

3. You are asked for the directory for content storage and also ftp user ID and password during install time. You can change this configuration

information later using `vsconfig` (see 2.3.9, "Quick install guide of VideoCharger for NT" on page 35).

2.3.6 Step 5: Installing VideoCharger for NT service release

As with the AIX installation, we recommend that you update the VideoCharger for NT to the latest level before you use it. At the time of writing this book, there are no service releases available. The download site is as follows:

```
ftp://ftp.software.ibm.com/ps/products/videocharger/fixes/
```

Service releases are cumulative; all you need to do is download and install the latest one. Remember to read the instructions and readme file provided, in order to install the fixes properly.

2.3.7 Step 6: Various configurations

The following configuration tasks must be completed.

1. VideoCharger administration user and content loading user

2. Web server

2.3.7.1 VideoCharger user management

Usually the installer will create and configure user **vsadmin** for you provided that a web server is installed. If not, you need to create user **vsadmin** with NT system administrator group membership for VideoCharger server administration and content management. For details on creating the user account, refer to Chapter 4, "VideoCharger integration with Content Manager" on page 81.

2.3.7.2 Web server

If IIS or PWS is installed when VideoCharger is installed, then the Web server will be configured automatically. Procedures to complete the Web server configuration on NT is similar to AIX, except for the following differences:

1. UNIX style symbolic link does not exist on NT. You need other directives to alias a virtual directory for a Web user to the actual directory where documents are stored and served.

2. File permissions of VideoCharger for NT are not set. Hence, all the VideoCharger for NT files should be accessible by the Web server. There is no need to change group membership for the user who runs the server on NT.

There is a slight difference in Web server configuration. The following examples should help to configure NT Web servers other than those from Microsoft.

Apache 1.3.x

To create the administration user **vsadmin** and content loading user **vsloader** for the Web server:

```
C:\Program Files\Apache Group\Apache\bin\htpasswd [-c]
C:\Program Files\Apache Group\Apache\conf\passwd userid
```

In these statements, *userid* should be **vsadmin/vsloader** and **-c** option should only be used when the password file does not exist.

Open the file **C:\Program Files\Apache Group\Apache\etc\httpd.conf**. Before you append the following lines to the file, you must change some of the directory references if you do not accept the default VideoCharger for NT installation directory. Read the comments in the following lines and you should know how to change them accordingly.

```
# Start of VideoCharger for NT configuration
DirectoryIndex  default.htm

# Passing environment of VC, these environment variables are very
# important to the CGI programs
PassEnv LANTV_DIR
PassEnv LANTV_SDK_DIR

# You must not revert the order of the following 2 directives.
# ScriptAlias must go before Alias in order to make the CGI work
# Use forward slash for path separator and double quote to quote
# directory with space
# *********************** Important ************************
# Modify the directory value of both ScriptAlias and Alias if you do not
# accept the default VideoCharger for NT installation directory

ScriptAlias /lantv/cgi-bin/ "c:/Program Files/IBM/IBM VideoCharger
Server/Data/public/cgi-bin/"
ScriptAlias /vs_admin/cgi-bin/ "c:/Program Files/IBM/IBM VideoCharger
Server/Data/admin/cgi-bin/"

Alias /lantv "C:/Program Files/IBM/IBM VideoCharger Server/Data/public"
Alias /vs_admin "C:/Program Files/IBM/IBM VideoCharger
Server/Data/admin"
Alias /content "C:/Program Files/IBM/IBM VideoCharger
Server/Data/content"
```

```
# Add protection to the CGI-bin directory
# ********************* Important *********************
# Change the directory reference of if you do not accept the
# default VideoCharger for NT installation directory
<Directory "C:/Program Files/IBM/IBM VideoCharger
Server/Data/admin/html/">
    AuthType Basic
    AuthUserFile "C:\Program Files\Apache Group\Apache\conf\passwd"
    AuthName "VideoCharger Admin"
    require valid-user
</Directory>

# Disable directory listing
# ********************* Important *********************
# Change the directory reference of if you do not accept the
# default VideoCharger for NT installation directory

IndexOptions FancyIndexing
<Directory "c:/Program Files/IBM/IBM VideoCharger Server/Data/public">
    IndexIgnore *
</Directory>
<Directory "C:/Program Files/IBM/IBM VideoCharger Server/Data/admin">
    IndexIgnore *
</Directory>
# End of VideoCharger for NT configuration
```

After saving the file, you can try starting the server by double-clicking the start server icon from the program group. Use a browser to access the following page. You should be able to view the welcome page:

```
http://vcserver/vs_admin/
```

In this URL, vcserver is the hostname of your VideoCharger server.

Lotus Domino Go Webserver 4.6.2
Note: If you use this Web server on NT, the directory reference must not contain a space character. Therefore, the assumed installation directory of VideoCharger for NT is C:\IBMVC

To create the administration user **vsadmin** and content loading user **vsloader** for the Web server:

```
C:\WWW\bin\htadm -create c:\www\passwd
C:\WWW\bin\htadm -add c:\www\passwd userid
```

In these statements, userid is **vsadmin/vsloader**. Remember to synchronize the password with that of the system user.

Open the file %windir%\httpd.conf, where %windir% is an NT environment variable that reflects your NT system directory. Before you append the following lines to the file, you must change some of the directory references if you do not accept the default VideoCharger for NT installation directory.

```
# Start of VideoCharger for NT configuration
# Use backward slash for directory reference

Exec/vs_admin/cgi-bin/*c:\ibmvc\data\admin\cgi-bin\*
Exec/lantv/cgi-bin/*c:\ibmvc\data\public\cgi-bin\*
Pass/lantv/*c:\ibmvc\Data\public\*
Pass/vs_admin/*c:\ibmvc\Data\admin\*

# Add protection
Protect  /vs_admin/html/*  {
     PasswdFile   c:\www\passwd
     Mask         All@(*)
     PostMask     All@(*)
     PutMask      All@(*)
     GetMask      All@(*)
     AuthType     Basic
     ServerID     Private_Authorization
}
# End of VideoCharger for NT configuration
```

After saving the file, you can try starting the server from the NT service window. Use a browser to access the following page, and you should be able to view the welcome page:

```
http://vcserver/vs_admin/
```

In this URL, vcserver is the hostname of your VideoCharger server.

Netscape Enterprise Web Server v.3.6.2
To accomplish the tasks of protecting your CGI administration page and user management, use the Web administration interface of the Web server.

1. Click the **Users & Group** button under the main administration page.
2. Click the **New User** link shown in the left-hand side frame.
3. Enter the new user information in the right-hand side frame.
4. Click the **Create User** button.
5. After successfully creating the administration user and content loading user, click the **Server administration** button to go to the main administration page.
6. Click the gray button which should have shown the logical name of your Web server. You will enter the specific server administration page.
7. Click **Server Preferences** located on the top left-hand corner.
8. Click the **Restrict Access** link shown in the left-hand side frame.
9. Click the **Wildcard** button under the region **A. Pick a resource** on the right-hand frame.

10.Enter `C:/Program Files/IBM/IBM VideoCharger Server/Data/admin/*.*` and press **OK.**

11.Click **Edit Access Control**.

12.Check the box **Access control is on.** A new line will be shown.

13.Click the **New Line** button. Another new line will be shown.

14.Click **Deny** of the second line. A new frame will be shown at the bottom. Check **Allow** radio button and click **Update**.

15.Click **anyone** of the second line. A new frame will be shown at the bottom. Check **Authenticated people only** option and **Only the following people** option. Enter your VideoCharger Server administration user that you created in the text region **User**.

16.Click the **Update** button at the bottom of the frame.

17.Uncheck the option **Continue** of the second line and Click **Submit.**

18.Click **Save and apply** in the next page.

To accomplish other tasks like adding alias to CGI directory, open the file httpd.conf located under the directory:

```
C:\Netscape\SuiteSpot\https-<your_server_name>\config
```

To edit the file:

1. Find the line **<Object name="default">,** this indicates the beginning of the default configuration for the Web server**.** Append the following text after this line.

```
NameTrans fn="pfx2dir" from="/vs_admin/cgi-bin" dir="c:/Program Files/IBM/IBM
VideoCharger Server/Data/admin/cgi-bin" name="cgi"
NameTrans fn="pfx2dir" from="/lantv/cgi-bin" dir="c:/Program Files/IBM/IBM
VideoCharger Server/Data/public/cgi-bin" name="cgi"
NameTrans fn="pfx2dir" from="/lantv" dir="c:/Program Files/IBM/IBM VideoCharger
Server/Data/public"
NameTrans fn="pfx2dir" from="/vs_admin" dir="c:/Program Files/IBM/IBM VideoCharger
Server/Data/admin"
```

Again, modify the directory reference to reflect your VideoCharger directory.

2. Add the following lines at the end or the beginning of the file. This is used to pass the environment variable LANTV_DIR and LANTV_SDK_DIR to the CGI program.

```
Init fn="init-cgi" LANTV_DIR="c:/Program Files/IBM/IBM VideoCharger Server"
Init fn="init-cgi" LANTV_SDK_DIR="c:/Program Files/IBM/IBM VideoCharger Server"
```

Although the environment variables are already defined as NT system variables, you need to define them once again for the Netscape Enterprise Server environment. You can query the value of them by issuing the following commands in the command prompt.

```
echo %LANTV_DIR%
echo %LANTV_SDK_DIR%
```

Once you have the values, modify the directory values to refer to your own system.

3. Add "default.htm" to the following line:

```
PathCheck fn="find-index" index-names="index.html,home.html"
```

So that it reads:

```
PathCheck fn="find-index" index-names="index.html,home.html,default.htm"
```

4. Save the file.

You can try starting the Web server from the NT service window. Use a browser to access the following page, and you should be able to view the welcome page:

```
http://vcserver/vs_admin/
```

In this URL, `vcserver` is the hostname of your VideoCharger server.

2.3.8 Step 7: Configuring VideoCharger for NT

Refer to Chapter 4, "VideoCharger integration with Content Manager" on page 81.

Configuration of Encoder port
After the encoder and its drivers are installed, you must define an encoder port to the VideoCharger to make the encoder accessible to the VideoCharger server.

To configure the encoder port:

1. Click **Configuration and Administration** on the VideoCharger home page.

2. Click **Configure Encoder Port**.

3. Click **Define Port**.

4. Select your **encoder type** and the **bit rate** to be encoded by this encoder port**.** See Figure 2.

Figure 2. Define encoder port Web page

5. You can set the options in Table 6 from the **Advanced** configuration form.

Table 6. Advanced encoder options

Options	Acceptable values
Logical Port Name	Alphanumeric
Port Descriptor	Select the brand of your encoder card
Video Type	MPEG1 / MPEG2
Mux Mode	System/Program/Transport/Audio only/Video only
Video Source	composite/rgb/svideo1/svideo2
GOPs Between Sequence Hdrs	0/1/2/3
Video Color System	NTSC/PAL
Video Frame Rate	Full/Half/Third/Quarter/Fifth/Tenth/Fifteenth
Bit Rate Settings	Set Mux Bit Rate/Set Video & Audio Bit Rate
Mux Bit Rate	numeric value in bit per second
Video Bit Rate	numeric value in bit per second

Options	Acceptable values
Audio Bit Rate	DEFAULT/32000/48000/56000/64000/80000/96000/112000/128000/160000/192000/224000/256000/320000/384000
Horizontal Resolution	352/480/544/640/704/720 (MPEG2 specific)
Transport Program Map PID	0x10 - 1FFE (inclusive, MPEG2 specific)
Transport Video PID	0x10 - 1FFE (inclusive, MPEG2 specific)
Transport Audio PID	0x10 - 1FFE (inclusive, MPEG2 specific)

The last four advanced options are MPEG-2 specific. For details, please consult the corresponding encoder card manual.

Note: Although you can assign a logical name to an encoder port, you cannot configure more than one logical encoder port to physically point to the same encoder.

2.3.9 Quick install guide of VideoCharger for NT

Disregarding any performance issues, you can get VideoCharger for NT up and running in very little time. "Step 1: Applying operating system fixes" on page 26, through "Step 5: Installing VideoCharger for NT service release" on page 28, can be done quickly, as most of the current NT systems meet the requirements without any special care. If the Microsoft Web server is used in "Step 2: Installing Web server" on page 26, in conjunction with a simple NTFS content storage system, you will end up at "Step 6: Various configurations" on page 28.

Here are the short-cut steps:

1. Install one of the suggested Microsoft Web Servers.

2. Install VideoCharger for NT and the fixes.

2.4 Test run the system

This section details how you can test run your system after you have configured it. It mainly deals with what should be done on the VideoCharger server side. Therefore, you need to set up the VideoCharger client on a client machine. Browse the following URLs to get the latest client code:

VideoCharger for AIX:

```
http://vcserver/vs_public/player/
```

VideoCharger for NT:

```
http://vcserver/lantv/client/default.htm
```

In these URLs, `vcserver` is the hostname of your VideoCharger server.

Download the client installation program (iscinst) and install it. If you want to play a QuickTime movie, you also need to download the QuickTime Player and install it on the client machine.

2.4.1 Starting the servers

Table 7 lists all the commands that you need to start or stop all the various servers involved.

Note: A root user is required to run the AIX commands. A user with administrative privilege is required to run the NT commands.

Table 7. Summary of commands to start/stop the servers involved

Server	Default directory to run	Start command	Stop command
VideoCharger for AIX	Any	startsrc -g vs	stopsrc -g vs
IBM HTTP Server for AIX	/usr/HTTPServer/bin	apachectl start	apachectl stop
IBM Internet Connection Server for AIX	Any	startsrc -s httpd	stopsrc -s httpd
VideoCharger for NT	Any	Start from service automatically or use vsstart	Stop from service or use vsstop
Apache for NT	C:\Program Files\Apache Group\Apache	Start from service automatically or use apache -s	Stop from service or apache -k shutdown
Netscape Enterprise Web Server for NT 3.6.5 for NT	C:\Netscape\Suitespot\https-your-servername	Start from service automatically or use startsvr.bat	Stop from service or use stopsvr.bat
Lotus Domino Go Webserver for NT	NIL	Start from service automatically	Stop from service
Microsoft Web Server	NIL	Start from service automatically	Stop from service

2.4.2 Uploading content

Command vsload is used to upload the video asset to the VideoCharger server. The command makes the VideoCharger server act like an ftp client and login to a ftp daemon to get the video asset. See Figure 3.
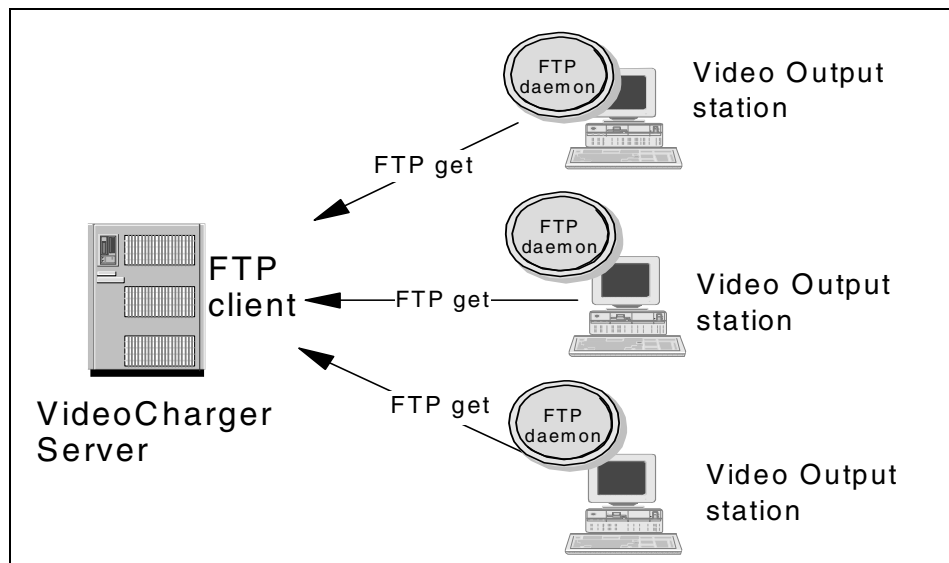
Figure 3. Loading content to VideoCharger server

Most likely, there is no default ftp daemon running on your video output workstation, which is usually a PC. Therefore, you can either install an ftp daemon on your Video Output station, or try the following methods:

VideoCharger for AIX
1. Let the video output station initiate the normal ftp session, that is, issue an ftp from the station to the VideoCharger server.

2. Put the video assets in a temporary video directory.

3. Telnet to the VideoCharger server and do a vsload locally.

4. If you have a lot of video files to be uploaded and renamed, try to create a script to upload them all in batch mode.

VideoCharger for NT
1. Share a directory for all users to put their output video.

2. The video output station can do a simple copy to put the video on the shared drive.

3. Issue `vsload/vsadd` on the VideoCharger for NT server. If you have a lot of video files to upload, create a batch file.

2.4.3 Video-on-Demand (VOD)

After you have uploaded some sample video clips, do a `vslist` to verify that the content is there, and do another `vslist -a assetname` to see if the video information is updated. Then, from a browser on the client machine, access the following URLs:

VideoCharger for AIX:

```
http://vcserver/vs_public/cgi-bin/iscpfhom
```

VideoCharger for NT:

```
http://vcserver/lantv/
```

In these URLs, `vcserver` is the hostname of your VideoCharger server.

You should be able to navigate to a page which displays a list of video assets you can play. Click on them to test the streaming. Do not run more than two clients at this moment, because your system is not tuned.

2.4.4 Multicasting an existing asset

You can manage multicasting of an existing asset from the administration main page:

1. Click **Content Management** from VideoCharger administration main page.

2. Click **Manage Multicasting**.

3. Click **Add**.

4. Under Windows, click **Multicast of Existing Asset**. This step is not needed on AIX.

5. Fill in the form accordingly. Remember that you cannot multicast MPEG-2.

6. Click the link **Help** at the lower right corner if you need help filling in the form.

   Note: For AIX multicast, you need to supply the bit rate of the asset. You can either telnet to the AIX to do a `vslist -a` and query the asset information from the Web.

To view the multicast video, go to the following URLs:

VideoCharger for AIX:

```
http://vcserver/vs_public/cgi-bin/iscpfmct
```

VideoCharger for NT:

```
http://vcserver/lantv/cgi-bin/iscpfevt.exe
```
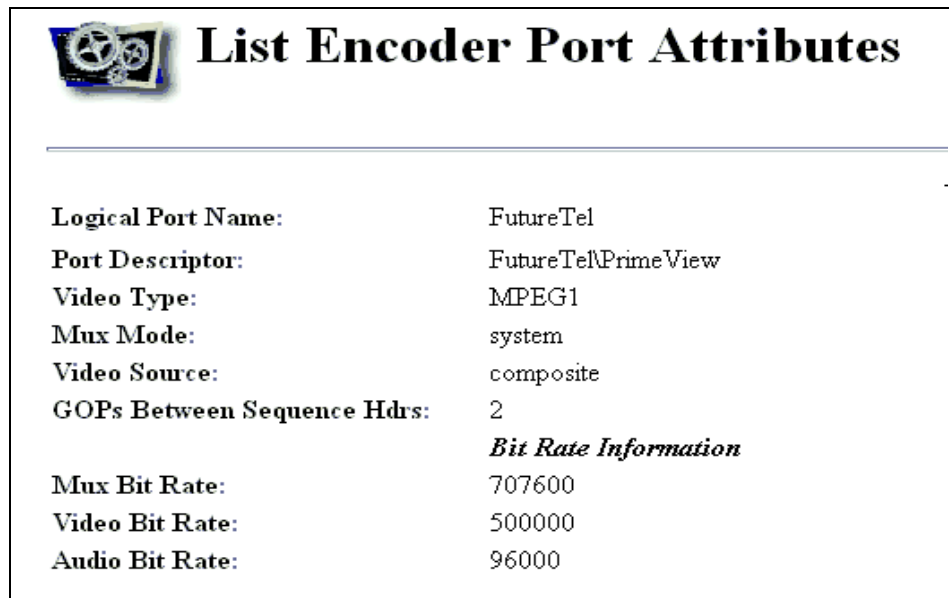
Click on the multicasting link to play.

2.4.5 Real-time encoding and streaming

Real-time encoding and streaming is, in fact, doing a multicast on an asset created on the fly from an encoder. As shown in Figure 4, there are a list of attributes associated with the encoder port. Therefore, whenever you use that encoder port to do streaming or recording, the output stream is already set to a certain bit rate, video type, and so on. If you need to change the attributes of the encoded stream, you have to modify the encoder attribute through the administration gateway from the Web.

Figure 4. List encoder port attributes Web page

To add a real-time encoding event:

1. Click **Content Management** from VideoCharger for NT administration main page.

2. Click **Manage Multicasting**.

3. Click **Add** and you are given the choices of **Multicast from Encoder**, **Record and Multicast from Encoder**. Click your choice, and fill in the form.

4. If you need help filling out the form, click the **Help** link at the lower right corner.

5. Even if the multicast lasts for long time, you must enter a very large value to cope with your need. There is no number to indicate multicast performing forever.

2.4.6 Asset staging

Asset staging is performed when you want to copy video assets from one VideoCharger server to another, or from a Multimedia Archive. See Figure 5.
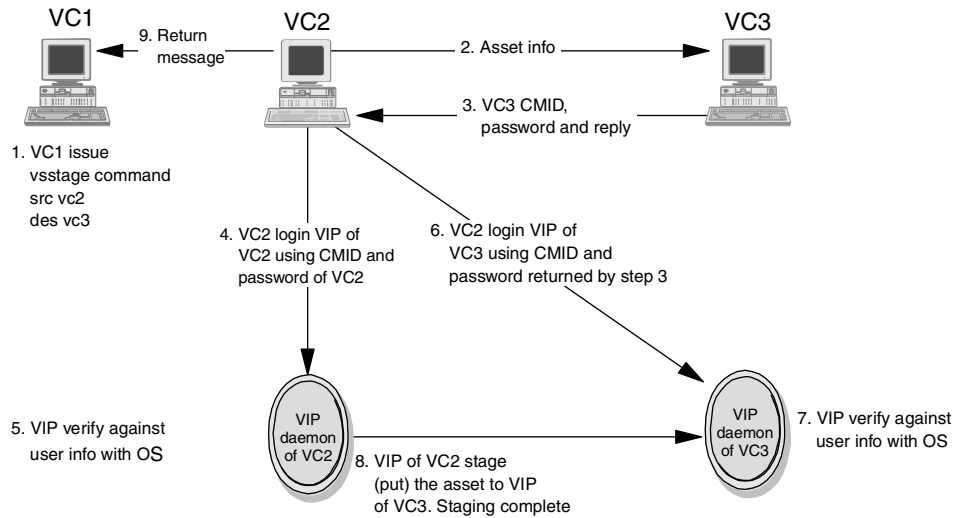
Figure 5. Sequence of asset staging

You can see that it is very important to have the content management userid and password synchronized with their own operating system in order to stage assets successfully, as shown in Figure 5. Otherwise, either Step 5 or Step 7 fails and you cannot stage the asset.

Therefore, you should note the following for staging assets:

- Make sure the content loading ID and password configured for the VideoCharger servers are synchronized with the password created on the operating system.

- There is no need to make the content loading ID and password the same across all the VideoCharger servers.

- If you change the userid/password of your content loading user, you must do the following:

  AIX:

  ```
  chvsdp -l dp -i newid -w newpasswd
  restart the VideoCharger
  ```

  NT:

  ```
  vsconfig -u newid -p newpasswd
  restart the VideoCharger
  ```

Chapter 3. Performance considerations

This chapter looks at performance related issues involved in planning and sizing a VideoCharger system. Unfortunately, there are no standard benchmarks, such as SPECint or OLTP for database performance, which characterize a system suitable for video stream delivery. Therefore, we took a closer look into the critical issues of video streaming from both sides: what is required on the system side, and how the VideoCharger application addresses those requirements.

After reading this chapter, you should have a solid understanding of what the critical resources of a VideoCharger server are, and how to plan a system that meets your requirements. You will also find that system sizing and tuning will be more at the system level than at the application level.

3.1 Overview

Video serving is a very resource-intensive application. It is also an isochronous work load, which means that data must be fed at a prescribed rate, or end users will see glitches (or artifacts) in the video. Networks that carry the data from the server to the client must be engineered to handle this heavy isochronous work load.

One important factor that you have to take into consideration is the use of hubs in your network. We discovered that using a hub in a VideoCharger network reduces the throughput by approximately 90 percent. Yes, 90%. Our recommendation is to use switches.

Because of these characteristics, the planning of a VideoCharger complex and the network is very important.

Figure 6 shows a schematic view of a VideoCharger complex and its main components:

- Server with subcomponents
- Network
- Client

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Client/Server Network Dataflow
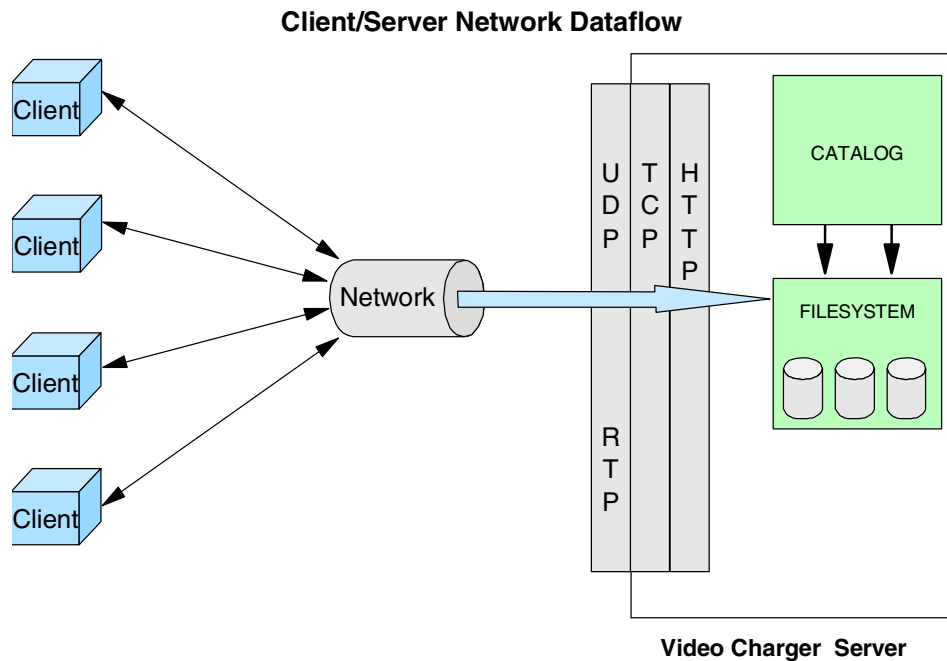
Figure 6. VideoCharger complex schematic view

The overall system performance depends on the right configuration and sizing of the individual components. For VideoCharger running on AIX, high scalability is achieved by distributing the load to multiple systems. We will look at each individual component and address the relevant issues in the following chapter.

The total bandwidth that the video server has to deliver will be determined by the number of concurrent streams and the quality (the format and bit rate of the streams).

The system I/O bandwidth has two main aspects:

1. The bandwidth of the disk subsystem of the server that is necessary to deliver the sum of the demands for video streams to the client.

2. The network bandwidth of the server and/or the segments of the network.

Another aspect to take into account is the level of interactivity, that is, individual user control of streams, such as play, pause, fast forward, and rewind.

3.2 Host capacity

The I/O performance of a system depends on many different factors. These include the hardware, the configuration of the hardware, the operating system with its settings, the application itself and how it uses the system resources. Any of these values can be a bottleneck for system performance. It is important to remember that removing one bottleneck will almost inevitably lead to another one elsewhere. A balanced system design is the ultimate goal of all performance tuning.

The capacity of the server machine is determined by the following components:

- CPU
- Memory
- System bus
- Disk subsystem

The tables in Appendix C, "VideoCharger sizing on AIX" on page 219 and in the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871, will help you determine the memory requirements for the VideoCharger components on AIX.

The system bus used in almost all new PC or RS/6000 systems is PCI, which provides a bandwidth of 32 MB/s to 132 MB/s. For a fully equipped machine with multiple disk and network adapters, the system bus can be the bottleneck. The solution to this problem is to use machines with multiple PCI busses, for example, RS/6000 models F50, H70, S70 or PC Netfinity servers.

For high bit rate content, video server systems tend to be I/O bound. In the following sections, therefore, we will concentrate on I/O subsystems like disk and network.

3.2.1 CPU

The workload put on the system originates mainly from tasks, such as:

- Coordinating connection setup
- Disk read operations
- Network packaging
- Scheduling
- Context switches

These are used rather than doing elaborate calculations.

3.7, "Summary of performance results" on page 77, gives details of how many streams you can expect to achieve at around 60 percent CPU utilization on various systems.

3.2.2 Disk subsystem

The disk subsystem bandwidth is determined by the following components:

- Disk throughput
- Number of disks
- Disk interface/adapter bandwidth

In this section, we will look at different aspects of these components and how they define the performance of the disk subsystem.

3.2.2.1 Performance on disk level

There is usually more than one disk drive installed in any given system. If all your data is on one disk, the performance cannot be better than the media data rate. See Table 8.

Table 8. Sample IBM disk drive specifications

Disk Name	Desk-star 8	Deskstar 40GV	Deskstar 75GXP	Ultrast ar 2XP	Ultrastar 18ZX	Ultrastar 73LZX
Capacity	8.45GB	20GB	75GB	9.11GB	18.2GB	73.4GB
Sustained Data Rate	5.8 - 10.2	32 MB/s	37 MB/s	10.3 - 15.4	15.2 - 20.2 MB/s	29.8 - 58.0 MB/s
Seek Time	9.5 ms	9.5 ms	8.5 ms	8.5 ms	6.5 ms	4.9 ms
RPM	5400	5400	7200	7200	10020	10000
Buffer	512 KB	512 KB	2 MB	812 KB	4M	4MB
Interface	IDE	IDE	IDE	SCSI	Ultra2 SCSI, SSA, FC-AL	Ultra160 SCSI, Ultra320 SCSI, FC-AL-2

For a video server application which mainly involves sequential reading with large block sizes, the media data rate is the most important factor. However, if you can stripe the data over more than one disk, you will usually obtain a better performance than by having all the data on one disk.

3.2.2.2 Disk striping
RAID technology (Redundant Array of Independent Disks) offers improved performance and reliability to a system's disk subsystem. There are five levels of RAID which target different requirements. Only the relevant levels are covered here. For an illustration of disk striping, see Figure 7.
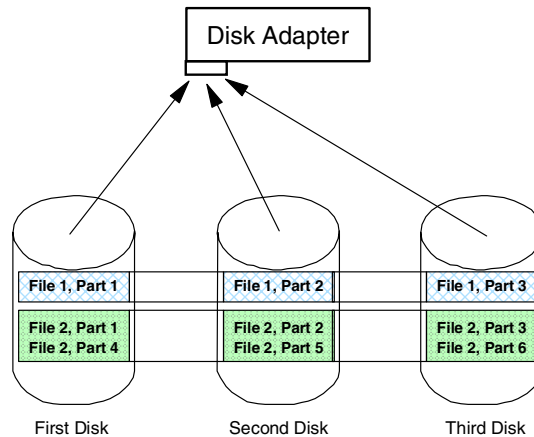
Figure 7. Disk striping

RAID 0: Disk striping
Raid 0 requires two or more hard drives. Consecutive blocks of data are each written to different physical drives in parallel. As a result, system I/O performance improves greatly because the data is spread out over X drives, on possibly more than one channel. For large sequential read or write operations, access to data theoretically increases by the factor X. Of course, better performance will be observed as the physical disk-to-controller ratio approaches 1.

RAID 0 does not offer any redundancy or parity control, and so offers no fault tolerance. Simply put, if one drive fails, all data in the array is completely lost. RAID 0 is more suited to situations where I/O performance is more important than file redundancy.

RAID 5: Disk striping with parity
RAID 5 is the most popular RAID implementation, because it is a good compromise between performance, data protection and cost.

RAID 5 introduces redundancy by storing parity information. Data blocks are striped across different disks; and parity for the blocks in the same rank is generated on writes, recorded in a distributed location, and checked on reads.

RAID 5 provides good availability, since an array can continue to operate in the event of a single disk failure. In addition, with the advent of "hotswappable" disks, one can easily swap good and bad spindles in this configuration with minimal jeopardy of data, while the system is running. The RAID controller reconstructs the missing data via the parity information stored on the other disk(s).

For Windows NT, software RAID for both levels 0 and 5 can be implemented using NT's disk administrator. There are also several hardware RAID implementations available. Software Raid 5 is discouraged because of its large overhead.

Recommendations: Define a stripe set to store multimedia content only. Do not use the set for any other purposes or other applications. Have an extra system disk. The stripe size used by Windows NT is 64 KB.

VideoCharger for AIX uses a special filesystem to store and deliver the multimedia content which is optimized especially for this purpose.

3.2.2.3 AIX: Multimedia Filesystem

The IBM Multimedia Filesystem is a scalable, parallel file system designed to support interactive multimedia applications, particularly large scale ones. The Multimedia Filesystem runs under the AIX operating system, on machines ranging from RS/6000 desktop workstations to the SP2 parallel super computer. Its main features are:

- Isochronous file access
- Scalability
- High availability
- Manageability

Let's look into those features in more detail. For more information on the Multimedia Filesystem, refer to the technical white paper on Tiger Shark:

```
http://www.software.ibm.com/data/videocharger/tigershark.html
```

Isochronous file access

The Multimedia Filesystem uses real-time features of the AIX operating system to prevent the kernel and other programs from interfering with isochronous data delivery. It also implements real-time disk scheduling to execute disk I/O operations in the proper order for achieving an uninterrupted flow of data to clients.

Scalability

The Multimedia Filesystem provides a high degree of scalability, both in the amount of data it can store and the data throughput it supports. The high scalability is achieved by using large disk blocks and wide striping.

- **Large disk blocks**: To efficiently support multimedia and supercomputing, a file system must maximize throughput from the available disks. Since disk throughput is strongly related to disk block size, the Multimedia Filesystem uses a large disk block size, 256 KB being the default. Conventional file systems optimize to reduce space rather than to increase throughput, by using small disk blocks; for example, the AIX native file system uses 4 KB blocks. Since the Multimedia Filesystem can store several small files (or partial blocks at the end of large files) together in a single large block, its disk-space utilization is comparable to that of a conventional, small-block file system.

- **Wide striping**: In both supercomputing and multimedia, much or all of the file system activity is often directed at a single file. For example, many or all clients of a Video-on-Demand system may be viewing the same movie simultaneously the first time it becomes available. It is easy to image a demand which is higher than the throughput of an individual disk (5-10 MB/s) or even of an individual storage node in the SP2 (40 MB/s). Achieving higher throughput than that of a disk or node from a single file requires striping it across multiple disks and storage nodes, so that successive blocks of the file go on different disks and nodes. Each Multimedia Filesystem can be striped across as many as 512 disks. Since each file is striped evenly across all disks in a stripe group, the disk load is inherently balanced, regardless of file-access skew (the unevenness of demand for different files).

High availability

As the number of disks and nodes in the system increases, so does the probability of component failures. If hardware RAID is available, the Multimedia Filesystem can use it as a means of protecting disk data. However, hardware RAID subsystems can be more than twice as expensive per byte as conventional disks; RAID controllers are often performance bottlenecks; and, for large systems, the probability of an entire RAID subsystem failing is significant. As an alternative to RAID, the Multimedia Filesystem uses block-level replication of both file data and metadata (the bookkeeping information that keeps track of the location of files on disk). Tiger Shark also recovers from file-system-node failures, so if a node crashes in the process of modifying the file system (for example, while recording, or while loading content from tape), the file system will be restored to a consistent state.

Manageability

The Multimedia Filesystem is designed to simplify or eliminate routine system management tasks. Automatic load balancing across disks is inherent in the design. The Multimedia Filesystem responds to commands from the AIX operating system to automatically recover and reconfigure in response to the failure or repair of hardware components. The system remains operational while reconfiguration occurs. System administration commands (creating and deleting file systems, adding and removing disks from file systems, and so on) are also executed while the system is operational. Files can be reorganized (that is, re-striped onto newly added disks) online, with the reorganization taking place in the background.

3.2.2.4 Performance at the interface/adapter level

The data transfer from the hard drives to the system is another important factor defining the performance of the disk subsystem. There are a number of different interface technologies that you can select. This section briefly introduces the most important standards.

IDE/ATA

Integrated Device Electronics (IDE) is also known as Advanced Technology Attachment (ATA).

IDE is generally the least expensive hard drive interface; many computer motherboards include ATA controllers and cable connectors. However, ATA is a slightly slower drive interface, so it is used primarily in single user computer applications or low-end RAID systems.

The original ATA interface was 16-bit wide and supported two hard drives at a maximum transfer rate of 8.3 MB/s. ATA-2 boosted maximum throughput to 16.6 MB/s, again for a maximum of two devices. From there, ATA designations blur as companies create names like Fast ATA or Extended IDE (EIDE) to describe proprietary feature additions to the ATA-2 standard. These designations are more marketing terms than official standards. Though not an official ANSI standard, Ultra ATA has been universally accepted by the hard drive industry to define an ATA-2 derivative that boosts the maximum transfer speed to 33 MB/s, adding cyclic redundancy check (CRC) error detection to maintain data integrity. Ultra ATA is designed to be backward-compatible, as is ATA-2. See Table 9.

Table 9. IDE/EIDE modes and transfer rates

Specification	Mode	Transfer Rate (in MB/s)
ATA	PIO mode 0 PIO mode 1 PIO mode 2 DMA mode 0	3.3 5.2 8.3 4.2
ATA-2	PIO mode 3 PIO mode 4 DMA mode 1 DMA mode 2	11.1 16.6 13.3 16.6
ATA-3/Ultra ATA	PIO mode 5 DMA mode 3 DMA mode 4	22 33 66

Small Computer Systems Interface (SCSI)

This is widely used in mid-range to high-performance workstations and servers. Small Computer Systems Interface offers faster transfer rates than ATA/IDE, the interface most commonly used in desktop PCs. In general, ATA/IDE is considered easier to implement and less expensive than SCSI, but it does not offer as many features. For example, SCSI can support up to 16 devices on a single bus (IDE offers two), and generally offers faster throughput, uses less CPU horsepower during operation, and is therefore more efficient in demanding multiple initiator applications for multi-users and uses. This is significant because it allows the processor to perform more commands at one time making for greater efficiency. See Table 10.

Table 10. SCSI variations

	SCSI	Fast SCSI	Ultra SCSI	Wide Ultra SCSI	Ultra2 SCSI	Wide Ultra2 SCSI	Ultra3 SCSI
Max. data transfer rates (MB/s)	5	10	20	40	40	80	160
Max. bus width (bit)	8	8	8	16	8	16	16
Max. cable length	6	3	1.5 -3	1.5-3	12	12	12
Max. device support	8	8	8 - 4	8 - 4	8	16	16

As shown in Table 10 on page 51, SCSI variations have emerged to meet the need for faster throughput, spawning an often confusing array of descriptive terminology. Data throughput is controlled by two factors. You can move more data by increasing the bus width, or by increasing the speed at which data can move on the bus. The SCSI terms Fast, Ultra, or Ultra2 typically refer to data rate increases that move data faster on the bus, while the term Wide refers to adding more lanes to the bus, typically transferring 16 bits of data at one time rather than 8 bits.

Other differences between the standards include the maximum cable length and the number of devices that can exist on the same SCSI bus. As one of the recent developments in SCSI, Ultra3 SCSI presents significant feature and benefit enhancements over Ultra2 SCSI products.

Ultra3 SCSI products are designed to offer, at a minimum, the following features: cyclic redundancy check, domain validation, and double transition clocking, none of which are available in Ultra2 SCSI products. These features are designed to improve speed, performance, and overall manageability of SCSI. Products that incorporate Ultra3 SCSI functionality will be interoperable with one another and with other SCSI products, and designed to offer full backward compatibility and investment protection for customers.

The subset of Ultra3 that includes the three features mentioned above is commonly called Ultra160, for its speed of 160 MB/s. The main difference between Ultra3 and Ultra160 is that Ultra3 implementations may offer other features in addition to those listed above. Note that the transfer rates referred to in the chart are maximum burst transfer rates available for short data transfer periods.

Perhaps the simplest approach is to buy the fastest available drive or SCSI adapter when buying a new system or upgrading a current one. However, when buying a drive, always check the specification sheet to determine the level of SCSI adapter required to optimize the utility of the drive. For example, the IBM Ultrastar 9ZX is designed to be compatible with an Ultra SCSI adapter, while a newer high capacity drive, the IBM Ultrastar 36XP, requires at least an Ultra2 SCSI adapter to take full advantage of drive features (although it is generally backward-compatible with an Ultra SCSI adapter).

So, that leads to another advantage of SCSI, which is that most SCSI products are backward-compatible. For example, if you purchased a faster, larger Ultra2 SCSI drive to increase overall system capacity, you could still use your current Ultra SCSI controller to interface with the drive, although, you may not achieve the drive's optimal data transfer rates.

For more information on SCSI, refer to technical SCSI white papers on Ultra2 SCSI or Ultra3 SCSI, at the following Web page:

http://www.storage.ibm.com/hardsoft/diskdrdl/library/whitepap/lvd/lvd.htm

Or, visit the Web page of the SCSI Trade Association, of which IBM is an active, contributing member and board representative:

http://www.scsita.org

Fibre Channel Arbitrated Loop (FC-AL)

Fibre Channel Arbitrated Loop is an exceptionally high-bandwidth industry-standard interface primarily targeted toward high-end servers and similar demanding applications. FC-AL uses fiber optic cabling in a loop configuration to produce maximum transfer speeds of 100 MB/s and is designed to connect up to 127 devices as far as 10 kilometers apart, enabling data storage in remote, secure locations distant from the server. FC-AL devices can be dual ported, providing two simultaneous input/output sessions that doubles maximum throughput, and FC-AL enables "hotswapping", so you can add and remove hard drives without interrupting system operation, an important option in server environments. FC-AL adapters tend to cost more than SCSI or SSA adapters. The IBM Ultrastar 36XP and many new IBM drives support FC-AL, producing burst transfer speeds of up to 200 MB/s with two FC-AL loops. Because Fibre Channel is a standard interface, it supports many different protocols, such as SCSI, IPI-3 Disc and Tape, Link Encapsulation, Internet Protocol, and ATM.

For more information, refer to the FC-AL white paper:

http://www.storage.ibm.com/hardsoft/diskdrdl/library/whitepap/fcal/fcal.htm

Serial Storage Architecture (SSA)

Serial Storage Architecture is an advanced interface that provides high throughput (160 MB/s) and a range of features valuable in server or enterprise environments. For example, SSA enables cable failure prevention, so you can add and remove drives without interrupting system operation. This allows for automatic configuration of new devices (without interrupting disk access to users) and supports up to 128 total devices at distances up to 10 km with a fiber optic extender. SSA throughput is impressive with a maximum of 160 MB/s data transfer speed.

It may sustain data rates as high as 90 MB/s per adapter in non-RAID mode and 85 MB/s in RAID mode, and in 8-way clusters, up to 600 MB/s and 60,000 I/Os per second are possible. In addition, SSA devices can act independently, so peripherals can be attached in multiple paths, making a

fault-tolerant system much easier to implement, and simplifying network maintenance. For example, one SSA drive can connect to multiple servers, and if one server goes down, data may be accessed through the other servers. IBM offers the SSA interface in its Ultrastar family of hard disk drives. IBM also uses Serial Storage Architecture in many IBM disk storage systems such as the 7133 Serial Disk System, and the Versatile Storage Server.

For more information on SSA, refer to the technical SSA Overview page:

    http://www.storage.ibm.com/hardsoft/ssaovu.htm

3.2.2.5 Example disk bandwidths

Table 11 shows the disk bandwidth that can be achieved on an S70A server on various configurations that have disks evenly distributed to the SSA adapters. It illustrates that to get the maximum bandwidth of the disks, it is important not to put too many disks to one adapter.

Table 11. Disk bandwidth examples

Disks	SSA adapters	Calibrated bandwidth (in KB/s)	KB/s per disk	KB/s per SSA adapter
9	3	52,054	5,784	17,351
13	4	74,453	5,787	18,618
17	5	96,718	5,689	19,344
21	6	118,794	5,657	19,799
25	7	141,317	5,653	20,188
29	8	163,144	5,626	20,393
33	9	184,635	5,595	20,515

3.3 Network capacity

The performance of your VideoCharger system is not only impacted by the features and capacity of the server, but by the features and capacity of the network. The VideoCharger does not manage network bandwidth. Therefore, designing a network that is capable of handling the isochronous work load can be a demanding task. There are many aspects to be considered in addition to those that are required for a normal network. This section provides information to help you plan your network. We will look at issues like different

network technologies, network segmentation, and protocols suitable for video streaming.

3.3.1 Popular network technologies

This section highlights the characteristics of the LAN technologies that are widely implemented today.

Table 12. Comparing LAN technologies

	Ethernet	**Token-ring**	**FDDI**	**ATM**
Topology	Bus	Ring	Dual rings	Star (switch)
Access method	CSMA/CD	Token passing	Token passing	
Speed (Mb/s)	10/100/1000	4/16/100	100	25/100/155/ 622/2400
Broadcast/ non-broadcast	Broadcast	Broadcast	Broadcast	Non-broadcast
Packet size (bytes)	64-1516	32-16K	32-4400	up to 9180
Self recovery	No	Yes	Yes	-
Data path redundancy	No	No	Yes	No
Predictable response times	No	Yes	Yes	Yes
Priority classes	No	Yes	Yes	QoS
Maximum cable length	Yes	Yes	Yes	Yes
Cost of deployment	Cheap	Moderate	Expensive	Expensive

3.3.1.1 Ethernet

Today Ethernet is the most popular type of network. It is popular because it is easy to implement at relatively low cost, it is easy to manage, and Ethernet products are readily available.

The disadvantage is that Ethernet does not scale very well. For high numbers of clients, the "usable" bandwidth of Ethernet LANs is about 60%-70%, after which the effects of collision are so bad that efficiency actually decreases.

Therefore, one important aspect of Ethernet LAN design is to ensure an adequate number of workstations per network segment.

If you are not careful in the way you segment your network, you may overrun some network segments with too much traffic for the bandwidth available. For example, suppose you had a VideoCharger server that could serve 20 streams at 1.25 MB/s per stream. This means that the processor and disk drives on the server could deliver 25MB/s to the network. Suppose you had one Ethernet adapter in your server and a single network segment with a bandwidth of 10MB/s. If you had 10 clients on that segment each trying to play one video stream at 1.25 MB/s, you can see that you are trying to run that one segment at 12.5 MB/s, which is above the bandwidth of the Ethernet of 10 MB/s.

This can be overcome by properly sizing the segments of your network, using a smaller number of clients per segment, multiple network adapters per server, and multiple Data Pumps on AIX.

The recommended, but more expensive, alternative is to use switched Ethernet, where you have a dedicated connection to each individual workstation.

3.3.1.2 Token-ring

The token-ring LAN is particularly stable and efficient even under high load conditions. The impact of an increase in the number of workstations on the same LAN does not affect token-ring as much as it would Ethernet. It guarantees fair access to all workstations on the same LAN, and is further enhanced with an eight-level priority mechanism. With extensive features like self recovery and auto configuration at the electrical level, the token-ring LAN is the network of choice for networks that require reliability and predictable response times.

3.3.1.3 Fiber Distributed Digital Interface (FDDI)

Similar to the token-ring LAN, Fiber Distributed Digital Interface uses a token passing method to operate but it uses two rings, one primary and one secondary, running at 100 Mb/s. Under normal conditions, the primary ring is used while the secondary is in a standby mode.

FDDI is very robust and provides flexibility in its connectivity and redundancy. FDDI offers capabilities, such as self recovery and security. Because it runs

mostly on fiber, it is not affected by electromagnetic interference. Due to its robustness and high speed, FDDI was being recommended as the backbone of choice. But with the development of 100 Mb/s Ethernet technology, network managers who are going for bandwidth rather than reliability have chosen to implement 100 Mb/s Ethernet rather than FDDI.

Though it may not be as popular as Ethernet or token-ring, one can still find many networks operating on FDDI technology.

3.3.1.4 Asynchronous Transfer Mode (ATM)

ATM is a switching technology that offers high speed delivery of information including data, voice and video. It runs at 25, 100, 155, and 622 Mb/s, or even up to 2.4 Gb/s, and is suitable for deployment in both LAN or WAN environments. Due to its ubiquitous nature, it can be categorized as both a LAN or a WAN technology. Unlike LAN technologies, such as Ethernet or token-ring that transport information in packets called frames, ATM transports information in cells. In legacy LANs, frames can vary in size, while in ATM, the cells are of fixed size and they are all 53 bytes. ATM is a connection-oriented protocol, which means it does not use broadcast techniques at the data link layer for delivery of information, and the data path is predetermined before any information is sent. It offers features that are not found in Ethernet or token-ring, one of which is called Quality of Service (QoS). Another benefit that ATM brings is the concept of Virtual LAN (VLAN). Membership in a group is no longer determined by physical location. Logically similar workstations can now be grouped together even though they are all separated.

Because ATM works differently from the traditional LAN technologies, new communication protocols and new applications have to be developed. Before this happens, something needs to be done to make the traditional LAN technologies and IP applications work across an ATM network. Today, there are two standards developed solely for this purpose:

Classical IP (CIP)

Classical IP is the term used for operation of the conventional IP protocol over an ATM network. The standards for doing this have been defined in RFC 1577.

LAN Emulation (LANE)

LAN Emulation enables the implementation of emulated LANs over an ATM network. An emulated LAN provides communication between end-systems similar to that over a real LAN but using the facilities of the ATM network. LAN Emulation software in each end-system is provided to allow existing network system software to continue to operate in the new ATM environment. It is this capability (that existing applications software can continue to be used), that

makes LAN Emulation so powerful and so important for ATM today, prior to the availability of applications using native ATM APIs.

For a more detailed discussion of IP network design and network technologies, please refer to:

- *IP Network Design Guide*, SG24-2580

- *Local Area Network Concepts and Products: LAN Architecture*, SG24-4753

ATM technology can be used in a VideoCharger environment using the CIP and LANE protocols. VideoCharger is an IP based streaming server and, therefore, independent from the underlying network technology as long as IP is supported. Of course, the underlying network eventually determines the quality and quantity of video streams the system can deliver. If you are in the position to design a new network infrastructure, then there is no doubt that the best solution for video streaming is the use of switched networks, such as switched Ethernet or ATM. The advantage is that there is a dedicated bandwidth per client workstation.

Note: We recommend not to exceed 60-70% of the maximum network interface bandwidth for Ethernet. For example, using a 10 Mbps Ethernet, you should run the interface at 6-7 Mbps; 100Mbps Ethernet will achieve no more than around 60 Mbps. 155Mbps ATM may achieve up to around 130Mbps.

3.3.2 Multicast

For non-switched network infrastructures, such as Ethernet, it is an engineering task to balance the quality requirements with the available bandwidth. Using multicast instead of Video-on-Demand can often help overcome these problems. Multicast allows a single video stream to go to a group of clients rather than a single client. The clients can leave or join the multicast session whenever they choose. However, since there are many clients receiving one multicast stream, individual clients cannot control (stop, rewind, fast-forward) the stream. Multicast is defined in RFC 1112.

However, there are several issues to deal with if you are using multicast. Multicast will only work if either:

1. All the clients are on a single network segment.
2. The routers on the network are multicast-enabled.

For this reason, multicast is generally only practical if all the clients are on a single LAN. Even then, you may have to enable multicast on any routers. Certainly, there is no way to multicast out to the public Internet. If you wish to

multicast on your LAN, but not all of the routers are multicast-enabled, then you may be able to use multiple VideoCharger servers on separate segments of the LAN, each multicasting to their own segment.

Also, dynamic path MTU discovery will not work for multicast streams as the server cannot determine the full path to all clients. You can set the MTU for multicast streams for each interface through the Web admin interface.

3.3.3 Dynamic path MTU discovery

Another parameter that should be considered in the IP implementation over different data link layer protocols, is the maximum transmission unit (MTU) size. MTU size refers to the size of the data frame (in bytes) that has to be transmitted to the destination through the network. A bigger MTU size means more information within a frame, therefore, requiring a lower total number of packets to transmit a piece of information. Different data link layers have different MTU sizes for the operation of the network (see packet size in Table 12 on page 55). If you connect two networks with different MTU sizes, then a process called fragmentation takes place, and this has to be performed by an external device, such as a router. Fragmentation takes a larger packet and breaks it up into smaller ones so that it can be sent onto the network with a smaller MTU size. Fragmentation slows down the traffic flow and should be avoided as much as possible.

Dynamic Path Maximum Transmission Unit (MTU) Discovery ensures that the largest MTU size, or packet size, that can be sent without fragmentation between the server and client is used. This feature relieves the network equipment of the burden of fragmentation of video packets.

For example, ATM can use up to 9180 bytes per packet. If ATM is used to connect a VideoCharger to a switch, which in turn connects to an ATM client, the VideoCharger uses an MTU size of 9180 bytes per packet, which is very efficient. However, if ATM is connected to a router that then connects to Ethernet-based clients, the MTU size of 1500 bytes per packet is detected by the Dynamic Path MTU Discovery feature, and the server sends only packets of 1500 bytes, therefore, saving the router from having to fragment the video packets. The MTU size of 1500 bytes versus 9180 bytes consumes approximately double the amount of CPU on the Data Pump, but having the correct packet size sent from the server has a positive effect on the network equipment. Enabled by default, path MTU can be disabled using the `no` command. See Appendix C, "VideoCharger sizing on AIX" on page 219.

Unlike the VideoCharger for AIX, the VideoCharger for NT does not discover the optimal path MTU between the server and client. If the MTU of the

network equipment on the path between the server and client is smaller than the MTU supported by the client and server, packets are fragmented by the network equipment. To avoid fragmentation, set the MTU parameter for the network interface according to what MTU is supported on intervening network equipment.

Important: Setting the MTU size for the network interface affects all clients connected through the network interface. Setting the MTU size is not recommended when both of the following conditions are true:

- Most of the clients are connected through network equipment that supports a smaller MTU size than the server.
- The network equipment does not handle fragmentation efficiently.

If the client and server are connected to the same physical network and there is no intervening network equipment, the MTU size of the server must be set to a size that all of the clients on the local network can support.

3.3.4 Quality of Service (QoS) for IP networks

Traditionally, IP networks are not designed for continuous audio/video stream delivery. Imagine a distance learning application providing live video streaming of a lecture: both the video images and the voice must be delivered to the destination within a specific time. Usually, both the video and audio are encoded separately and the encoded data is sent out separately. At the receiving end, there must be some mechanism to do a proper ordering of the data received and also to synchronize both the image and the voice.

Also, IP networks work on a best-effort basis. There is no guaranteed bandwidth; the data can be delayed or lost along the transmission path. The idea of introducing QoS is to separate network traffic into different classes, and the network provides different treatment for this traffic. Mechanisms are introduced in the network devices to forward traffic based on different priorities so that important applications will be less affected by network congestion. It is important to note that for users to enjoy the benefit of QoS, it must be implemented end-to-end. That is, the application, operating system, and the network must have the ability to agree on a certain traffic contract.

Protocols and standards have been developed for delivery of isochronous data over IP networks. The following section introduces RTP and RSVP, which are supported by VideoCharger.

3.3.4.1 Real-Time Protocol (RTP)

Real-Time Protocol (RTP) provides the ability to make scenarios like the distance learning application possible. RTP makes use of UDP as its transport to provide for timely delivery of data, although, at the expense of reliability. RTP provides synchronization of media data through a timestamping mechanism, so that the receiver can play back the media data in the correct order.

The main job of RTP is to provide payload identification, sequence numbering of data, and time stamping.

The RTP protocol is usually associated with the Real-Time Control Protocol (RTCP). While RTP provides a way of transporting the multimedia data across the network, it does not have a feedback mechanism to tell the sender what is happening in the network. The RTCP augments the functions of RTP by providing a feedback mechanism about the quality of the RTP traffic. RTCP is responsible for providing sender and receiver reports that include information, such as statistics and packet counts. It uses a separate UDP port, usually one higher, than that of the RTP protocol.

3.3.4.2 Resource Reservation Protocol (RSVP)

Resource Reservation Protocol was developed by the IETF and is documented in RFC 2205. It enables an application to make a request to the network for a certain guaranteed service.

The request for service in RSVP is done dynamically and requires the routers in the network to participate. Rather than let the sender request for service, RSVP requires the receiver to initiate the request instead. The QoS of the connection between a sender and a receiver is made along each hop in the path from the receiver to the sender. A reservation consists of a set of parameters that determine the nature of the connection. The application must be enabled with RSVP capability so that the reservation can be made. IBM provides an additional capability whereby the router, such as the IBM 2212 Access Utility, can make the RSVP request on behalf of a non-RSVP-capable application.

3.4 Scalability

A VideoCharger server scales with the system it is running on. The number of concurrent streams can be improved by using a faster processor or adding more processors in case of an SMP system; using a faster disk subsystem; adding more network interfaces; or if the system bus is the bottleneck, using a system with multiple system busses. However, it is foreseeable that a single

system configuration has its limitations when it comes to high numbers of concurrent streams, high data rates, and a high level of user interactivity. Therefore, the VideoCharger architecture allows you to distribute the functional components to several machines. As illustrated in Figure 8, the components to be distributed are:

1. Presentation Formatter
2. Controller
3. Data Pump (one or more)
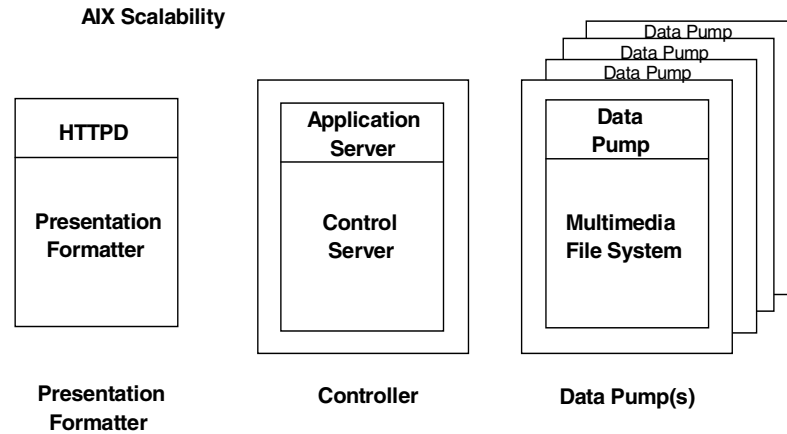
Figure 8. AIX scalability

Note: The multiple system option is only available on AIX.

Separating the Controller and Presentation Formatter Server onto different machines provides the following advantages:

- Each system can handle a higher transaction throughput.

- Response time is better if the Controller is driving multiple Data Pumps.

- The Presentation Formatter Server can process other HTTP protocol requests while the Controller and the Data Pump(s) focus on handling asset delivery.

The highest performance improvement is achieved by increasing the number of Data Pumps, the component which is responsible for the stream delivery. If multiple Data Pumps are available, stream delivery is load balanced across the configured Data Pumps. In addition, the use of multiple Data Pumps provides a higher level of availability.

Requirements: For the load balancing and overall management of the content to work properly, the content of the Data Pumps must be identical.

This means that each Data Pump must be configured with the same amount of disk space. The Content Manager insures that content loaded onto the VideoCharger is replicated across all Data Pumps. When an additional Data Pump is added to an existing VideoCharger complex, the system automatically "clones" the new Data Pump by replicating the content from an existing Data Pump.

The optimum configuration of a system depends on many factors, including:

- Number of users to be served simultaneously
- Level of user interactivity expected or required
- Cost
- Content Management requirements
- Other uses beyond serving video

3.4.1 Choosing the best configuration for your needs

The configuration with all components on one machine is obviously the most cost efficient. This system configuration could be used as a general purpose HTTP server with the added ability of serving a relatively small number of video streams. Controls are provided that will allow the system administrator to configure the system so that it can be used for general HTTP serving and other non-video related service, but still provide a sufficient quality of service.

A more powerful setup could be configured to have the Presentation Formatter and Controller on one system and a small number of Data Pumps (one or two) on separate systems to serve an environment with a relatively small level of interactivity and little non-video HTTP serving.

Select a completely distributed system, if there is a requirement for more Data Pumps, and you also expect to use the HTTP server heavily for non-video HTTP serving. This option allows each system to specialize on certain functionality.

3.5 Admission control, QoS

The delivery of multimedia traffic is very different from that of conventional data because of its reference to time. A common characteristic of conventional file servers is the best-effort service. When a conventional file server becomes overloaded, all users experience slower throughput and greater response time. For multimedia data, the server must deliver digitized video and/or audio data at a rate that allows it to be presented to the user in a smooth, continuous stream. Any significant delay by the server results in stream starvation, which appears to the user as an annoying interrupt in the

presentation. Stream starvation can be avoided by buffering data and/or underloading the server, but either of these alternatives can increase cost prohibitively. A video server differs from a conventional file server by incorporating an admission control mechanism to prevent overloading, and a scheduling mechanism to ensure that data is delivered in a continuous manner.

3.5.1 VideoCharger admission control

As shown in Figure 9, a VideoCharger complex can have multiple Data Pumps (only one on Windows NT), and a Data Pump controls a filesystem and one or more network interfaces.
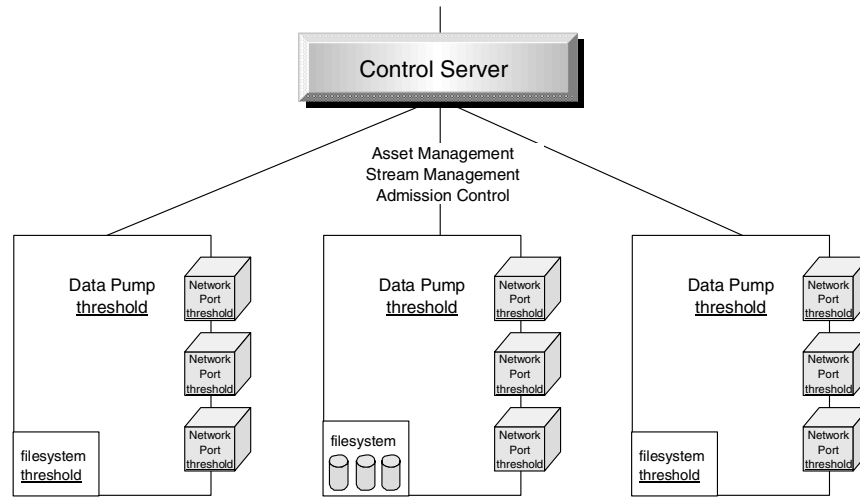
Figure 9. VideoCharger admission control

The Control Server performs admission control for three types of resources:

- Data Pumps
- Network interfaces
- Disk drives

These resources all have configurable thresholds to set their maximum usable bandwidth. Admission control prevents system overloading by monitoring the consumed bandwidth of every active stream, and as soon as any threshold is reached, incoming requests are rejected.

3.5.2 Admission control on AIX

For each port (network interface), an individual threshold can be set, which limits the bandwidth used for video streaming. Setting such a limit helps the system avoid overruns and overcommitting the capacity of the network adapter or downstream network capabilities. You can set bandwidth differently for each port, based on that port's function. For example, you might set the limit lower for a port that handles content load as well as play. You can also set this as a temporary limit under unusual circumstances.

A bandwidth limit can be set at the Data Pump level also. This threshold determines the maximum bandwidth of all ports configured for this Data Pump. Requests are rejected if either the threshold of the port or the Data Pump is reached, whichever comes first. If no Data Pump bandwidth threshold is set, bandwidth limitation is essentially turned off. However, other admission control factors (such as the stripe group or port bandwidth) take over at that point, so the system is never without some form of admission control.

If no port bandwidth limit is set, the bandwidth limit for the port is set to the nominal available bandwidth of the network interface, that is, 100 Mb/s for a Ethernet 100 adapter or 155 Mb/s for an ATM 155 adapter. VideoCharger attempts to configure it automatically for a number of different network adapters during initial system setup.

Note: The automatic configuration does not work reliably for all network adapters. Therefore, it is a good idea to check the automatically set port bandwidth, using the command `lsvsport`. Otherwise, it can lead to unexpected results.

For stripe groups, bandwidth is dynamically measured during configuration of the multimedia file system. The calibrated bandwidth of all the striped disks is used for admission control. For each filesystem, a performance group is created which holds the bandwidth settings. There are two percentages which can be manipulated.

1. The **maximum disk throughput percentage** is the percentage of possible disk bandwidth that can be used for all file system operations. (real-time + non real-time operations)

2. The **non-real-time throughput percentage** is the percentage of disk bandwidth available for non-real-time file system operations. This percentage represents a subset of the maximum throughput percentage.

The default for total maximum percentage of usable disk throughput is 90 percent for a performance group. The default for non-real-time operations is

five percent. So, by default, 85 percent of the total possible bandwidth for a performance group is reserved for real-time operations, and five percent of the total possible bandwidth for a performance group is reserved for non-real-time operations.

Recommendation: Always use 90 percent or less for the maximum disk throughput percentage. This will enable the file system to support brief instances of additional throughput when critically needed.

There are two main scenarios under which you would modify your bandwidth limit:

1. If the complex is serving more than multimedia, you can use bandwidth to dedicate a certain percentage of the server's processor to serving multimedia (as opposed to general HTTP serving). For example, if your system, configured as Option 1, were capable of delivering 60 Mb/s of video at maximum capacity, you might want to set the Data Pump bandwidth limit to 30 Mb/s. This would allow the system to serve 20 streams of 1.5 Mb/s MPEG-1, but still allow enough CPU cycles for other non-video related service (such as general purpose HTTP serving).

2. The second scenario involves determining bandwidth for a VideoCharger in a complex environment. For example, while a Data Pump can be capable of streaming data at 10 megabits per second (Mb/s), the Data Pump might connect to a router that is capable of only 1.5 Mb/s. In this case, you can either take the lowest common denominator or experiment to determine the maximum throughput of your configuration. In this configuration, you might set the port bandwidth limit to 3 Mb/s (or less) to prevent the outgoing video from overwhelming the router.

3.5.2.1 Changing your configuration

As your needs change, you must update your configuration. When you add an adapter for example, you must update your configuration to reflect the additional ports available.The HTML forms available through the VideoCharger home page allow you to update or alter the following components of the complex:

- Data Pumps
- Ports
- Stripe groups
- Application Server
- Asset Group Name

Or, you might want to temporarily change the non-real-time throughput of the performance group to perform content loading more rapidly.

Follow this procedure to change the throughput percentages of a performance group. Using `smit`:

1. Use the `smit mmfs` fast path to access the Multimedia File System menu.

2. Select File System Operations.

3. Select List/Change Attributes of a File System.

4. Select Change Attributes of a File System.

5. Click List, or enter the file system name, for example, `sg0`.

6. Click OK.

7. Enter information for the following fields:
   - Maximum Disk Throughput %
   - Non real time Throughput %

3.5.3 Admission control on Windows NT

The administrative interface Windows to admission control on Windows NT is the VideoCharger calibration Web page, which provides the following functions:

- Calibration
- Query/modify calibration data and thresholds
- Monitor CPU and memory usage

The Video Calibration page is illustrated in Figure 10.

Calibrate VideoCharger Resources

Use this form to tune disk, network, and system resource usage. All threshold values are percentages. The VideoCharger server must be stopped and restarted after any changes to disk or network resources.

[**Configuration and Administration** | **Help**]

Disk

Logical Drives	Bandwidth	Threshold	
C:	13449748	80	Update
D:	11666396	80	Update
E:	11729036	80	Update
	0	80	New Disk

Recalibrate all disks	Start Video Server	Stop Video Server

Display Video Server Status

Network

IP Address	Bandwidth	Threshold	Unicast MTU Multiplier	Multicast MTU	
9.112.16.156	16000000	40	1	1053	Update
	0	40	1	1053	New Interface

Recalibrate all network interfaces	Start Video Server	Stop Video Server

Display Video Server Status

System

CPU Usage	CPU Threshold	Memory Usage	Memory Threshold	Timer	
31	99	49	99	60	Update

[**Configuration and Administration** | **Help**]

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Figure 10. VideoCharger calibration page for Windows NT

At initial system setup the system is automatically calibrated. After every hardware configuration change, the calibration utility must be run to determine the characteristics of the disk, system and network resources. This information is stored in the Windows NT registry.

The admission control is performed by the control server for three types of resources:

- System (CPU, Memory)
- Network interfaces
- File system

These resources all have configurable thresholds to specify their maximum usable bandwidth. Admission control prevents system overloading by monitoring the consumed bandwidth of every active stream, and as soon as any threshold is reached, incoming requests are rejected.

By default, the following thresholds are set:

- System threshold 99%
- Disk threshold 80%
- Network threshold 40%

This means that the admission control refuses incoming requests if either CPU or memory utilization is 99 percent, the disk throughput reaches 80 percent of its calibrated bandwidth, or 40 percent of the nominal available network bandwidth is used. Admission control monitors the current system utilization constantly for the currently used disk, and only network bandwidth activities under VideoCharger control are taken into account. Therefore, those thresholds are set to allow higher safety margins.

3.6 Experiences with VideoCharger performance measurement

In the following section, we describe our experiences with setting up two entry level VideoCharger systems on Windows NT and AIX. We consider the performance we initially achieved, what we did to improve it, and what issues we came across. This will give you an impression of what you can expect from entry level, out-of-the-box, untuned systems.

3.6.1 Project description

We looked at two scenarios: VideoCharger Server for Windows NT, and for AIX. IBM VideoCharger Server 7.1 Service Level 4 was installed on a 450 MHz Pentium II system and on a 200 MHz Power3 system. We used the systems as they came, out-of-the-box, and did no system/hardware or

operating system tuning prior to installing VideoCharger. Two client systems had been set up to run VideoCharger Client Simulation Software. One extra machine was used as an actual client to watch for content delivery when needed. The maximum number of concurrent connections, CPU utilization, network, and disk throughput performance results were recorded.

3.6.2 Benchmark and metric description

The benchmarks were run using a client simulator, which is an internal development tool. A client simulator was installed on each client system simulating as many client connections as required. The workloads were stored video content, with the benchmarks requesting only Video on Demand distribution. There were two benchmarks that were used to simulate the two worst conditions:

- Each client accessing the same asset
- Each client accessing a different asset

The asset used for these tests was a 10 minute MPEG1 file at a bit rate of 1.5 Mb/s.

Each client initiated a request and waited for the entire video content to finish streaming. While streaming, the client simulator tracked and logged each client's reception of video data. After all the clients had received the requested asset, the client simulator calculated the statistics for each client stream, and that was then used to decide the quality of the video streams. The following metrics were examined on the client simulator for each client stream:

- A delayed response time to receive the video content. An acceptable delay was 2 seconds, since the clients buffered the data up to 8 seconds.

- A starvation time between packets received. An acceptable starvation time was 2 seconds.

- The maximum number of packets lost. An acceptable packet loss was less than 1 percent of total packets received.

The server performance was tracked using platform specific performance monitoring tools. The sampling interval was set to 5 seconds or greater, so it would not adversely affect the results. The following data was recorded:

- Maximum number of concurrent streams that were successfully streamed to the clients

- CPU utilization

- Network throughput

- Disk throughput
- Disk queue length

3.6.3 Scenario 1: VideoCharger for Windows NT

The numbers produced, and the comments made in this section, are based on a system with the configurations shown in Table 13.

Table 13. VideoCharger server

Model	Processor Type	Memory	Disk Drive	Network Adaptor
PC 300PL	Pentium II 450 MHz	128 MB	1x 3.1GB system 1x 6.4GB content EIDE	Ethernet 100 Mb/s

Refer to , "VideoCharger servers" on page 201 for our server configurations. As specified in the table above, one disk was used as the system disk for the operating system and paging space and the other disk for the content directory of VideoCharger.

To be more specific about the disk drive configuration, we should mention that the system disk was attached to the primary EIDE interface/controller and the content disk to the secondary EIDE channel. As we will see later, this had implications on the overall system performance.

Before the VideoCharger was started, the calibration tool was run to initialize the calibration data, which is used as a base for admission control. The calibration utility determines the characteristics of the disk, system, and network resources and stores the information for admission control.

The following system data was measured by the calibration tool:

- Disk calibration statistics
  - Disk write performance (MB/s): 3.46
  - Disk read performance (MB/s): 3.29
  - Disk threshold 80% (default)
- System calibration statistics
  - CPU usage: 10%
  - Memory usage: 27%
  - System threshold: 99% (default)

- Network calibration statistics
    - Maximum bandwidth: 100 Mb/s
    - Network threshold: 40% (default)

The results of the initial test runs are summarized in Table 14.

Table 14. Performance numbers, PC 300PL, one disk with admission control

Benchmark	Streams	%CPU	Disk(MB/s)	Disk queue	Net (MB/s)
Single Asset	6	38.9	1.26	0.39	1.26
Multiple Assets	7	33.6	1.07	0.38	1.07

For the next run, we set the admission control thresholds very high (99%), virtually turning off admission control, to find out the maximum number of streams the system can deliver. Another way to turn admission control off is to start the Control Server (CS) service with start-up parameter `-a of`. This is not recommended in a production environment, though. See Table 15.

Table 15. Performance numbers, PC 300PL, one disk without admission control

Benchmark	Streams	%CPU	Disk(MB/s)	Disk queue	Net (MB/s)
Single Asset	7	39.5	1.25	0.47	1.18
Multiple Assets	8	39.3	1.26	0.44	1.22

Looking at the results, it is not easy to see which component limits the maximum number of streams. The CPU utilization of 40 percent should be able to handle more streams and the network bandwidth is far from its maximum. Although, according to the calibrated disk bandwidth, the hard drive should be able to deliver more streams; we suspected the bottleneck there.

We changed the system configuration accordingly and added another hard drive. Now we had a system disk connected to primary EIDE channel and two drives identical in size and performance connected to the secondary channel. A stripe group was created for maximum performance and the VideoCharger configuration was updated to use the newly created filesystem as its content directory. (See the command `vsconfig`.)

The following disk performance values (see Table 16) were measured by the calibration tool:

- Write performance (MB/s): 3.6

• Read performance (MB/s): 4.1

Table 16. Performance numbers, PC 300PL, two disks with admission control

Benchmark	Streams	%CPU	Disk(MB/s)	Disk queue	Net (MB/s)
Single Asset	8	34.4	1.44	0.44	1.30
Multiple Assets	8	34.3	1.44	0.68	1.18

For the same reason as during the last test run, we turned admission control off to see what the system could deliver. See Table 17.

Table 17. Performance numbers, PC 300PL, two disks without admission control

Benchmark	Streams	%CPU	Disk(MB/s)	Disk queue	Net (MB/s)
Single Asset	12	54.4	2.16	0.80	2.14
Multiple Assets	14	64.4	2.52	1.78	2.51

Compared to the setup using only one disk, the maximum number of streams had doubled, but the bottleneck was still not obvious.

The relative high number of requests in the disk queue implies that the system is waiting for disk I/O. An average disk queue length of around 2 and higher implies that many requests cannot be serviced.

Modern disk drives are able to deliver a data rate much higher than 2.5 MB/s, especially if striped, so we decided to look at the EIDE interface. After some research, we found that Windows NT only supports DMA mode 0 and 2 with a maximum transfer rate of 4.2 MB/s and 16.6 MB/s, respectively. The DMA mode 2, which would give us a reasonable performance, is generally not supported on the secondary channel. With the two disks connected to the secondary channel, it seems reasonable that the EIDE interface limited the performance in our case.

Conclusion: For resource intensive video serving, do not use EIDE drives. If you need a high number of concurrent streams, use SCSI drives.

We have included some pre-configured systems of different sizes which are tested to deliver a given number of streams. See Appendix B, "Sample VideoCharger configurations" on page 205.

3.6.4 Scenario 2: VideoCharger for AIX

The system configuration that was used for Scenario 2 VideoCharger for AIX is described in Table 18. The initial system used to produce performance numbers for scenario 2 had two hard drives. One drive was used as the system disk, and the other drive was used to store the content.

Table 18. 43P configuration

Model	Processor Type	Memory	Disk Drive	Network Adaptor
43P-260	POWER3 200 MHz	512 GB	1x 9.1 GB system 1x 9.1 GB content Fast/Wide SCSI-2	Ethernet 100 Mb/s

Video Charger for AIX stores its content on a multimedia filesystem that requires at least one separate disk drive.

The procedures to create a multimedia filesystem are documented in the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871. For performance reasons, we recommend that you use a blocksize of 256 KB. Only use 32 KB, if you have low bit rate content (bit rate less than 1.0 Mb/s), since devoting 256 KB buffers to each low-speed stream wastes memory.

Before you create the multimedia filesystem, you should look at the filesystem memory requirement tables in Appendix C, "VideoCharger sizing on AIX" on page 219, which are extracted from the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871, for your convenience.

During the creation of the multimedia filesystem, the disk performance is measured. The calibrated bandwidth of all the striped disks is used for admission control. The file system throughput is defined by two percentages that you can control. The maximum disk throughput percentage is the percentage of possible disk bandwidth that can be used for all file system operations. The non-real-time throughput percentage is the percentage of disk bandwidth available for non-real-time file system operations. This percentage subsets the maximum throughput percentage. Therefore, if the maximum throughput percentage is 90 percent and the maximum non-real-time throughput is 5 percent, then the percentage of disk bandwidth available for real time file system operation is 85 percent (the default).

The following bandwidths were measured by the calibration tool:

- Calibrated bandwidth: 7805 KB/s

- Real-time bandwidth: 6634 KB/s

You can obtain those numbers by issuing the `qda` command.

Note: The real-time bandwidth is 85 percent of the calibrated bandwidth.

Table 19 shows the initial results using the specified configuration and settings:

Table 19. Performance numbers, RS/6000 43P, one disk

Benchmark	Streams	%CPU usr sys wio idle	Disk(MB/s)	Net (MB/s)
Single Asset	37	41 59 0 0	0.18	6.60
Multiple Assets	37	40 60 0 0	6.67	6.60

Note: Make sure that bandwidth limit of your Data Pump ports is adjusted to your network bandwidth. Otherwise, you might be surprised if your system only delivers a few streams. In our case, the port bandwidth, which limits the maximum used bandwidth per network adapter, was set by default to 9 Mb/s. You can check and update port bandwidth by using the commands `lsvsport` and `chvsport` respectively.

After we set the port bandwidth to 90 Mb/s for our 100 Mb/s Ethernet adapter, we got the expected number of streams.

If you look at Table 19, it becomes obvious that the transmitted data rate has reached the real-time bandwidth of the multimedia filesystem, at which point the admission control rejects additional streams. It is interesting that, in case of single asset access, the disk only reads with a data rate of 0.18 MB/s, which is equivalent to one stream at 1.5 Mb/s. This is a feature of the multimedia filesystem to optimize disk access. Additional incoming requests are rejected because the admission control calculates the data rate at a particular moment from the metadata of the individual instances of the asset, rather than from the disk load at this moment.

The distribution of the CPU cycles with a high percentage in user or system space and a low number of cycles spent waiting for I/O or idle usually implies a CPU-bound system. But here it only tells us that the VideoCharger application consumes all the CPU resources it can get. As soon as there are active streams, the combined system and user space CPU load is always at 100 percent, independent of the number of streams.

In this case, the number of streams delivered by the VideoCharger is limited by the bandwidth of the disk drive. To improve the total number of streams the

system can deliver, and to use the wide striping feature of the multimedia filesystem, another disk was added.

The procedure for adding a disk to an existing multimedia filesystem is explained in the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871.

After adding a disk, the filesystem is restriped to distribute data evenly across all disks. An extended down time is not required, because the restripe occurs while the system is running. This operation can be very time-consuming for large file systems. Plan on six minutes per gigabyte of assets (one hour per 10 GB). For example, it requires 50 hours to restripe 500 GB of assets using this procedure.

Note: Do not forget to remeasure the filesystem to update the calibrated and real time bandwidth.

The following bandwidths were measured by the calibration tool:

- Calibrated bandwidth: 14914 KB/s

- Real-time bandwidth: 12677KB/s

Running the benchmarks against the newly configured system, we achieved the results shown in Table 20.

Table 20. Performance numbers, RS/6000 43P, two disks

Benchmark	Streams	%CPU usr sys wio idle	Disk(MB/s)	Net (MB/s)
Single Asset	43	35 65 0 0	0.18	7.66
Multiple Assets	43	40 60 0 0	7.95	7.66

This time, the number of streams was not limited by admission control rejecting incoming requests. It was possible to get a maximum number of 57 streams connected to the server before admission control refused additional client connections. However, the stream statistics recorded by the client simulator (for example, number of packets lost, delay between packets) were quite high, indicating a poor steam quality. Reducing the number of client connections to get a satisfactory stream quality as specified in 3.6.2, "Benchmark and metric description" on page 70, produced a number of 43 successful streams.

From Table 20, you can see that the delivered data rate is below the real time bandwidth of the filesystem. This suggests that the bottleneck this time is not the disk subsystem.

While the benchmarks were running, we noticed an increasing number of collisions at the Ethernet Hub. If you look at the total transmitted bandwidth, you will find that 43 streams at 1.5 Mb/s approach a network utilization of over 60 percent. It is a fact that the performance degrades as Ethernet approaches a utilization of 60 to 70 percent.

The conclusion was that, this time, the number of concurrent streams was limited due to the network topology. To further improve the maximum number of streams delivered by the VideoCharger server, it would be necessary to change the network topology. This could be done by adding more network adapters to the server and splitting up the network into several smaller segments, or using switched Ethernet.

Further testing, disregarding the network collisions, showed that the system was able to deliver 57 streams. Changing the bandwidth limit of the Data Pump from 90 Mb/s to 100 Mb/s gave us 66 streams.

We have included some pre-configured systems of different sizes which are tested to deliver a given number of streams. See Appendix B, "Sample VideoCharger configurations" on page 205.

3.7 Summary of performance results

Figure 11 summarizes the number of streams you can expect to achieve at around 60 percent CPU usage on various systems.

Anticipated Number of Streams at 60% CPU Usage

Streams

(@ MPEG1 1.5 Mbps)

△ 627 streams

600

△ 464 streams

400

200

△ 135 streams

△ 46 streams

△ 12 streams

Pentium 450MHz   1-Way Xeon   4-Way F50   8-Way S70A   12-Way S70A

CPU
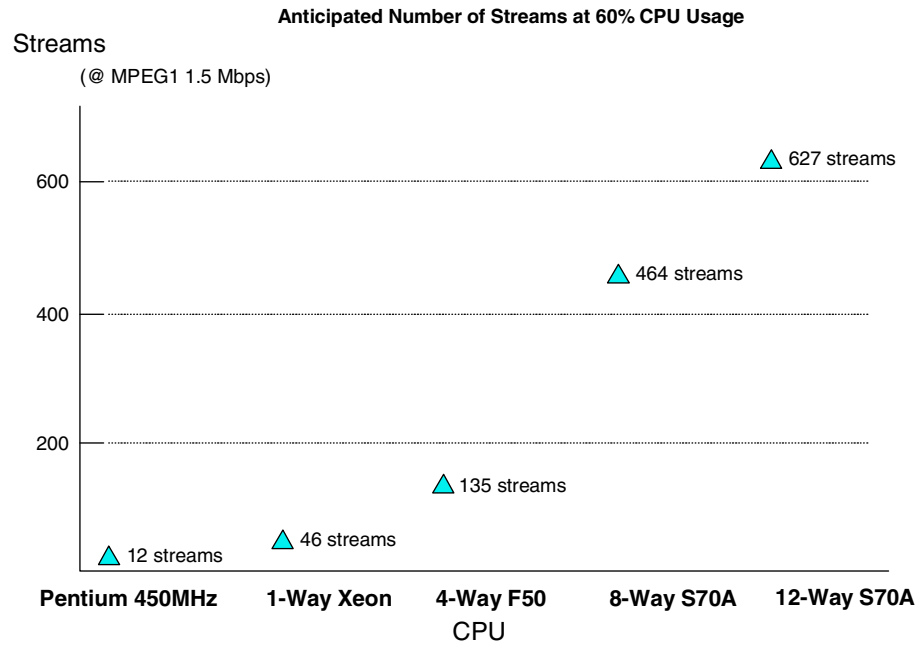
Figure 11. Anticipated number of streams

Xeon server configuration

Table 21 is a summary of the Xeon configuration.

Table 21. Xeon server configuration

Model	CUP	Memory	Disk	Network Adapter	NT Version
Netfinity7000 M10	Xeon 450 MHz	2GB	5 ultra SCSI RAID 5	3 x 100 Mbps Ethernet	Windows NT V4.0 + SP6

AIX F50 server configuration

Table 22 is a summary of the AIX F50 server configuration.

Table 22. AIX F50 server configuration

Model	CUP	Memory	Disk	Network Adapter	AIX Version
RISC System/6000 4-way F50-025	604e-166 MHz	1GB	14 Disks, 4 loops in 2 SSA adapters(160 Mbps each)	3 x 155 Mbps ATM	AIX 4.3.3

Note: MMFS Disk Bandwidth is:

- Calibrated Bandwidth = **70,038 x 1024** Bytes/sec

- Realtime Bandwidth = **59,532 x 1024** Bytes/sec

AIX S70A server configuration

Table 23 is a summary of the AIX S70A server configuration.

Table 23. AIX S70A server configuration

Model	CUP	Memory	Disk	Network Adapter	AIX Version
RISC System/6000 12-way S70A	262 MHz	32 GB	33 Disks(7.2k rpm, 40 Mbps for SSA160), 9 SSA adapters(160 Mbps each)	8 x 155 Mbps ATM	AIX 4.3.3

Note: MMFS Disk Bandwidth is:

- Calibrated Bandwidth = **184,653 x 1024** Bytes/sec

- Realtime Bandwidth = **156,940 x 1024** Bytes/sec

3.8 Summary

Video serving is a very resource-intensive application. We hope that we have shown that setting up an infrastructure for video delivery is not a trivial task. We want to emphasize the importance of planning a VideoCharger complex

and network infrastructure. Therefore, look at the individual subsystems like disk and network, and do the math to calculate what they can deliver before you attempt to implement your solution.

Recommendations for high bit rate stream delivery (> 1 Mb/s)

- Critical resources are usually disk subsystem or network.

- For high numbers of streams (> 100), consider using SMP.

- For even higher numbers of streams (> 300), consider using the high scalability architecture on AIX platforms, and distribute the components.

Keep in mind that the numbers given in this chapter were produced using client simulator software. The tests differ from real client environments to the extent that no user interactivity, such as pause or rewind of individual video streams, was taken into account. In addition, a different codepath was used. A real user would, for example, go through the process of searching for available assets, selecting and then playing. The client simulator skips all of that and directly starts playing an asset. Also, we used a controlled network environment dedicated only to doing the tests.

3.9 Don't forget about the hubs

In fact, here we will reprint the paragraph from 3.1, "Overview" on page 43, so that you won't forget about the hubs.

One important factor that you have to take into consideration is the use of hubs in your network. We discovered that using a hub in a VideoCharger network reduces the throughput by approximately 90 percent. Yes, 90%. Our recommendation is to use switches.

Chapter 4. VideoCharger integration with Content Manager

In this chapter, we explain how to integrate VideoCharger with Content Manager 7.1 systems. We will discuss three scenarios: (1) a new VideoCharger and new Content Manager installation, (2) an existing Content Manager installation and new VideoCharger installation, and (3) switching an existing Content Manager system to use a different VideoCharger server. In our scenarios, our Content Manager system was on Windows NT; however, a brief section is included on the differences for a Content Manager AIX system.

4.1 Introduction

If you also have to manage other types of assets, such as scanned documents, photographs, text or presentation files, you may want to consider a Content Manager/VideoCharger installation. IBM's Content Manager is a powerful, scalable asset management system. It has a triangular architecture separating the search functions from the store and retrieve functions. When these two products are integrated, the VideoCharger server becomes another object server to the Content Manager system.

Figure 12 shows the way the assets flow. The following sections provide some simple steps you can use to create a complete asset management system that can manage store-and-forward types of objects as well as streamed objects. We also discuss three powerful search engines that can help you locate your assets: a typical parametric search using the power of DB2, a full text search using IBM's Advanced Text Search engine, and an image search engine using IBM's QBIC (Query by Image Content) server.
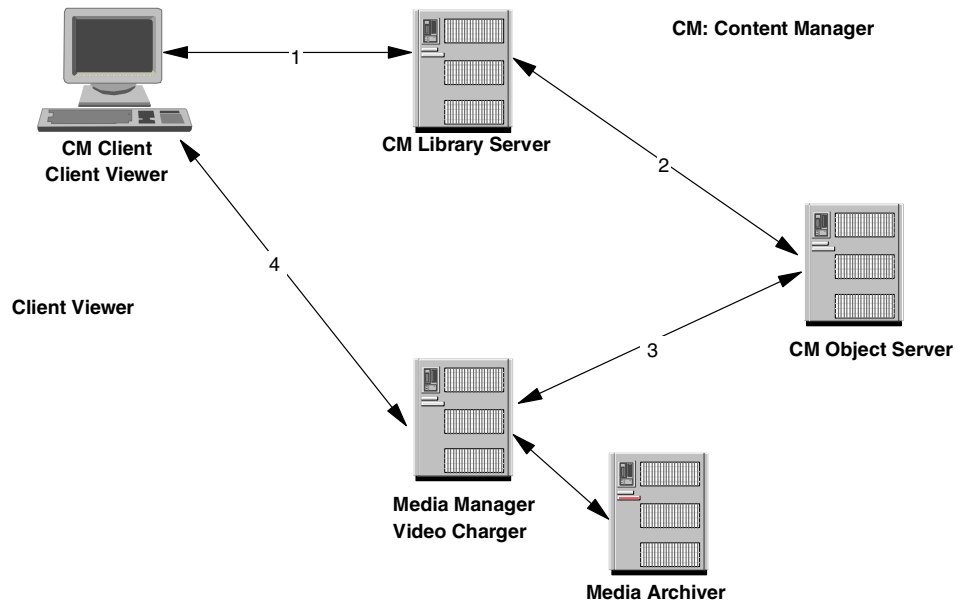
Figure 12. Content Manager/VideoCharger flow

As shown in the diagram in Figure 12, assets are queried by the client through the library server. When the search has been refined and the client decides to view a particular asset, the request is passed from the library server to the object server. If this is a streamed asset, there is an entry in the Content Manager object server (base_objects_media table) indicating that it is a streamed object. The actual object is stored on the VideoCharger server. The Content Manager object server would pass the asset name to the media manager component of the VideoCharger server. The VideoCharger server then dynamically generates the metafile, which is passed to the client viewer. Then the client viewer plays the object.

The correlation of object servers to VideoChargers is one VideoCharger per object server. However, each object server in your configuration can be linked to a different VideoCharger server. One VideoCharger server can support multiple object servers. See Figure 13 for supported and unsupported configurations. The configuration you would install depends on the type of environment, location of assets, and expected streams and corresponding rates. In a configuration connecting a single object server to multiple VideoCharger servers, the first performance bottleneck encountered would be the single object server. If such a bottleneck were to occur, you could increase your throughput by adding a second object server.

| Supported Configuration | Supported Configuration | Unsupported Configuration |
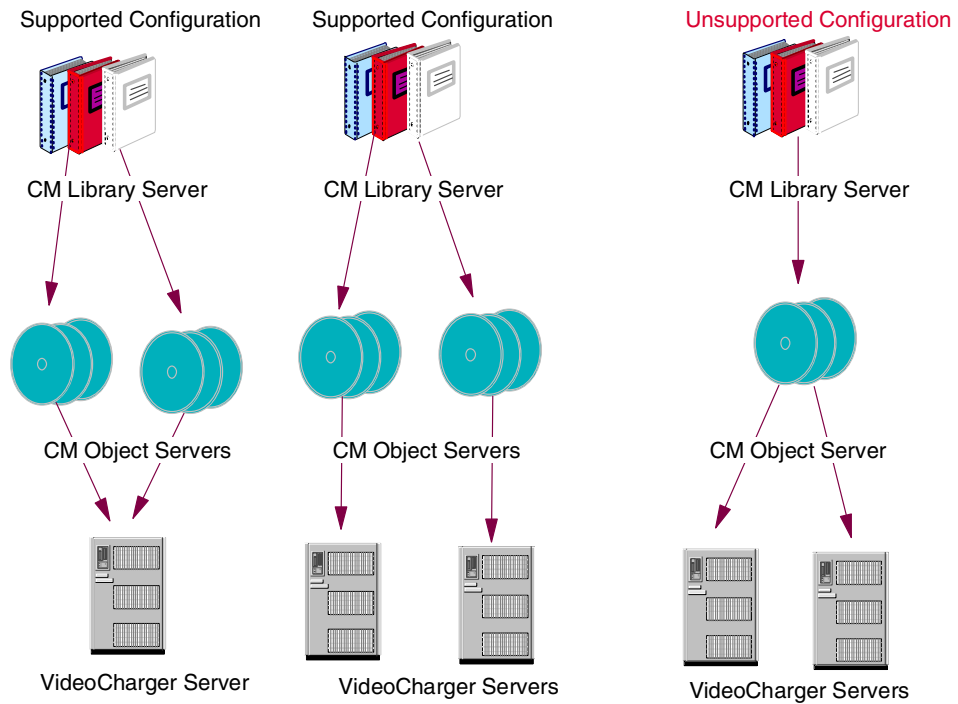
Figure 13. Supported CM/VC configurations

For those of you who understand the structure of the Content Manager object server tables, you know that when you load one part of a store-and-forward object, you will get one row in the base_objects table, and there will be a corresponding file in the staging directory. When you load a streamed part (denoted by content type 209 -- IBM VSS), you will get one row in the base_objects_media table, and no files in the staging directory. The corresponding file is on the VideoCharger server.

4.2 New VideoCharger and Content Manager installation

1. The first task is to install your VideoCharger Server. See 2.3.9, "Quick install guide of VideoCharger for NT" on page 35 for details. As recommended for a quick and easy install/configuration, install the VideoCharger code from the CD-ROM. The latest fixes can be downloaded from:

   ```
   ftp://ftp.software.ibm.com/ps/products/videocharger/fixes/
   ```

2. Install the VideoCharger player or QuickTime player on your client machine as well. Validate that you have a successful installation of VideoCharger and can load and play videos.

3. Now go to your Content Manager 7.1 Windows machine. It needs to be running Windows NT Server V4.0, with service pack 5, or later, or Windows 2000. We used Service Level 6 for this test. If this is your first Content Manager installation, to quickly validate the integration with VC, do not install the QBIC (Query by Image Content) server or the Text Search Server at this time. They can always be installed later.

4. Pay close attention to the object server screens. Since we have already installed VideoCharger and we know we want it integrated with Content Manager, be sure to check the box during installation to **"Do you want to enable the Media Object Feature?"**. See Figure 14.
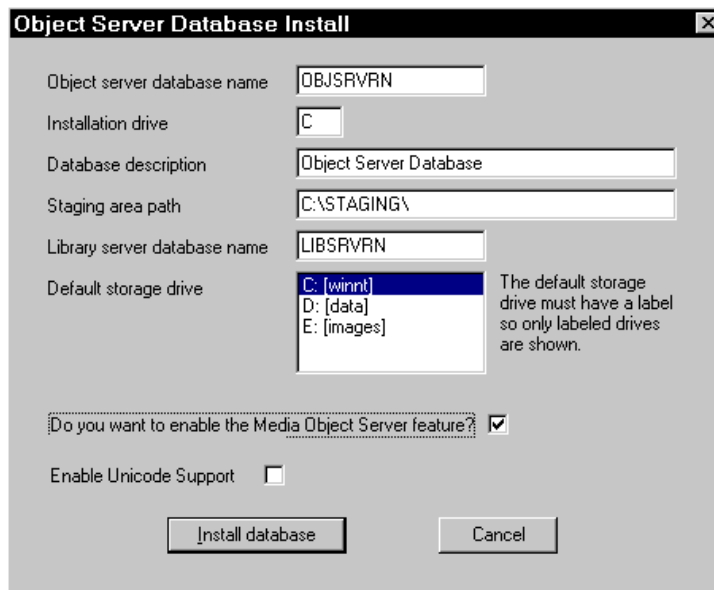
Figure 14. Object server database install

5. Continue with the Content Manager install, following the *Planning and Installing Content Manager*, GC27-0864, for a proper installation. We recommend starting with a standalone machine to quickly validate this test. Install library server, object server, client, and system administration on one machine. For this initial installation, take all the defaults.

Tips:

- Did you raise the paging space as recommended?

- Make sure you are logged in as a Windows administrator when performing the tasks.

6. Once the installation has completed, reboot the system.

7. Once the system is up and running, we need to run a utility to add the media manager stanza to the Content Manager network table. At this time, this stanza is not added automatically by the install program. Go to **Start** > **Programs** > **IBM Content Manager for Multiplatforms** > **Utilities** > **Network Table Generation** (or enter `frnnlinc`), and enter and select values at the Network Table Utility program. See Figure 15.

   a. Go to **Menu** > **Action** > **Add** to add new server entry.

   b. For select Server Type, select **Media Manager**.

   c. Assuming that you installed the VideoCharger Server on a different machine, select **Remote** in Location.

   d. Assuming that you installed the VideoCharger Server for Windows version, select **NT** in Platform.

   e. Enter name of Media Manager server - `MMSRVRN`.

   f. For input Port, enter `23793,` assuming that 23793 is the default port.

   g. For input hostname/IP address, enter your VideoCharger host name.

   h. For select Active Directory, select **No**. (Assuming that you do not use Active Directory.)

   i. Click **OK** to exit.
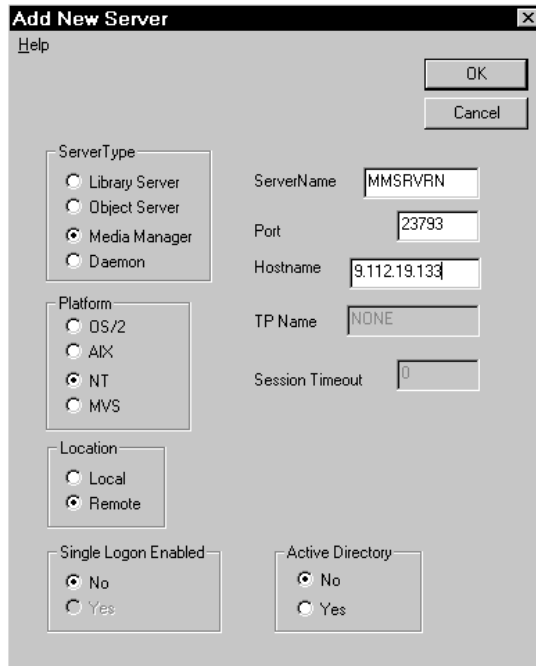
Figure 15. Add media manager to network table

Attention: If the port assigned to media manager is already in use, you can change the port number in the Windows registry by completing the following steps (see Figure 16):

    i.   Click **Start > Run**. The window opens.

    ii. In the **Open** field, type **regedit**.

    iii. Click **OK**, the Registry Editor opens.

    iv. Double-click **HKEY_LOCAL_MACHINE** > **SOFTWARE** > **IBM** > **LANTV** > **Current Version** > **MediaManagerPort**. The value set windows opens.

    v. Click on the **Decimal Base**.

    vi. Type in the new port number value.

    vii. Click **OK** to save changes and exit.
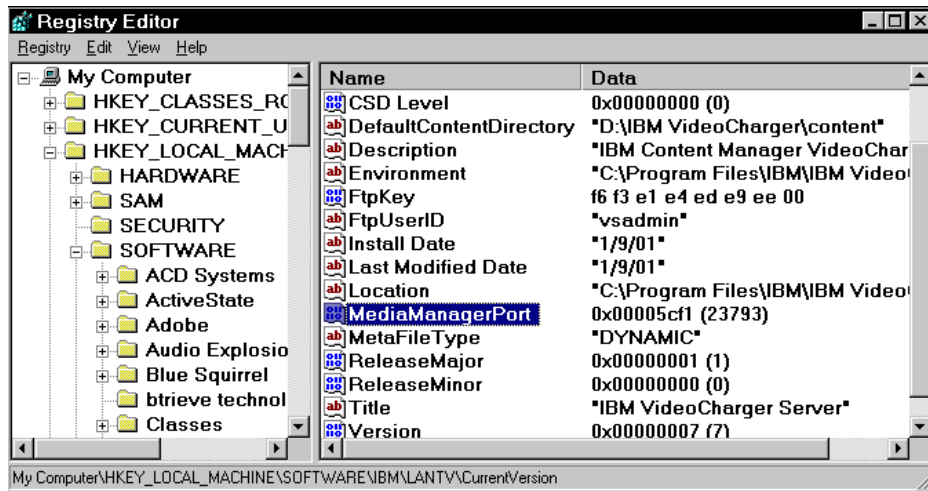
Figure 16. Port assigned to media manager

Now we can start the Content Manager system and validate it. The first step will be to start the servers. Since we enabled the object server for media, the VideoCharger server must be started in order for the object server to start. You can start the VideoCharger services by opening the VideoCharger machine command line prompt and enter `vsstart` command.

8. Now, let us start the Content Manager servers one at a time. First, start the library server. Go to **Start** > **Settings** > **Control Panel**. Double-click **Services**, and select **CM Library Server (LIBSRVRN)** and click **Start**. It will take several minutes the first time you start the library server, as it has to create several DLLs. You will know it is started by the **Started** status you will see in **Services** menu.

9. Start the Content Manager object server. **Start** > **Settings** > **Control Panel**. Double-click **Services**, and select **CM Object Server (OBJSRVRN)** and click **Start**. The same status **Started** should also appear when it has started. If not, you will have to check the error log to determine the reason. Content Manager errors are logged in a file that you will find on the server drive. For example, see Figure 17. (This example is automatic start.)
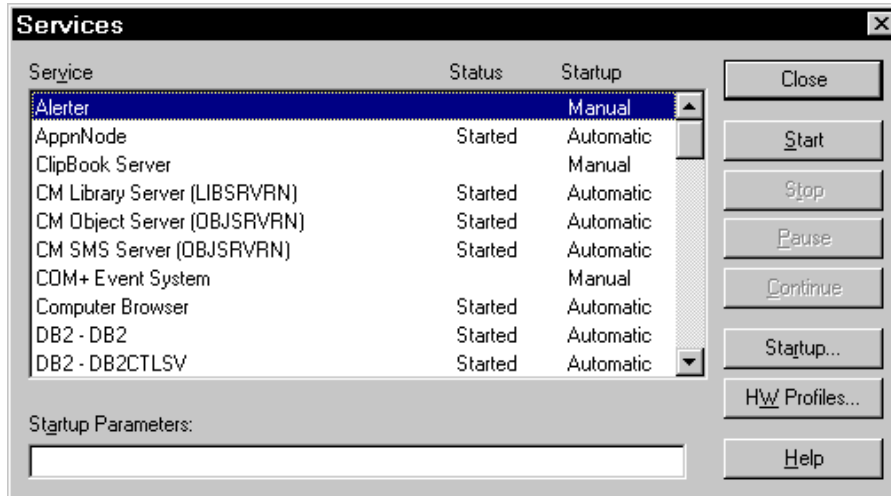
Figure 17. Content Manager services

Go to the **\%FRNROOT%\Log** subdirectory. Using notepad, open the file named **frndiag.log**. This files contains all the errors from all components of the Content Manager system. The latest errors will be appended to the bottom of the file. Go to the bottom and look for the timestamp that coincides with the failure of the object server to open. There may be more than one stanza or error. Along with an error code that will begin '**FRN**xxxx' followed by four numbers, there may be some information that describes the type of failure.

The most common failure is that the VideoCharger server was not running when you attempted to start the object server, or the stanza that had to be added to the network table was not done, or has an error. If this is not the case, using the **FRN**xxxx error code, refer to *IBM Content Manager for Multiplatforms: Messages and Codes Version 7.1*, SC27-0870 (`http://www-4.ibm.com/software/data/cm/pubs/cm71/cmmc/cmmc.pdf`), to get more information about why the failure occurred. We cannot proceed until the object server is started. If you cannot find the problem, call your IBM Technical Support Line for assistance.

10.In order to validate that the Content Manager system is working correctly, we always run two tests: (1) add an index class; this will validate that your library system is operating correctly and can access the necessary files from the compiler and database you installed, and (2) load and view objects. This will validate that the communication between our "triangle" is complete (library server, object server, and client).

11. Go into **System Administration** to create the index class. Go to **Start** >
    Programs > **IBM Content Manager for Multiplatforms** > **System Admin**
    Client. Use the default userid of `frnadmin` and the default password of
    `password`, for example, see Figure 18:
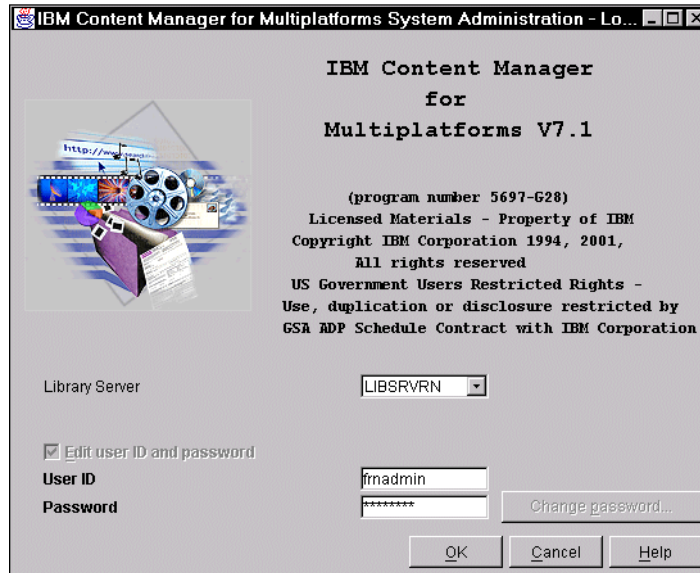
Figure 18. System administration login window

12. Since this is the first time we accessed the library server, it asks us to
    validate our licenses. We can easily take care of this. Once the sysadmin
    window opens, go to the **license** item on the menu bar. Click on the
    update licenses to validate licenses. Enter in a number of users. Close
    the window.

13. Now click the plus sign in front of your library server. Open the **Fileroom**
    icon. Right-click on **Index Classes**, then left-click on **new**. Create a text
    index class with a few attributes. Click **OK**. Wait a few moments for the
    index class to be created. Now open it. If you can open it successfully,
    then the creation was a success. For example, see Figure 19.
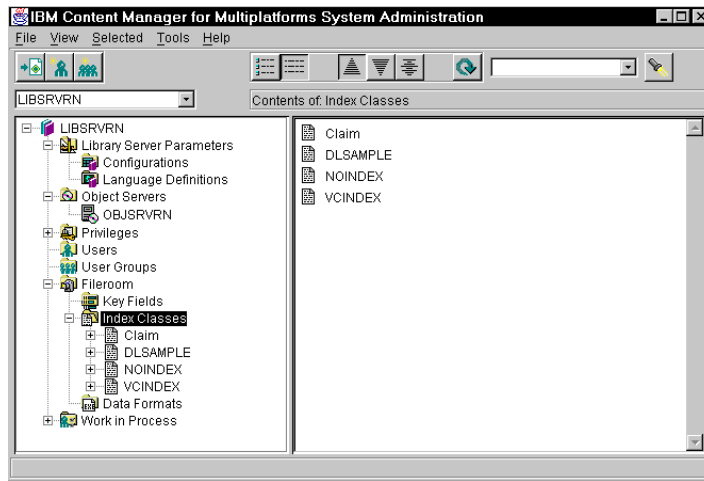
Figure 19. Index classes in library server

If you have any errors, you need to correct this prior to continuing. The most common error is that the compiler variables did not get set correctly and associated to the userid that you used when you logged on to Windows NT.

Attention: The user who starts Content Manager services (both library server and object server), should be a Windows *Administrator*. Also, the `PATH`, `INCLUDE` and `LIB` values defined for Microsoft Visual C++ compiler and DB2 or Oracle must be moved from the user level to the system level.

If you believe that your compiler variables are incorrect, a quick way to determine this is to go to a **C:** prompt. Type `cl`. This is the executable file used to compile code. It should be recognized by the operating system. If it is not, then you must fix your compiler variable problem. Depending on the compiler version you use, the variables are different. For details on the proper variables, refer back to:

- *IBM Content Manager for Multiplatforms: Messages and Codes Version 7.1*, SC27-0870, at:
  `http://www-4.ibm.com/software/data/cm/pubs/cm71/cmmc/cmmc.pdf`

14.In order to validate that the Media Manager system is working correctly, check the Media Server properties. From the System Administration Client window, click **LIBSRVRN** > **Object Servers** > **OBJSRVRN** > **Media Server**, and make sure that **Size** is active. For example, see Figure 20.
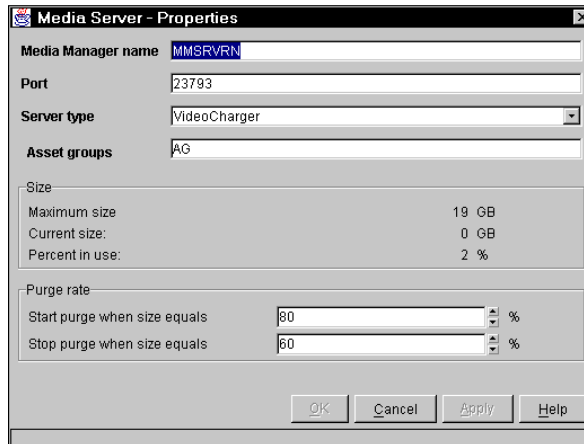
Figure 20. Media server properties

15. To stream media objects from Content Manager, you must first load them onto the VideoCharger Server. You can then stream the object by clicking on its 16-character filename in the VideoCharger **Searching?** page, or by playing the metadata file directly from the client. Content Manager provides a sample application called Media Client in Content Manager 7.1 and Content Manager 6.1 (with the latest service pack). Their locations are:

> **AIX**: `/win/samples/mclient/mclientx.c`

> **Windows**: `\win\samples\mclient\mclientn.c`

16. First, insert the Content Manager CD-ROM and copy `readme.txt`, `load.txt`, `mclient.h`, `mclient.in` and `mclientx.c` (for AIX) or `mclientn.c` (for Windows) from `win\sample\mclient\` into a local directory on your Content Manager client.

Make sure to define the operating system in your compiler settings. Define **FRN_WIN** for Windows, and **FRN_AIX** and **AIX** for AIX. For example, in the Microsoft Visual C++ compiler, you would select **Project** > **Settings** > **C/C++** and add, **FRN_WINNT** in the Preprocessor definitions field.

Finally, Media Client requires header and library files from Content Manager. You can either set your path to specify `%FRNROOT%\INCLUDE` and `%FRNROOT%\LIB`, or copy the following files to the directory where you stored mclient:

```
[Header files]
frnolmla.h, frnperr.h, frnpfo.h, frnplldf.h, frnp.h, frnpfi.h,
frnplcli.h, frnptype.h, frnpcapi.h, frnpfi2, frnplibc.h, frnpvars.h
```

```
[Library files]
frnwfi.lib, frnwfi2.lib, frnwfo.lib
```

17. After compiling Media Client, you must configure it to match your VideoCharger system specifications:

   a. From Content Manager CD-ROM, `load.txt` and `mclient.in` into a local directory on your Content Manager client.

   b. Compile the `mclientx.c` (AIX), or `mclientn.c` (Windows) file.

   c. Open `mclient.in` and edit the default text to match your VideoCharger system configuration:

   UserId Password 0 load.txt 2 asset1 MPEG1 SIF NTSC SYSTEM 0 20 30 46
   2900 1536000 1 *FTPhostname FTPuserId FTPpassword*

   You only need to specify:

   - *UserId* (Library server user ID, for example, `frnadmin`)
   - *Password* (Library server user's password)
   - *FTPhostname* (host name where media file (video file) exists for FTP)
   - *FTPuserId* (FTP user ID for host name), and
   - *FTPpassword* (FTP user password).

   Leave the other values at their defaults.

18. You are using a valid ftp server that will work with VideoCharger server. Microsoft ftp service for Windows NT V4.0 server with Service Level 5 will work. However, Microsoft ftp service for Windows NT V4.0 Workstation with Service Level 5 **will not** work. The ftp service that comes on the Windows NT Workstation Option Pack is fine.
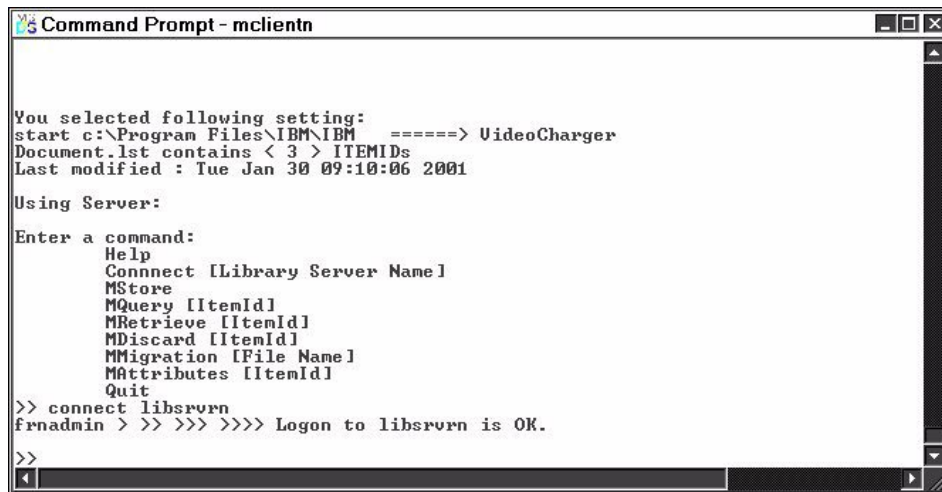
   You can also use War ftp service, Hummingbird's ftp service (`http://www.hummingbird.com/products/nc/ftp/index.html`), or another ftp service. In our tests, we used War ftp service, Beta 1.70, Release 4, as well as the MS ftp server on the NT Server.

19. The userid you authorized to ftp must have access as part of operating system user rights. You have created an alias or defined directories to your ftp service where your assets are stored.

20. To ensure that the VideoCharger server will work with the ftp service you set up, open a Web browser and enter the URL for VideoCharger administration:

```
http://<servername>/vs_admin
```

Log in and go to **Content Management**. Use this interface to load an asset from the remote server. If this is successful, then your ftp server is set up correctly.

21. To stream media objects using mclient:

   a. Start the VideoCharger Server.

   b. Start the Content Manager library and object servers.

   c. Login to the System Administration Client application using default user ID, `frnadmin`, and password, `password`.

   d. Run `mclientx.exe` for AIX; or `mclientn.exe` for Windows.

   e. At a command prompt, enter `connect libsrvrn` to connect to library server. For example, see Figure 21:

Figure 21. Connect to library server

   f. Open `load.txt` file and specify the location of the assets you want. For example: In the case of following example, `sample15.mpg` file exists on ftp root on *FTPhostname* in `mclient.in` file.

```
sample15.mpg
```

   g. Enter `ms` (Media Store) to store a media object in VideoCharger. For a successful storage, the following message appears. For example, see Figure 22.

```
Command Prompt - mclientn                                        _ □ X
Using Server: libsrvrn

Enter a command:
        Help
        Connnect [Library Server Name]
        MStore
        MQuery [ItemId]
        MRetrieve [ItemId]
        MDiscard [ItemId]
        MMigration [File Name]
        MAttributes [ItemId]
        Quit
>> ms
***** Create Item *****
...........................................................
Create successful!
New ItemID          = GETLP4HOWXH5$$6O
New FRN$MEDIA ItemID = Q2S9YQ82WPI6@@7P
Item ID: is stored :::>>> 1  in .\document.lst file
...........................................................

>>
```

Figure 22. Media Store to store media object in VideoCharger

In addition, output appears in a local file, `document.lst`.

```
INDEX#:      ITEM_ID           MEDIA_ITEM_ID       TIME_STAMP
-------      ---------------   ---------------     ---------------
      1      GETLP4HOWXH5$$6O  Q2S9YQ82WPI6@@7P
```

If you specified multiple assets in `load.txt`, mclient groups them into one continuous stream and assigns one item ID for them. To store another asset group, edit `load.txt` again and enter `ms`. The mclient program then creates an item ID for the new asset group and appends it to `document.lst`:

```
INDEX#:      ITEM_ID           MEDIA_ITEM_ID       TIME_STAMP
-------      ---------------   ---------------     ---------------
      1      GETLP4HOWXH5$$6O  Q2S9YQ82WPI6@@7P
      2      GHWIC905d$xd9200  WCK098YQ82WPI@7P
```

h. To verify whether the load completed, enter `mq` *INDEX#* (Media Query) where *INDEX#* represents the index number that corresponds with the asset in the Media Store output.

- If MediaState is **1**, load in process, then wait a few more minutes for the FTP to finish.

- If MediaState is **2**, the load completed and you can continue to the next step.

- If MediaState is **3**, load failed, then consult the server logs for error messages.

For example, see Figure 23.


```
Command Prompt - mclientn                                              _ □ ✕
>> mq 1

********************************************************************
ulPartNo:                  1
lMediaState:               2
ulInvalidCommands:         20
ulMediaDurSeconds:         121
ulMediaDurFrames:          14
ulMediaFrameRate:          1106231951
ulMediaBitRate:            600000
ulCopyRate:                0
lNumUsers:                 1
szItemID:                  GETLP4HOWXH5$$6O
chRepType:                 FRN$NULL
szTimeStamp:               2001-01-31-09.13.26.890000
szMediaType:               MPEG1
szMediaResolution:         SIF
szMediaStandard:           NTSC
szMediaFormat:             SYSTEM
szAssetGroupName:          asset1
szReserved1:
szReserved2:
********************************************************************

Object Ok

>>
```

Figure 23. Media query output

22.If your load was completed, we can now end our verification by playing back the video. You can play the asset in one of two ways:

- Locate the 16-character item_id in your VideoCharger **Searching?** Web page and click on the asset to automatically play it in the VideoCharger Player. Remember that you must have a VideoCharger Player installed for this to work. The VideoCharger Searching URL is (see Figure 24):

      http://<servername>/lantv/cgi-bin/iscpfhom.exe
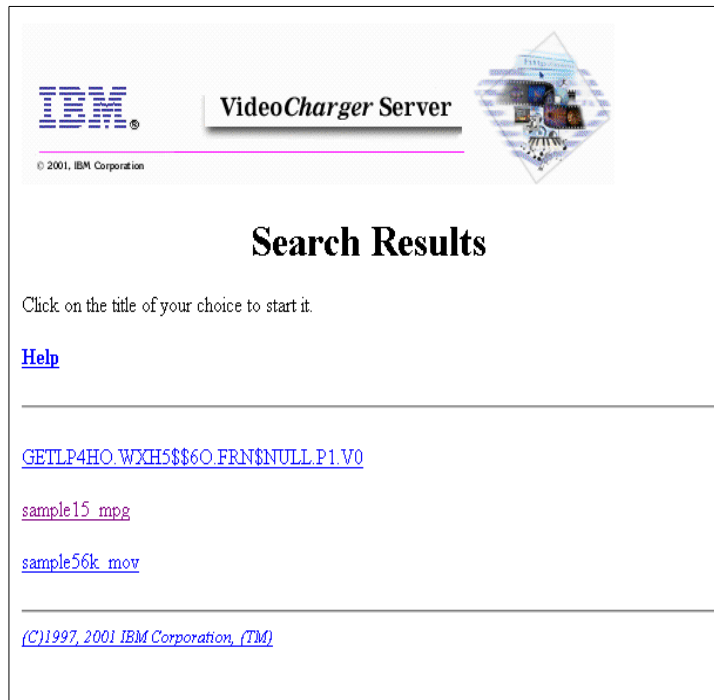
Figure 24. VideoCharger search results

- Enter `mr INDEX#` to create a local metadata file (the default is view.tmp). Select one of the following:

  GET_IT: Saves a metadata file locally to stream from the VideoCharger Server.

  STAGE_IT: Stages asset from the Multimedia Archive if the asset is not on the VideoCharger Server, and saves a metadata file locally to stream from the VideoCharger Server.

  STAGE_IT_PREFETCH: Stages asset from the Multimedia Archive if the asset is not on the VideoCharger Server.

  Play the asset by opening the newly created metadata file in the Player. The metadata file tells the Player how to locate and play the asset or asset group.

  To play the asset from the metafile (view.tmp), for example, (assuming that the VideoCharger Player was installed on "`c:\Program Files\IBM\IBM VideoCharger Player\`" directory) enter the following command at the command prompt:

```
"c:\Program Files\IBM\IBM VideoCharger Player\iscview.exe"
veiw.tmp
```

You can create your own client loader application to store and play
assets through Content Manager. You can find sample codes for
adding media parts in the `%FRNROOT%\SAMPLES` (Windows) or
`$FRNROOT/SAMPLES`(AIX) directory of any machine where you
installed the Content Manager client toolkit. For example, the file
`Java\txdoAddVs.java` shows how to add a media part using the
Java API; `ACTIVEX\xdoMedia.frm` shows how to add a media part
using the ActiveX API. For more detail, refer to the *IBM VideoCharger
Programmer's Reference,* SC27-0872.

4.3 Adding VideoCharger to an existing Content Manager system (NT)

What if you have had Content Manager installed for several months, and now
you want to integrate it with VideoCharger? This is also quite simple to do.
We already know you have a working Content Manager System. So, step one
would be to install VideoCharger on another machine. Follow the quick install
instructions in 2.3.9, "Quick install guide of VideoCharger for NT" on page 35
of this book to install VideoCharger. Since we will want to play videos from
our Content Manager client, we need to install the VideoCharger player on
the Content Manager clients. Also, we have to ensure that a proper and
operational ftp server is running on the Content Manager client/s that will be
loading the videos.

In order to have ftp streamed assets go to a VideoCharger server, validate
that the following has been done:

- You are using a valid ftp server that will work with the VideoCharger
  server. Microsoft ftp service for Windows NT V4.0 Server with Service
  Level 6 will work.

- Microsoft ftp service for Windows NT V4.0 Workstation with Service Level
  5 *will not* work.

- However, the ftp service that comes on the Windows NT Workstation
  Option Pack is fine. Or you can use either Hummingbird's ftp service
  (`http://www.hummingbird.com/products/nc/ftp/index.html`), War ftp service,
  or another ftp service. (In our tests, we used War ftp Service, Beta 1.70,
  Release 4) as well as the MS ftp server on NT Server.

- Whichever userid you authorized to ftp must have access as part of the
  operating system user rights.

- You have created alias or defined directories to your ftp server where your assets are stored.

To ensure that the Videocharger server will work with the ftp service you set up, open a Web browser and enter the URL for VideoCharger administration:

```
http://<servername>/vs_admin
```

Log in and go to **Content Management**. Use this interface to load an asset from a remote server. If this is successful, then your ftp server is set up correctly.

1. We will need to "enable" our object server as a media object server. This requires changing some flags in the object server database tables that indicate that this server is a media object server. Content Manager has a utility to help us do this. On your object server, go to the **\%FRNROOT%** subdirectory. From here, open a DB2 command window: DB2CMD. In this window, issue the utility: FRNMEDB2 <objservername>. This would be your object server database name. You will see a connection to DB2 and some commands being run followed by a successful statement.

2. Next, we must add the media manager stanza to the network table, as in Step 7. on page 85, from a new install. It is repeated here for your convenience. At this time, this stanza is not added automatically by the install program. Go to **Start** > **Programs** > **IBM Content Manager for Multiplatforms** > **Utilities** > **Network Table Generatation**. Enter and select values at the Network Table Utility program:

   a. Go to **Menu** > **Action** > **Add**, to add the new server entry.

   b. For select Server Type, select **Media Manager**.

   c. Assuming that you installed the VideoCharger Server on a different machine, select **Remote** in Location.

   d. Assuming that you installed the VideoCharger Server for the Windows version, select **NT** in Platform.

   e. Enter the name of Media Manager server - MMSRVRN.

   f. For input Port, enter 23793, assuming that 23793 is the default port.

   g. For input hostname/IP address, enter your VideoCharger host name.

   h. For Select Active Directory, select **No** (assuming that you do not use Active Directory).

   i. Click **OK** to exit.

You do not need to reboot after this step.

3. Check sysadmin under **Object Server** > **Media Server** to validate the port and asset group name. The defaults are port: **23793**; asset group: **AG**

4. After compiling the Media Client, you must configure it to match your VideoCharger system specifications:

   a. From the Content Manager CD-ROM, `load.txt` and `mclient.in` into a local directory on your Content Manager client.

   b. Compile the `mclientx.c` (AIX) or `mclientn.c` (Windows) file.

   c. Open `mclient.in` and edit the default text to match your VideoCharger system configuration:

      UserId Password 0 load.txt 2 asset1 MPEG1 SIF NTSC SYSTEM 0 20 30 46 2900 1536000 1 *FTPhostname FTPuserId FTPpassword*

      You only need to specify:

      - *UserID* (Library server user ID, for example, `frnadmin`)
      - *Password* (Library server user's password)
      - *FTPhostname* (host name where media file (video file) exists for FTP)
      - *FTPuserId* (FTP user ID for host name)
      - *FTPpassword* (FTP user password).

      Leave the other values at their defaults.

5. To stream media objects using mclient:

   a. Start the VideoCharger Server.

   b. Start the Content Manager library and object servers.

   c. Login to the System Administration Client application using default user ID `frnadmin` and password `password`.

   d. Run `mclientx.exe` for AIX or `mclientn.exe` for Windows.

   e. At a command prompt, enter `connect libsrvrn` to connect to library server. See Figure 21 on page 93.

   f. Open `load.txt` file and specify the location of the assets you want. For example:

      `sample15.mpg`

   g. Enter `ms` (Media Store) to store a media object in VideoCharger. For an example of a successful storage see Figure 22 on page 94.

h. To verify whether the load completed, enter `mq INDEX#` (Media Query), where `INDEX#` represents the index number that corresponds with the asset in the Media Store output.

i. If your load was completed, you can now end your verification by playing back the video. You can play the asset in one of two ways:

- Locate the 16-character item_id in your VideoCharger **Searching?** Web page and click on the asset to automatically play it in the VideoCharger Player. Remember that you must have a VideoCharger Player installed for this to work. The VideoCharger Searching URL is (see Figure 24 on page 96):

  ```
  http://<videocharger-hostname>/lantv/cgi-bin/iscpfhom.exe
  ```

- Enter `mr INDEX#` to create a local metadata file (the default is view.tmp). Select one of the following:

  GET_IT: Saves a metadata file locally to stream from the VideoCharger Server.

  STAGE_IT: Stages asset from the Multimedia Archive if the asset is not on the VideoCharger Server, and saves a metadata file locally to stream from the VideoCharger Server.

  STAGE_IT_PREFETCH: Stages asset from the Multimedia Archive if the asset is not on the VideoCharger Server.

  Play the asset by opening the newly created metadata file in the Player. The metadata file tells the Player how to locate and play the asset or asset group.

  To play the asset from the metafile (view.tmp), for example, (assuming that the VideoCharger Player was installed on `"c:\Program Files\IBM\IBM VideoCharger Player\"` directory) enter the following command at the command prompt:

  ```
  "c:\Program Files\IBM\IBM VideoCharger Player\iscview.exe"
  veiw.tmp
  ```

You have now successfully integrated your Content Manager with the new VideoCharger system. You can, if you want to add more parts to this item, either add streamed parts, or add thumbnail or description parts as well. Content Manager treats streamed objects as "just another part". Details are included in the *IBM Content Manager C Application Programming Reference for Workstation, Volume 1,* SC27-0865 (`http://www-4.ibm.com/software/data/cm/pubs/cm71/aprvc1/aprvc1.pdf`),

so you can write a loader specific to your data model, including streamed assets.

There are some sample code for adding media parts. In the `FRNROOT\SAMPLES\JAVA` subdirectory, you will see a file named `txdoAddVs.java`. This is an example for adding a media part using the Java API set. In the `FNROOT\SAMPLES\ACTIVEX` subdirectory you will see a file named `xdoMedia.frm`. This is an example of adding a media part using the ActiveX API set. There are similar files in the appropriate directories on AIX as well. These files are found on any machine where you installed the Content Manager Client Toolkit.

4.4 Changing VideoCharger servers in Content Manager

Content Manager's object server can only communicate with one VideoCharger server. However, one VideoCharger server can be shared with more than one object server. In your environment, if you need to upgrade your NT VideoCharger server to AIX in order to obtain more streaming capacity, you will need to tell Content Manager to use the new VideoCharger server. Here is how you can do that.

1. Once you have installed VideoCharger on your new system, you will need to migrate your assets to this system. Use the `vsstage` command. The syntax is as follows: `vsstage -s oldserver -S newserver -a assetname`. The complete description and syntax can be found in "vsstage Command" of the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871. If you have a lot of assets to move, you may want to consider creating a script file to move them.

2. In order to switch the media manager server in Content Manager, you will have to do one manual step to update a database table. On your object server machine, go to a DB2 command line, or use the command center to enter the following SQL commands. First connect to the object server database:

   ```
   connect to <objserservername>
   ```

   Once this has been done, issue the command to change the media server name:

   ```
   update base_staging_media set mst_servername = 'mmsrvrx'
   ```

   This command assumes that the default of `mmsrvrx` is for the name of the media manager server. Use your actual name if it is different from the default.

3. Next, we have to alter the network table with the correct media manager name, part, hostname, server type. There are two ways to do this. One is to edit the network table manually, making the necessary changes in the existing media manager stanza. The file is named `frnolint.tbl`. It is located in the `%frnroot%` directory. Look for the stanza which starts: SERVER: MMSRVRN REMOTE SOCKETS. Change the name, hostname and server type (change NT to AIX). Also validate the port number. Save this file.

   Or, the other possible method is to use the **Network Table Generation** utility for Content Manager. However, this utility will not let you change a server name, so you will have to delete the current media manager entry and create a new one. See Step 7. on page 85, in the new install, or Step 2. on page 98, in the adding VideoCharger server install.

4. Validate that the data is correct by opening the Content Manager **System Administration Client** > **Object Server** > **Media Server**.

5. Test that your switch was successful by both playing an existing video file through Content Manager and loading a new video file into your new VideoCharger.

4.5 Content Manager on AIX

If your Content Manager system is on AIX, the steps for the previous procedures are still valid. However, the exact commands that would be issued are slightly different. The utility to add VideoCharger to an operational object server is named differently. For AIX object servers running DB2, it is `frnmedobj.db2.sh`. If you are using Oracle, it is `frnmedobj.ora.sh`. See the *IBM Content Manager: Planning and Installing Content Manager Version 7.1,* GC27-0864, for exact syntax.

You will basically need three steps to add or integrate VideoCharger with Content Manager:

1. Enable the object server for media, either by checking the **Enable Media Manager** box during install, or running the appropriate utility to update the object server for media after initial install.

2. Update the **Network Table** with the media manager stanza using the utility, `frnnetcfg`, from a command prompt.

3. Validate/alter the **Media Server** data in System Administration.

4. The steps to load or play a video are the same as described in 4.2, "New VideoCharger and Content Manager installation" on page 83.

4.6 Common trouble areas

One of the most common mistakes made during a Content Manager/ VideoCharger installation is to install all the components for both products, and then run the validation. It is easier to correct an error if you install one product, and then validate it. Therefore, we strongly recommend that you install the VideoCharger and validate that you can load and view streamed assets. Then install the Content Manager system and validate that you can create index classes and load as well as view objects. With this method, you will have fewer problems when you link them together.

The other most common error is not starting all the servers before validation. Remember that, once you have defined a VideoCharger server to a Content Manager object server, it must be running before you can successfully start the object server.

If you experience delays in loading objects, or for clients accessing other data while assets are being loaded, you may want to raise your allowable child processes on your library server. The default is 5. Raising it to 10 or 15 should remove any delays you may be having, because this allows more concurrent processes. This is done through the Content Manager System Administration Client component. Content Manager comes with one default configuration, IBMCONFIG, which cannot be modified. If you have created your own configuration files, then you can simply go into it and modify the number of maximum processes. This field is found under the Performance tab. See Figure 25 on page 104.

If you have not previously created a new configuration file, then you will have to copy the IBMCONFIG file, giving your copy a unique name. Then you can modify the child processes. Once you have saved this file, you will need to stop your library server, go into the Properties section of the library server icon, to the Shortcut tab, and alter the configuration name to your file.

We advise you to increase these processes on your object server configuration as well. Keep the library server/object server process recommendation in mind, which is a 3:2 ratio (library to object server processes) for optimal performance.
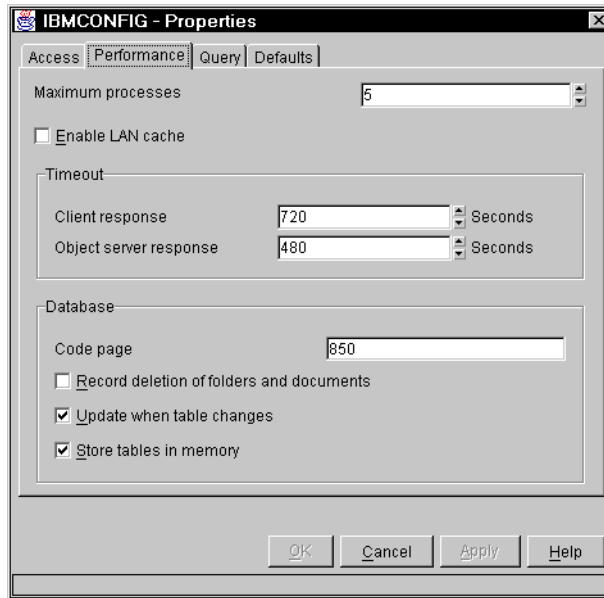
Figure 25. Content Manager configuration update

4.7 Content Manager media specific tables

With the addition of handling streamed objects, Content Manager has updated several database tables and added some specifically for media objects.

Two that may be of interest are the AVT00009 (commonly referred to as FRN$MEDIA) table in the library server, and base_objects_media in the object server. Both of these tables carry information on streamed objects only. Because it is not detailed in *IBM Content Manager C Application Programming Reference for Workstation, Volume 1,* SC27-0865, we have added this information here, in Table 24 and Table 25 on page 106.

Table 24. AVT00009 (FRN$Media) table in library server

Column Name	Definition	Notes
ITEMID	Media reference ID	16 characters, not null
ATTRIBUTE47	Media item ID	File name of media asset
ATTRIBUTE48	FRN$MEDIARepType	Default is FRN$NULL
ATTRIBUTE49	FRN$MEDIAPartNo	Part number of media asset

Column Name	Definition	Notes
ATTRIBUTE50	FRN$MEDIATimestamp	Timestamp when object was stored
ATTRIBUTE51	FRN$MEDIAMediaState	1. Pending, load in progress 2. Load completed successfully 3. Load failed
ATTRIBUTE52	FRN$MEDIAInvalidCmds	Invalid commands for video player control mask
ATTRIBUTE53	FRN$MEDIAMediaType	Describes file format of media asset. Value is alphanumeric and up to 16 characters. Current values include: MPEG1(default), MPEG2, AVI, WAV, LBR, QT, MJPEG, H263, H273,G723
ATTRIBUTE54	FRN$MEDIAResolution	Value is alphanumeric and up to 16 characters. Current values: SIF(default), HHR, CCIR601
ATTRIBUTE55	FRN$MEDIAStandard	Value is alphanumeric and up to 16 characters. Current values: NTSC(default), PAL
ATTRIBUTE56	FRN$MEDIAFormat	Streaming type of video asset. Current values: System(default), Program, transport
ATTRIBUTE57	FRN$MEDIADurationSeconds	Asset duration in seconds
ATTRIBUTE58	FRN$MEDIADurationFrames	Asset duration in frames
ATTRIBUTE59	FRN$MEDIAFrameRate	Frame rate multiplied by 100. Value is stored at 100 times the actual value
ATTRIBUTE60	FRN$MEDIABitRate	Total multiplexed bit rate
ATTRIBUTE61	FRN$MEDIACopyRate	Copy rate at which data will be transferred
ATTRIBUTE62	FRN$MEDIANumberUsers	Users allows to stream asset concurrently. Default is 1, but value not used by VC
ATTRIBUTE63	FRN$MEDIAAssetGroup	Alphanumeric up to 120 characters. Default is AG

Table 25. Base_objects_media table in object server

Column Name	Definition	Notes
MOB_OBJECTNAME	Correlates with FRN$MEDIAItemID/RepType	Primary Key
MOB_COLLECTIONID	Collection identifier	Smallint, not null
MOB_MGTCLASSID	Management class identifier	Smallint, not null
MOB_STGCLASSID	Storage class identifier	Smallint, not null
MOB_VOLUMEID	Volume identifier	Integer, not null
MOB_PATH	Identifier which correlates to volume directory structure	Integer, not null
MOB_FILENAME		
MOB_ATTRIBUTES	Value to interpret path (value indicates source of object) 32 was added to indicate media object	Integer, not null
MOB_PLAYSTATUS	Streaming availability: T - Temporary V - Valid object I - Invalid object	Alpha, not null
MOB_STAGINGSTATUS	media object status on VC: P - load operation pending B - load successfully (staged, but not archived) N - not on VC staging area X - object can be purged	Alpha, not null
MOB_VOLSTATUS	Media object status on archiver: P - destage operation pending V- valid object I - invalid object N - not on archiver X - purgable object R - retry (used during media destage)	Alpha, not null
MOB_SIZE		Float, not null
MOB_CREATEDATE	Date object was stored	Date
MOB_REFERENCEDDATE	Date object last referenced	Date

Column Name	Definition	Notes
MOB_ACTIONDATE	Migration action date	Date
MOB_MGTCLASSDATE	Date object entered management class	Date
MOB_STGCLASSDATE	Date object entered storage class	Date
MOB_RETENTION	Date object to be deleted	Integer, not used
MOB_LIBRARYID	Library with index of object	Small integer

Other tables are modified as well when media is enabled for a particular object server. These include the following:

- BASE_CNTL (information about the object server configuration)
- BASE_STAGING_MEDIA (information about the media server)
- BASE_VOLUMES (archive information)
- BASE_DEVMGR (device manager information regarding whether the archive is enabled/disabled)
- BASE_COLLECTIONS (added two default collection ids: (2) media.collectn.archive and (3) media.collectn.noarchiv)

Chapter 5. Troubleshooting

In this chapter, we will share some of the experiences we had during this project, as well as experiences our development team and our customers have had. We have detailed some troubleshooting tips, as well as questions that are frequently asked. In the event you have difficulty setting up or using VideoCharger, this is a good section to review. Another reference for troubleshooting tips is the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871, or the Content Manager VideoCharger Web site:

> `http://www.ibm.com/software/data/videocharger`

In the event that you need help from IBM technical support, they will probably request a trace file to assist them. Knowing where and how to set these traces will speed up the problem determination. Details on how to run such traces are given in 5.3, "Error and trace logs" on page 125.

5.1 Troubleshooting on Windows NT

Use the Windows NT event viewer to determine the source of the problems. System, application, and security events are entered into the event log. VideoCharger error messages and recovery information are written to the application event log.

To view the event log:

1. Click **Start** on the Windows task bar.

2. Select **Programs—>Administrative Tools—>Event Viewer**.

3. From the **Log** menu, select the log that you want to display.

By default, fatal errors from VideoCharger are written to the application event log. To enable detailed VideoCharger logging, set the trace level parameter This parameter determines the level of logging that is performed by the VideoCharger components. Valid settings for this parameter are 0 to 7. Set this parameter to 0 to record only fatal errors. For any nonzero value, fatal errors and trace level information is written to the log. Use a nonzero value only when collecting trace information for IBM Service.

5.1.1 Symptom: Cannot select video

1. Either run the following command to make sure daemons are running, or use the **Display the Status** option on the Configuration and Administration form on the Web interface.

```
vsstat -g vs
```

2. Run the `netstat -an` command to show the network mapping to see if the network connections are up. The Control Server listens on port 8500. The Data Exporter listens on port 8888.

5.1.2 Symptom: No video appearing

Inability to contact a client can be caused by VideoCharger failures, IP configuration problems, network hardware failures, or network failures. The first thing to check is the current streaming activity. The most recent request might have exceeded the capacity of the Data Pump, and been rejected through Admission Control. If the Data Pump is running at or below capacity, use the following steps to help isolate the problem:

1. The VideoCharger is IP-based. Determine whether all IP programs are having problems by using the `ping`, `telnet`, or `ftp` commands to contact the client. If these programs succeed, it is likely that the problem is with the VideoCharger software. In this case:

   a. Use the Event Viewer to check the Application Event Log for Control Server or Data Exporter errors. The system reports serious error conditions in this log.

   b. Verify that the Control Server service (vserver.exe) the Scheduler service (vschedsvc.exe) and the Data Exporter service (dex.exe) are running by starting the task manager, `taskmgr`.

   c. Issue a `netstat -an` command on the VideoCharger system. UDP entries for the client should exist if the Data Pump is transmitting content to the client.

   d. Ensure that VCRPLAY (port 8500) is listening.

   Important: All commands in Steps b and c must be issued on the VideoCharger node.

2. If step 1 shows that IP programs are generally failing to contact the client, the IP configuration must be checked. In this case:

   a. If IP commands appear to hang, issue a `ping` command on a host name that should be able to be resolved. If this command appears to hang, it is likely that you are experiencing name server problems or outages. Contact your network administrator.

   b. If you receive messages of the form: `A route to the remote host is not available` from general IP commands, your IP routing configuration does not allow you to contact the client. Issue a `netstat -an` command

to obtain a summary of the nodes routing table. Add a route to the client to resolve the problem.

    c. If you receive messages of the form: `The network is not currently available` from general IP commands, the network hardware must be checked. Proceed to Step 3.

    d. If your routing appears correct, and no error messages are generated from general IP commands, issue an `arp -a` command. Look for an entry for the client or the gateway to the client. If an entry exists or an incomplete entry exists, network hardware must be checked. Proceed to Step 3.

3. To verify that a network interface is available to IP, that IP is transmitting data to that interface, and that data is actually being transmitted, complete the following steps:

    a. Issue a `netstat -rn` command. If the interface name is not displayed, the interface is not enabled to IP.

        i.   Select the Networks icon from the Control Panel.

        ii. Click the Bindings tab.

        iii. Set Show Bindings for all adapters.

        iv. Ensure that each of your adapters is displayed.

        v. Click the plus sign (**+**) beside the name of each adapter and ensure that the adapter is enabled for the TCP/IP protocol.

    b. Issue a `netstat -s` command to display the number of packets being transmitted by IP, TCP, and UDP. Wait a few seconds, reissue the command, and compare the number of packets that were transmitted. This should show UDP packets being transmitted on the interface to the client node.

    c. Check the System Event Log to ensure that no network errors are being encountered.

4. If Step 3 shows IP activity and that data is being transmitted on the network interface, but IP programs are still failing, then the problem is likely with the network or with the client. Follow Steps b and c at the client.

Tip: The syntax for the `netstat` and `arp` commands varies with the type of client.

5.1.3 Symptom: Poor video quality

Poor video quality at the client is typically caused by VideoCharger delivery failures, long packet delays in the network, or large packet losses in the network. The following procedure can help isolate the problem:

1. Verify that the play rate for the asset is correct. The asset might be playing at a rate faster than its reservation rate.

2. View the Event Log to see if the disk is experiencing errors.

3. Run the Performance Monitor (`perfmon`) to see if the disks or the network interfaces are experiencing long I/O delays.

4. To detect large packet delays or large packet losses in the network, ping to the client node. Use the `-l` option of the `ping` command to set the packet size to the path MTU being used by the system. The `ping` command reports packet loss percentages, as well as minimum and maximum round-trip times. Large packet losses or large packet delays, combined with poor video quality to a client, indicate that the network connection to the client must be upgraded.

5.1.4 Problems with content loading

Symptoms for problems with content loading are listed here.

5.1.4.1 Symptom: Cannot load content

This section provides procedures to assist you if you are having problems loading assets. Check the Application Event Log regularly to see if it includes error messages you need to investigate. To view the Event Log, select **Start—>Programs—>Administrative Tools—>Event Viewer**.

You should also ensure that you have enough space on all drives. To display information about all drives:

1. Click **Start** on the Windows task bar.

2. Select **Programs—>Administrative Tools—>Windows NT Diagnostics**.

3. Select the **Drives** tab.

4. Double-click each drive to view the Properties dialog box.

5. Select the **General** tab to see the amount of free space.

To check the ftp service:

1. Ensure that the ftp service is running. Either use the facilities of the **ftp** service you are using, or issue the `netstat -an` command and ensure that port 21 is in a listening state.

2. Attempt to access the ftp service for the VideoCharger and remote host manually:

- Run the `ftp` command to each host.
- Log into each host through ftp.
- Display the directory that you are attempting to access.

5.1.4.2 Symptom: The asset loads, but it is not on selection list

If the Content Management database daemon went down while a video was being loaded, the video might not appear on selection list that is viewed by the end user. The best thing is to delete the asset, and reload it. Normally, you can delete assets through the online interface by selecting **Delete a video** from the main Content Management menu. If you have trouble deleting an incomplete or unusable asset, do the following:

1. Select **Delete a video** from the main Content Management form.
2. Select the name of the asset that you want to delete.
3. Click **Delete**.

5.1.4.3 Symptom: The asset is loaded, but it is not parsed

If the asset is of a type that is not supported by the `vsparse` command, the load request completes with an indication that the attributes could not be set. Use the **Modify Existing Asset** option from the Content Management Web interface to set the asset attributes.

5.2 Troubleshooting on AIX

Use these troubleshooting tips to check for basic problems. We have also listed several symptoms and their solutions.

5.2.1 Basic check list

You can use the following steps to check for any basic problems with your VideoCharger on AIX install:

1. Login to the machine as vsadmin and verify the password.
2. Login to the machine as vsloader and verify the password.
3. Login to the machine as root.
4. Use `df` to see if the root directory is full. If it is, use `smitty` to make it bigger, or free up some space.
5. Use `locale` to check that the language is one of those supported by VideoCharger.

6. Use `qda` to check that mmfs is configured and running.

7. Use `hostname` to verify the machine's host name, and `host` *hostname* to verify its fully qualified host name.

8. Ping the machine by its fully qualified host name (using `ping` *hostname*).

9. Type `ls -l /home/vsadmin/.rhosts`. You should see:

    ```
    -rw-r-----   1 vsadmin  system        78 Jan 10 15:33
    /home/vsadmin/.rhosts
    ```

    (the file size and date will vary)

10. Type `cat /home/vsadmin/.rhosts`. You should see:

    host_name.domain_name `root`
    host_name.domain_name `vsadmin`

    (there may be additional lines as well)

11. Type `rsh` *datapump_hostname* `-l vsadmin ls` (where *datapump_hostname* is the host name of the data pump). You should not get an error message (like permission denied). If you do, check the .rhosts file on the data pump.

12. Stop VideoCharger with the command `stopsrc -cg vs`

13. Stop DCE with the command `dce.clean`

14. Start DCE with the command `rc.dce`

15. Start VideoCharger with the command `startsrc -g vs`

16. Check the control server log for error messages with `cat /var/adm/ras/avscs.log`. If you find error messages check here and on the Web site for a solution.

5.2.2 Symptom: Cannot select video

If the Search Results HTML page lists "0 Titles Returned" even though `vslist` shows assets, the /tmp directory may be full. If so, free up some space in /tmp either by removing files no longer needed or increasing the size of the filesystem with `chfs -a size=+1000 /tmp`.

In other cases, the following steps may help to isolate the problem:

1. Run the following command to make sure the daemons are running:

    `lssrc -g vs`

2. Run `rpccp` to show mapping to see if the network connections are up.

3. Check the `ISC.INI` file to see if the `ap_process_user_data` flag is set to `1`; if it is, the `iscbldmn` daemon must be running for a client to see a video (in order to track billing or marketing information).

5.2.3 Symptom: Client cannot play multicast asset

There is one known problem with a newer version of AIX like 4.3.2, if your network is using token-ring. Use the following AIX command to fix the problem:

```
no -o ie5_old_multicast_mapping = 1
```

5.2.4 Symptom: No video appearing

Inability to contact a client can be caused by VideoCharger failures, IP configuration problems, network hardware failures, or network failures.

If the player gives a message `Streaming Network Error: Server rejected the player request, session connection is aborted. Error possibly due to unavailable Server resource. Check also the Server log. RC=1016 Server RC=05800005`, then the VideoCharger server does not have a port defined for the LAN interface that must be used to stream video to the client. Use the admin Web pages to define a port.

If the player gives a message `Streaming Network Error: RC=1016, Server RC=0X480000A`, and typing the command `qda` at the server shows 0 for all the performance data, then the performance group for mmfs is missing. Create the performance group as follows:

1. Stop VideoCharger with `stopsrc -cg vs`.

2. Unmount the mmfs file system with `smitty mmfs`, select `File System Operation`, `Unmount File System`, and select `[all]`.

3. Create the performance group with smitty mmfs, select Manage Performance, then Create Performance group.

4. Mount the mmfs file system using `smitty mmfs`, select `File System Operation`, `Mount File System`, then select `[all]`.

5. Start VideoCharger with `startsrc -g vs`.

If the player gives a message `Set Video Name Failed, rc=1900008 Server binding error`, and /var/adm/ras/isc.log shows `Daemon ISCARDMN is not available`, the hostname in the application server may be configured incorrectly. Type `lsvsas -l DEFAULT`. This will list the application server configuration. The Application Server hostname must match the hostname of the machine on which the application server is installed. Use the `chvsas` command to change the hostname if it is incorrect.

If the player is not giving an error message, the first thing to check is the current streaming activity. The most recent request might have exceeded the capacity of the Data Pump, and been rejected through Admission Control. If

the Data Pump is running at or below capacity, use the following steps to help isolate the problem:

1. The VideoCharger is IP-based. Determine whether all IP programs are having problems by using the ping, telnet,or ftp commands to contact the client. If these programs succeed, it is likely that the problem is with the VideoCharger software. In this case:

   a. Run `errpt` on both the Data Pump and Controller nodes. The system reports serious error conditions in this log. VideoCharger failures are denoted by a VSC: entry under the `RESOURCE_NAME` heading.

   b. Verify that the Control Server daemon (vserver) and the Application Server daemons (iscardmn and iscasdmn) are running on the Control Server node by running a `ps` command.

   c. Verify that the Data Pump daemon, dex, is running on the Data Pump node by running a `ps` command.

   d. If either Step b or c fails, look for core files in the /usr/bin directory. The presence of a core file indicates a software failure that should be reported to your service representative. In any event, the VideoCharger system must be restarted to resolve the problem.

   e. If the Data Pump daemon is active, issue a `/usr/lpp/avs/ras/destat` command to obtain statistics on the video connections being served.

   f. Issue a `netstat -A` command on the Data Pump node. UDP entries for the client should exist if the Data Pump is transmitting content to the client.

   g. Issue a `netstat -A` command on the Controller node. Ensure that VCRPLAY (port 2500) is listening.

   Important: All commands in Steps b or c must be issued on the Data Pump node.

2. If step 1 shows that IP programs are generally failing to contact the client, the IP configuration must be checked. In this case:

   a. If IP commands appear to hang, issue a `netstat -i` command. If this command appears to hang, it is likely that you are experiencing name server problems or outages. Contact your network administrator.

   b. If you receive messages of the form: `A route to the remote host is not available` from general IP commands, your IP routing configuration does not allow you to contact the client. Issue a `netstat -ra` command to obtain a summary of the nodes routing table. Add a route to the client to resolve the problem.

c. If you receive messages of the form: `The network is not currently available` from general IP commands, the network hardware on the Data Pump node must be checked. Proceed to Step 3.

d. If your routing appears correct, and no error messages are generated from general IP commands, issue an `arp -a` command. Look for an entry for the client or the gateway to the client. If an entry (complete or incomplete) exists, network hardware on the Data Pump node must be checked. Proceed to Step 3.

3. To verify that a network interface is available to IP, that IP is transmitting data to that interface, and that data is actually being transmitted, complete the following steps:

a. Issue a `netstat -i` command. If the interface name is reported with an asterisk (*), the interface is down to IP. Issue an `ifconfig` command to bring the interface up. If the interface is up, then the number of opkts (output packets) should be increasing if IP is transmitting.

b. Issue an `iptrace -i` interfacename `-d` clientHostname command to trace IP packets sent to the clients. This command should show UDP packets being transmitted on the interface to the client node.

c. If Steps 3a and 3b show IP activity to the client node, issue a `netstat -v` command. This command reports detailed adapter statistics. Look for error conditions being reported on the interface of interest. In addition, issue an `errpt` command to obtain a report of serious errors on the network adapter.

4. If Step 3 shows IP activity and that data is being transmitted on the network interface, but IP programs are still failing, then the problem is likely with the network or with the client. Follow Steps 3b and 3c at the client.

Tip: The syntax for the `netstat` and `arp` commands varies with the type of client. The `iptrace` command is AIX-specific.

5.2.5 Symptom: Poor video quality

Poor video quality at the client is typically caused by VideoCharger delivery failures, long packet delays in the network, or large packet losses in the network. The following procedure can help isolate the problem:

1. Issue a `/usr/lpp/avs/ras/destat` command on the Data Pump node. Look for RTP underruns. If present, this is an indication that the VideoCharger is overloaded. Verify that general network traffic is not interfering with video delivery. You might have to restrict this load. Verify that there are no

problems with the multimedia file system. RTP underruns are an indication that the data is not being delivered fast enough to the network transmitter.

2. Verify that the play rate for the asset is correct. The asset might be playing at a rate faster than its reservation rate.

3. View the error report to see if the disk is experiencing long disk I/Os.

4. Run the `qda` and `tsa` commands to see if there is a correlation between other stream activity and single-stream video disturbances.

5. To detect large packet delays or large packet losses in the network, use a `ping` to the client node. Use the **-s** option of the `ping` command to set the packet size to the path MTU being used by the system to send to the client node. A `netstat -ra` command reports this number. The `ping` command reports packet loss percentages, as well as minimum and maximum round-trip times. Large packet losses or large packet delays, combined with poor video quality to a client, indicate that the network connection to the client must be upgraded.

5.2.6 Problems with content loading on AIX

Check the symptoms here for problems with content loading.

5.2.6.1 Symptom: Cannot load content

This section provides procedures to assist you if you are having problems loading assets.

Check the Control Server error log regularly to see if it includes error messages you need to investigate. To view the error log, enter:

```
pg /var/adm/ras/avscs.log
```

You should also ensure that you have enough space in all file systems. To display information about all mounted file systems, enter: `df`.

Important: When investigating content-loading problems, do not change the **/etc/resolv.conf** file. The following **/etc/resolv.conf** errors do not affect single-threaded commands like `ping` and `ftp`, but they cause the VideoCharger's multi-threaded programs to fail with `invalid domain` or `non-existent name server`.

To check the Data Pump configuration files:

1. Look at the **/etc/services** file for the CM service:

```
grep vip /etc/services
```

You should see a single entry that looks like this:

```
vip 4324/tcp
```

The number `4234` can vary, but it must match the CM port number that you see when the `lsvsdp` command is run.

2. Make sure no other service is using the same CM port number:

```
grep 4324/tcp /etc/services
```

You should see a single entry that looks like this:

```
vip 4324/tcp
```

If you see anything else, this means that 4324 is used by another service. You will need to change the port number in this file, and then change it on the Data Pump using the `chvsdp` command.

3. Look at the /etc/inetd.conf file:

```
grep vip /etc/inetd.conf
```

This command should produce the following output:

```
vip stream tcp nowait root /usr/bin/vip vip -b 256 -R 1323
```

If either the **/etc/services** or the **/etc/inetd.conf** files are modified, you must refresh the **inet** daemon as follows:

```
refresh -s inetd
```

To verify your content management configuration using ftp:

1. Use the `lsvsdp` command to get the content management (CM) host name, user ID, password, and port number. Verify this information by using the `ftp` command as follows:

```
ftp CM_host_name CM_port_number
200 CM_host_name Multi Media Content Transfer server...
Name: CM_user_id
Password: CM_password
ftp> quit
```

The `CM_port_number` is `4324` unless you have reassigned `vip` to another port number.

2. After this test is successful, use the `lsvssg` command to get the stripe group mount path. Then use the `ftp` command again as follows:

```
ftp CM_host_name FTPD_port_number
ftp server...
Name: CM_user_id
Password: CM_password
ftp> put test_file stripe_group_mount_path/foo
ftp> delete stripe_group_mount_path/foo
ftp> quit
```

Tip: If the `ftp` command reconnects to the Multi Media Content Transfer server, you will need to determine the FTPD_port_number, which is specified in the **/etc/services** file on the CM_host_name machine. The test file can be any file on the machine from which the `ftp` command is run.

To check the permissions on the Data Pump:

1. Use `smit` to get the groups to which the CM user ID (usually vsloader) belongs:

    a. Enter `smit` users.

    b. Select **Change/Show Characteristics** of a User.

    c. Enter the CM user ID in the User **NAME** field.

    d. Look at the Primary **GROUP** and Group **SET** fields. These are the groups to which the CM user ID belongs. `vsasset` should be listed in Group SET.2. Determine access to each mount path of each stripe group. For example, if a stripe group path was `/mmfs/sg0`, enter:

    ```
    ls -l -d /mmfs/sg0
    ```

    Review the list of directory/file permissions and owner/group IDs that these commands produce. Insure the CM user ID has read/write access.

2. Look at access permissions:

    ```
    ls -l /etc/objrepos/AVSpatt
    ```

    Again, make sure the CM_user_id has read/write access.

3. Look at the CM command itself:

    ```
    ls -l /usr/bin/vip
    ```

    This command should produce the following output:

    ```
    -r-sr-xr-x 1 root system ...
    ```

4. Finally, look at `/var/mmfs/gen/pg.cfg`:

    ```
    ls -l -d /var
    ls -l -d /var/mmfs
    ls -l -d /var/mmfs/gen
    ls -l /var/mmfs/gen/pg.cfg
    ```

    Make sure that the CM user ID has read access to each directory and to the pg.cfg file. If the pg.cfg file is missing, you need to create multimedia file system performance groups for each stripe group.

    Check multimedia file system performance group(s):

    Look at the /var/mmfs/gen/pg.cfg file:

    ```
    grep stripegroup /var/mmfs/gen/pg.cfg
    ```

You should see a line for each stripe group. If you don't, use the `smit mmfs_perfman` fast path to create the missing performance group(s).

Start the content management service log:

Determine if content management service logging is specified in the /etc/syslog.conf file:

```
grep daemon.debug /etc/syslog.conf
```

If the following line is shown (and not commented out), content management service logging is specified:

```
daemon.debug ...
```

Note the path and file name. This is where content management service messages are sent. If this line does not appear, enter the following command to specify CM service logging:

```
echo "daemon.debug /var/adm/ras/syslog.debug" > \
/etc/syslog.conf
```

Create the content management service log and refresh the syslog daemon as follows:

```
touch /var/adm/ras/syslog.debug
refresh -s syslogd
```

5.2.6.2 Symptom: The asset loads, but it is not on selection list

If the content management database daemon went down while a video was being loaded, the video might not appear on selection lists viewed by the end user. Delete and reload the asset to get it included on the selection lists.

Normally, you can delete assets through the online interface by selecting **Delete a video** from the main Content Management menu. If you have trouble deleting an incomplete or unusable asset, do the following:

1. Select **Delete a video** from the main Content Management menu.

2. Select **Ignore errors and continue processing**.

3. Enter the name of the asset that you want to delete.

4. Click **Continue**.

The asset will be deleted.

5.2.7 Problems with the Multimedia File System

Check the symptoms here for problems with the Multimedia File System.

5.2.7.1 Symptom: Cannot change MMFS configuration

If the Multimedia File System does not respond when issuing file system configuration commands:

1. Ensure that the Multimedia File System is running by issuing `lssrc -s mmfs`.

2. Ensure that, as a minimum, the TCP/IP loop-back is configured properly, by issuing `ping hostname`.

3. Ensure that you have not specified a memory size that is too large for your memory configuration. If the memory size is too large, the File System Manager can have trouble pinging it due to lack of real memory.

5.2.7.2 Symptom: Inconsistencies

You might need to check and repair a Multimedia File System when you encounter inconsistencies, such as:

- Unpredictable results on the server or client.

- A system message instructing you to check your file system for inconsistencies.

To check and repair a file system using `smit`:

1. Use the `smit mmfs` fast path to access the Multimedia File System menu.

2. Select **File System Operations**.

3. Select **Check/Repair File System**.

4. On this menu, enter the following information:

    - File System Name

    - Recover lost blocks only?

    Select either **yes** or **no**. If you select **no**, the file system must be unmounted. If you select **yes**, the file system might be mounted.

    Note: It is a normal consequence of unexpected system halts (with the file system mounted) that file system blocks currently being deleted can be lost. These lost data blocks do not represent loss of usable user data. It is therefore recommended that periodic recovery of these lost blocks be done by specifying **yes**.

5. **Action Taken When Inconsistencies Are Found**
   (leave this field blank for report and prompt).

    - Select from the following options:

        - Select from Report and prompt for corrective action.

- This is the default. You can leave the **Action Taken When Inconsistencies Are Found** field blank for this action to occur:

    - Report and take corrective action automatically.

      Use this action carefully. It should be used only for severely damaged file systems:

    - Report only.

      Recommendation: Select **report only** before letting the multimedia file system take corrective actions.

5.2.7.3 Making disks available

When the file system cannot detect volumes because they are not powered on, these volumes are automatically changed to a not-ready status. To make the volumes available again so that they can be used by the file system, use the procedure described in "Changing the State of Disks in a File System" in the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871, to specify the following items:

1. Specify start for volume whose status is **stopped**.

2. Specify resume for the volumes whose status is **suspended**.

You can also use this procedure to restore volumes to a ready status after explicitly suspending or stopping the volumes.

5.2.7.4 Detecting and handling disk failures

In an environment where the data is not replicated, and a failure has already occurred, you need to:

1. Change the state of the disk and, if possible, migrate data off the disk.

2. Delete the disk.

3. Delete the file system and reload content, if the data could not be migrated.

If failure is imminent (but has not yet occurred), or the data is replicated, you need to:

1. Change the state of the disk and migrate data off the disk.

2. Delete the disk.

3. Add a new disk.

4. Restripe the file system.

If a disk fails, you should refer to the *AIX Version 4 System Management Guide: Operating System and Devices*, SC23-2525, or the documentation that accompanied the disk.

5.2.7.5 Changing the state of disks in a Multimedia File System
To accomplish this task:

1. Use the `smit mmfs` fast path to access the Multimedia File System menu.

2. Select **File System Operations**.

3. Select **List/Change the State of Volumes in a File System**.

4. Select **Change the State of a Volume in a File System**.

5. On this menu, enter this information: **File System Name**. Specify the name of the file system.

Action: Select either **suspend**, **resume**, **stop**, or **start**.

5.2.7.6 Deleting a Multimedia File System
Deleting a file system does the following:

1. Removes the stanza in **/etc/filesystems** that corresponds to the mount point for the file system.

2. Removes the character-mode device entry in **/dev** for the file system.

3. Removes the file system from any performance group to which it belongs.

4. Removes all file system data.

Follow this procedure to delete a file system using SMIT:

1. Use the `smit mmcs` fast path to access the Managing Multimedia Content Storage menu.

2. Select **Delete Content Storage**.

3. Select **Delete File System**.

4. Select the file system to delete and press **Enter**.

5.2.7.7 Symptom: The bit rate returned by qda is very low
This can happen if MMFS was created with the option `Is Data Pump Dedicated to Low Bit Rate Media` set to yes. This causes the MMFS to be formatted with a smaller block size that is less efficient for moving large blocks of data. If this is the case, backup any existing content, delete the MMFS (as described in Chapter 5.2.7.6, "Deleting a Multimedia File System" on page 124), then create a new MMFS with `Is Data Pump Dedicated to Low Bit Rate Media` set to no.

5.3 Error and trace logs

Throughout previous sections of this book, or the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871, you will find references to where the error and trace logs are on VideoCharger. This section will document all these files for easy reference.

5.3.1 NT VideoCharger server

Use the Windows NT event viewer to determine the source of problems. System, application, and security events are entered into the event log. VideoCharger error messages and recovery information are written to the application event log.

To view the event log:

1. Click **Start** on the Windows task bar.

2. Select **Programs—>Administrative Tools—>Event Viewer**.

3. From the **Log** menu, select the log that you want to display.

There are some exceptions and additional logs. These are described below:

5.3.1.1 Media Manager log files

- **Log file location**: For log path, registry entry for:

  `//HKEY_LOCAL_MACHINE//SOFTWARE//IBM/LANTV//currentVersion//LogDirectory`

- **Log file**: mm.log

- **Logging levels**: 7

- Error levels are controlled by registry entries:

  `//HKEY_LOCAL_MACHINE//SYSTEM//CurrentControlSet//Services/EventLog//Application//lantv_mm`

- **MaximumLogfileSize** = Maximum log file size

- **TypesSupport** Logging Level:

  0 - Emergency (default)
  1 - Alert
  2 - Critical
  3 - Error
  4 - Warning
  5 - Notice
  6 - Info
  7 - Debug

5.3.1.2 Data exporter tracing
- Set SCMTRACE=YYYYNY
- Log level: vsconfig -t trace_level (0-7)
- Start DEx in debug mode; that is, start dex -debug
- Log file: %LANTV_DIR%\log\dex.log

5.3.1.3 Application server tracing
- Service stop: vsstop -a
- Log level: vsconfig -t trace_level (0-7)
- Set SCMTRACE=yyyyny(enter,dbmsg,debug,dump,loc,api)
- Debug mode: start iscardmn - debug
- Log file: %LANTV_DIR%\log\ar.log

5.3.1.4 Control server tracing
- Set SCMTRACE=YYYYNY
- Log level: vsconfig -t trace_level (0-7)
- Debug mode: start vserver -debug
- Log file: %LANTV_DIR%\log\cs.log

5.3.2 AIX VideoCharger server

Many of the components log errors to the errlog daemon. Use `errpt -a` to view errors. Exceptions to this rule are detailed below.

5.3.2.1 Media Manager log files
- **Log file Location**: log path/var/adm/ras/

- **Log File**: mm.log

- **Logging levels**: 2

- Error levels are controlled through SCM traceson. Use `traceson -s vsmm` to set trace level to debug.

  3 - Error (default)
  7 - Debug

5.3.2.2 Data exporter tracing
To set a trace for the data exporter:

- Export SCMTRACE=YYYYNY
- Start dex (startsrc -s vsdex)
- Trace;csstrc(start), csetrc(end) & csgtrc(format)
- Trace file: /var/adm/ras/avsdex.log and /tmp/trace.txt

5.3.2.3 Application server tracing

To set a trace for the application server:

- Export SCMTRACE=YYYYNY
- Daemon start: startsrc -s vsasreq; startsrc -s vsascom
- Trace file: /var/adm/ras/avsas.log and /var/adm/ras/isc.log

5.3.2.4 Control server

To set a trace for the control server:

- Export SCMTRACE=yyyyny
- Daemon start: startsrc -s vscs
- Trace file: /var/adm/ras/avscs/log

5.3.3 VideoCharger player

To turn on tracing, from the VideoCharger player, and click:

- **Options > Preferences > Trace**
- Check **Program Flow** check box
- Check all **Components**, unless performance degrades too much
- Once error occurs, exit the player to stop tracing
- View the log to find error return code
- Log file: **c:\<VideoChargerplayer directory>\pcstrace.log**

5.4 Frequently asked questions (FAQs)

Here is a question and answer format for frequently asked questions.

5.4.1 VideoCharger server for NT

Q: Trying to configure an encoder port using the advanced HTML page gives the message:

```
Error: Unable to capture encoding headers, msOpenRecordStream failed rc=f5c
Error: Unable to save new encoding headers, rc=0xffffff5c1
```

A: This indicates that some of the settings chosen from the advanced menu are not supported by the encoding board. For example, choosing full frame for low bit rate mpeg video when only a half or quarter frame rate is supported. Try different settings for bit and frame rate. If that doesn't work, try stopping the VideoCharger server and bring up the mpeg encoding software that came with your encoder board. Try the same combination of settings that failed with VideoCharger and see if the board will support those settings. If you can't get the settings you want to work, consult the documentation that came with your board.

Q: When using the vslist command or the HTML page to view the list of assets, I get the following message:

```
2100-075 RPC system error, unable to contact Control Server
```

(but the lantv_cs service is active)

A: Aventail Connect (SINE client) is installed. Try removing Aventail Connect and rebooting the system.

Q: When starting VideoCharger on a system with an encoder board, the `lantv_de` service hangs in the starting state. Why?

A: The encoder board is not properly configured. Make sure you have the latest drivers for the encoder board, then use the control software that comes with the board to encode a short test sample to ensure the board is working properly. After the board has been checked out start VideoCharger.

Q: When I try to use the `vsconfig` command to create the Administrative userid and password for VideoCharger, I get the message:

```
Error 10: Unable to define VideoCharger Administrator Account
```

A: The minimum password length for Administrative users is set too high for the password you are trying to use. Change the minimum password length by using the following procedure:

1. Select **Start > Programs > Administrative Tools > User Manager for Domains**.

2. Highlight **Administrator**.

3. From the task bar select **Policies > Account**.

4. Under **Minimum Password Length** decrease the minimum to at least the number required for the password you are trying to use.

5. Rerun `vsconfig`.

Q: When I try to use the `vsconfig` command to create the Administrative userid and password for VideoCharger, I get the message:

```
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```

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2. Highlight **Administrator**.

3. From the task bar select **Policies > Account**.

4. Under **Minimum Password Length** decrease the minimum to at least the number required for the password you are trying to use.

5. Rerun `vsconfig`.

Q: I know that user `vsadmin` (or another VideoCharger server administration account) is used to authenticate the user to do the administration work through the Internet. If I don't use Microsoft IIS, can I delete that user and just maintain the user under the Web server user database?

A: No. If you examine the lantv_xxx services in the service window of NT carefully, you will find that the services are being run using the administration account that we configured using `vsconfig`. Therefore, the administration account is the person who is responsible for the services.

Q: I have received the error message `cannot login to host` while importing videos from a remote host. How do I correct this problem?

A: The problem you encountered is due to incorrect permissions for the ftp user ID. The ftp user ID needs to be created and assigned the permission of **Act as part of the operating system**. The new permission of the user ID takes effect when the VideoCharger server starts. The following steps can be done to correct the problem:

1. Click **start** on the Windows NT task bar.

2. Select **Programs > Administrative Tools > User Manager**. If the user ID already exists, you can skip to Step 14.

3. Select **User > New User** from the menu bar on the User Manager window.

4. Set **Username** on the New User window to the user ID that you want to create.

5. Set **Password** and **Confirm Password** to the password for the user ID.

6. Deselect the **User Must Change Password at Next Logon** check box.

7. Select the **User Cannot Change Password** check box.

8. Select the **Password Never Expires** check box.

9. Click **Groups**.

10. Select **Administrators** in the **Not member of:** list on the Group Memberships windows.

11. Click **Add**.

12. Click **OK** on the Group Memberships window.

13. Click **OK** on the New User window.

14. Select **Policies > User Rights** from the menu bar on the User Manager window.

15. Select **Act as part of the operating system** from the right drop-down list box.

16. Click **Add**.

17. Click **Show Users** on the **Add Users and Groups** window.

18. In the Names list, select the user ID you just created for the ftp user ID.

19. Click **Add**.

20. Click **OK** on the Add Users and Groups window.

21. Click **OK** on the User Rights Policy window.

Q: I got the message during installation that the Peer Web Services or IIS isn't installed. What does the installation look for?

A: The installation looks for the register entry:

```
"HKEY_LOCAL_MACHINE\\SYSTEM\\CurrentControlSet\\Services\\W3SVC\\Parameter
s\\Virtual Roots"
```

This registry entry is created when Peer Web Services or IIS is installed.

Q: The default port number assigned to Media Manager is already in use. How do I change the port used by Media Manager?

A: Change the registry entry:
```
HKEY_LOCAL_MACHINE\\SOFTWARE\\IBM\\LANTV\\CurrentVersion\\MediaManagerPort
```
by running `regedit` in the start menu:

1. Double click the registry entry **MediaManagerPort**.

2. A window will pop up with the current value set. Click on the **Decimal** base.

3. Change the value of the port number.

4. Press **OK**.

Q: I would like to have my NT VideoCharger server start up at boot time. How can I do this?

A: You can do this by putting the `vsstart` command in your NT **startup** folder. This will start VideoCharger once you log onto Windows NT.

Q: I started a multicast from encoder. The multicast is "in progress". I removed this multicast. It disappears from the list, but keeps on playing. The process vsendode.exe stays alive. The data is still transmitted over the network. There is no way to stop it (only reboot). The same with multicast from file (ipplay.exe process). The processes only disappears when the duration time is over. If you scheduled a live stream for four hours, there is no way to stop this except reboot. Any advice?

A: We found a workaround for this problem. It is the access problem of the services that prevents the encoder to stop when the multicast job is removed. The workaround is as follows:

1. Go to **Control Panel** in NT and select **services**.
2. Look for **lantv_cs**, **lantv_de** and **lantv_sc**.
3. Double-click on each service and change the **log on as** panel.
4. Select **this account** and click on the **...** button. Select the login ID that performs the administration of the VideoCharger server, type in the password, and confirm the password.
5. Press **OK**.
6. To remove the multicast job, you need to log in as the administrator id (the same name as the one that is set in the services).

Q: If I schedule a multicast, using the option TCP instead of RTP under advanced, there is the message success, but the item does not appear in the schedule list.

A: Multicast is only supported with RTP, not TCP. We need to disable this option in multicast.

Q: I am running VideoCharger server on a Netfinity 5000, ATM, Future Tel NS 320, but I can't seem to get multicast to work. Any advice?

A: Our understanding is that ATM with classic IP does not support multicast. We believe this is an ATM problem and not a VideoCharger problem. Multicast is only supported over Ethernet, token-ring, and ATM running LAN emulation.

Q: My VideoCharger server is inside my firewall and clients accessing it are outside the firewall. I am using Network Address Translation (NAT) to translate the IP address of the server (as defined inside the firewall) to a different IP address outside the firewall (seen by the clients). How do I configure the VideoCharger server to work with NAT?

A: A new feature was introduced into VideoCharger to allow the use of the NAT tool in the configuration you describe. Edit the registry.

1. Click the **Start** button. Click **run**. Type in `regedit`. Click **OK**. Go to the following key:

   `HKEY_LOCAL_MACHINE\SOFTWARE\IBM\LANTV\CurrentVersion\ControlServer\` Options\Network Address

2. Highlight **Network Address** and then select **Edit** and **Modify**. Change the **value data** from **0** to **1** and then click **OK** and close regedit. A value of **1** configures the application server to relax some security features of the server, and allows the use of the NAT facilities. A value of **0** (default) allows the server to run in normal mode.

3. After changing the registry, stop (`vsstop`) and then restart (`vsstart`) VideoCharger.

Q: How do I configure the IBM HTTP server for use with VideoCharger on Windows NT or 2000?

A: **Important**: The following instructions assume that you have installed the IBM HTTP Server in the default directory of "C:\Program Files\IBM HTTP Server". If its installed into a different directory you will have to modify the following instructions accordingly.

To create the administration and content loading user vsadmin for the IBM HTTP Server, run this command and enter the vsadmin password when prompted:

`"C:\Program Files\IBM HTTP Server\htpasswd" -c "C:\Program Files\IBM HTTP Server\conf\vc.passwd" vsadmin`

Open the file `C:\Program Files\IBM HTTP Server\conf\httpd.conf`. Before you append the following lines to the file, you must change some of the directory references, if you did not accept the default VideoCharger on Windows installation directory. Read the comments in the following lines and you should know how to change them accordingly.

Note: You can cut and paste the following then make any necessary editing changes.

```
# Start of VideoCharger for NT configuration
DirectoryIndex default.htm
# Passing environment of VC, these environment variables are very
# important to the CGI programs
PassEnv LANTV_DIR
PassEnv LANTV_SDK_DIR
# You must not reverse the order of the following 2 directives.
# ScriptAlias must go before Alias in order to make the CGI work
# Use forward slash for path separator and double quote to quote
# directory with space
# *********************** Important ************************
# Modify the directory value of both ScriptAlias and Alias if you do not
# accept the default VideoCharger for NT installation directory
# ****WARNING*** if any of the following single lines is incorrectly
entered as two lines
# in the httpd.conf file the IBM HTTP Server may not start.
ScriptAlias /lantv/cgi-bin/ "c:/Program Files/IBM/IBM VideoCharger
Server/Data/public/cgi-bin/"
ScriptAlias /vs_admin/cgi-bin/ "c:/Program Files/IBM/IBM VideoCharger
Server/Data/admin/cgi-bin/"
Alias /lantv "C:/Program Files/IBM/IBM VideoCharger Server/Data/public"
Alias /vs_admin "C:/Program Files/IBM/IBM VideoCharger Server/Data/admin"
# Add protection to the CGI-bin directory
# ********************* Important **********************
# Change the directory reference of if you do not accept the
# default VideoCharger for NT installation directory
<Directory "C:/Program Files/IBM/IBM VideoCharger Server/Data/admin/html/">
AuthType Basic
AuthUserFile "C:\Program Files\IBM HTTP Server\conf\vc.passwd"
AuthName "VideoCharger Admin"
require valid-user
</Directory>
# Disable directory listing
# ********************* Important **********************

# Change the directory reference of if you do not accept the
# default VideoCharger for NT installation directory
IndexOptions FancyIndexing
<Directory "c:/Program Files/IBM/IBM VideoCharger Server/Data/public">
IndexIgnore *
</Directory>
<Directory "C:/Program Files/IBM/IBM VideoCharger Server/Data/admin">
IndexIgnore *
</Directory>
# End of VideoCharger for NT configuration
```

After saving the file, you can try starting the server by double-clicking the start server icon from the program group.

5.4.2 VideoCharger server for AIX

Q: After rebooting the VideoCharger server, it does not work. The /var/adm/ras/avscs.log has the messages:

```
Nov 22 14:19 VSCS: 2100-435 Unable to login to user id "vsloader" on host
"dp0"
Nov 22 14:19 VSCS: 2100-435 Unable to login to user id "vsloader" on host
"dp0"
Nov 22 14:19 VSCS: 2100-426 Failed to get file system information in
function msiGetFileSysInfo
Nov 22 14:19 VSCS: 2100-437 Unable to access stripe group
"str0.stl.ibm.com.sg0@dp0.stl.ibm.com"
```

What does this mean?

A: The vsloader password has changed. Set the vsloader password in AIX to match the password for the data pump.

Q: 100Mbit Ethernet port bandwidth is limited to 9Mbit/sec. How do I increase the limit to a more sensible level?

A: The `lsvsport` command can be used to list the ports defined to VideoCharger. Use `lsvsport -l` *portname* to list detailed information on a single port, including the bandwidth limits. If you want a higher bandwidth, issue `chvsport -l` *portname* `-b` *bandwidth* to set the maximum interface bandwidth. This takes effect immediately and you do not have to reconfigure or redefine the Data Pump.

Q: When using a web browser to access the admin web pages at `http://hostname/vs_admin/admin/vs.html`, I get an error like:

```
Configuration Error: Access Denied. HTTP Server is not authorized to access
this page.
```

What does this mean, and how can I fix it?

A: The Web server is running as a user that is not a member of the vsadmin and vsasset groups. Determine the user that the Web server runs under (using `ps -ef`), then add that to the vsadmin and vsasset groups. For example, if the Web server runs under the user nobody then use:

```
/usr/bin/chgrpmem -m + nobody vsadmin
/usr/bin/chgrpmem -m + nobody vsasset
```

Q: On a machine whose language is not en_US (but is supported by VideoCharger) there is a message `message not found` in /var/adm/ras/avscs.log. How do I stop this message appearing?

A: Start the control server with the command `startsrc -s vscs LC_ALL=JaJP` (for Japanese)

Q: When I type `pwdadm vsadmin` and then the password, I get the message `3004-619 Security method "DCE" could not be loaded`. How do I fix this?

A: This happens if DCE is set at the password authentication method. Type `smitty users`, select `Change/Show Characteristics of a User`, then enter `vsadmin` as the User Name. Set the following fields:

```
Login AUTHENTICATION GRAMMAR: [compat]
Password REGISTRY: [files] or []
```

Q: A user gets the message `Streaming Network Interface received error code from the application Server, session is aborted. Check the Application server log. PC=3F8 Secondary RC=480000A`. Another user gets the same message with `PC=3F8 Secondary RC=580000E`, but there is nothing in the log. What do these return codes mean?

A: Return codes that have either x8000nnn or x9000nnn within them are errors detected by the Control Server or Application Server.

- x8000nnn can be checked by looking in **mserror.h**, which is installed with avs.cs.client.adt and which is included in the installation CD.
- x9000nnn can be decoded by looking at **iscerror.h,** which is in the pac package avs.applsrv.client.adt.

Return code 480000A is "Disk bandwidth exceeded". Check file /var/mmfs/gen/pg.cfg to make sure that the mmfs performance data has been measured and recorded.

Return code 580000E is "Port Inactive". Issue command `Isvsport` to get the port(s) defined and then issue `Isvsport -I[portname]` to check the status of the port.

Q: Where is the application server log located?

A: The logs are in the /var/adm/ras directory, and are called:

- isc.log
- avscs.log

- avsas.log
- avsdex.log
- avslog
- mmfs{yymmdd}

There is one log for each component of VideoCharger. You can view each of them (except avslog) with `pg`, `more`, `vi`, and so on. For avslog, you need to type: `alog -f avslog -o` (and pipe it to `pg` or `more`). You may also want to look at the errlog (use `errpt -a` piped to `pg`).

The Control Server (CS) messages are very useful; and while the DE messages are not readable to you, they are an indicator of some problems.

To turn on extensive application server logging, use the `chvssy` and `lsvssy` to see the settings. Turn on ERROR, WARNING, and, if you are really curious, INFO *trace* (not just messages).

Return codes that can be decoded with the 0x00800000 offset, for example, 1800008, can be looked up in /usr/include/avs/mserror.h, for example, MS_NO_RESOURCES, which is installed if you install the client development kit (avs.cs.client.adt).

Return codes with the 0x00900000 offset, for example, 1900005, are from the application server and can be found in iscerror.h, for example, AI_INVALIDVIDEONAME.

Return codes that cannot be decoded this way should be reported to your IBM Technical Support.

Q: The default port number assigned to Media Manager is already in use. How do I change the port used by Media Manager?

A: The default port assigned to the Media Manager is 23793. Use the following procedure to change it:

Edit the **/usr/bin/startmm** file and add the following after the sentence **exec /usr/bin/mediamgr -p portnumber** (portnumber is in decimal). For example, to change the port to 23000, the sentence should read: **exec /usr/bin/mediamgr -p 23000**.

Q: What is the procedure for configuring VideoCharger on an SP node (that uses a Control Workstation to manage its userids)?

A: Configuring VideoCharger on an SP node (that uses a Control Workstation to manage its userids) requires the following extra steps.

1. Create the `vsadmin` and `vsloader` users on the Control Workstation.

2. Set passwords for `vsadmin` and `vsloader` on Control Workstation, first using the `pwdadm` without and then with `-c`.

3. Create `rcmd.vsadmin` and `rcmd.vsloader` kerberos principals on the Control Workstation with the `kadmin` program.

4. Create `.klogin` file for `vsadmin` and `vsloader` users on VideoCharger server node.

5. Update password and group files on all nodes via the command `dsh -av /var/sysman/supper update`.

Q: When I try to stage video from one VideoCharger server to another, I get the error message "`2100-017`". It also mentions "invalid sempte time code". What do I do?

A: If the video asset to be staged has been loaded under an earlier version of the VideoCharger server, it may be that the frameRate parameter for the asset is now invalid, that is, set to **0**.

You can verify this by using the `vslist -a` *assetname* command ("*assetname*" is the name of the asset being staged).

If the frameRate is **0**, you can then correct this by updating it using the `vsparse -a` *assetname* command to reparse the video asset.

Q: How do I find out the version of VideoCharger components I have installed on in my AIX server?

A: From the command line type: `lslpp -L avs.*`

This command will then list the VideoCharger filesets and their levels.

Q: Why can't VideoCharger multicast over ATM when its configured for classic IP?

A: IP support establishes an ATM virtual circuit - logically, a point-to-point connection - between a host pair. This won't allow multicast. The VideoCharger Windows version is the same.

Q: Is there a way to manage the bandwidth limit on both a Data Pump basis and a LAN adapter basis?

A: Its possible to set a maximum Data Pump bandwidth and also a port bandwidth limit on a per port basis. The default for the data pump is not to set a bandwidth limit. If you wish to set a limit use the command `chvsdp -l datapump_name-r new_limit` (where `datapump_name` is the name of the data pump and `new_limit` is the bandwidth limit you want to set for the data pump). To return the Data Pump to the default of having no limit use the command `chvsdp -l datapump_name-r -1`

For the port bandwidth, at the time the port is created, VideoCharger tries to determine the bandwidth of the LAN adapter and set the limit appropriately. Often this limit must be changed after the port is created. The port bandwidth limit on each port can be changed by using the command `chvsport -l port_name -b newlimit`, where `port_name` is the name of the VideoCharger port and `newlimit` is the limit you want to set for the port. The command `lsvsport` will list all of the defined VideoCharger ports.

Note: You should set the port limit to no more than 70 percent of the maximum rated value of the LAN adapter. So for a 100Mbit Ethernet adapter the VideoCharger port bandwidth should be set at no more than 70Mbits. This will account for packet overhead, in sending the video stream and also that many LAN adapters cannot achieve their maximum rated value.

Q: After I backed up the multimedia file system (mmfs), the mmfs file system does not seem to be mounted and cannot be mounted anymore. How do I fix the problem?

A: The multimedia file system (mmfs) is backed up by going through `smitty mmfs` > **File System Operations** > **Backup a File System Configuration**, and then `smitty mmfs` > **File System Operations** > **Restore a File System Configuration** to restore it.

If it then cannot be mounted, issue the following commands to fix the problem:

1. `lsvg | grep vghdisk` (to find out all the mmfs volume group names)
2. `chvg -a y vghdisk#` (for each volume group, where `vghdisk#` is the volume group name listed in the previous `lsvg` command).
3. `varyonvg vghdisk#` (for each volume group, where `vghdisk#` is the volume group name listed in the previous `lsvg` command).

Q: My VideoCharger server and clients are separated by a firewall. What ports have to be open in the firewall to enable video streaming?

A: The VideoCharger server requires the standard port 80 (TCP) for Web page browsing, port 8500 (TCP) for non-QuickTime stream setup and control, and port 554 (RTSP) for QuickTime stream setup and control. Port pairs are randomly selected from 5000 - 65535 (UDP,TCP) for both UDP and TCP streaming. (This port range can be limited on AIX 4.3, see the following question). In addition if loading video through the firewall and into the server is needed, then port 22 (TCP) is required (this is the default but can be changed in the Data Pump).

Q: My VideoCharger server is inside my firewall and the clients that are accessing it are outside the firewall. I am using Network Address Translation (NAT) which translates the IP address of the server (as defined inside the firewall) to a different IP address (as seen by the clients) outside the firewall. How do I configure the VideoCharger server to work with NAT?

A: Edit the file `/var/avs/config/ISC.INI`. At the bottom of `ISC.INI` you should see `APP_SERVER_NAT=`, which can be set to `ON` or `OFF`. For example, to allow VideoCharger to work with NAT, you would change the line to this: `APP_SERVER_NAT=ON`. A value of `ON` configures the application server to relax some security features of the server, and allows use of the NAT facilities. A value of `OFF` (default), allows the server to run in normal mode.

After changing `APP_SERVER_NAT` to `ON`, stop (`stopsrc -cg vs`) and then restart (`startsrc -g vs`) VideoCharger.

Q: When I reboot VideoCharger, I see the following errors in the /var/adm/ras/avscs.log: "`VSCS:2100-454 Portmap erro when contacting Data Pump`". If I stop (`stopsrc -cg vs`) and then restart (`startsrc -g vs`) VideoCharger the errors go away.

A: The VideoCharger components may be starting in the wrong order when the system is rebooted. Check the file `/etc/inittab`. The VideoCharger components must be started after TCP/IP and DCE and should be in the following order:

```
rcvsdp:2:wait:/etc/rc.vsdp 2>&1 | alog -tavs >/dev/console # Start Video
Data Pump
rcvscs:2:wait:/etc/rc.vscs 2>&1 | alog -tavs >/dev/console # Start Video
Server
rcvsas:2:wait:/etc/rc.vsas 2>&1 | alog -tavs >/dev/console # Start Video
Server Appl. Server
rcvsrtspd:2:wait:/etc/rc.vsrtspd 2>&1 | alog -tavs >/dev/console # Start
RTSPD Daemon
```

```
rcvsmm:2:wait:/etc/rc.vsmm 2>&1 | alog -tavs >/dev/console # Start Media
Manager Daemon
```

If you need to edit the order, make a copy of the current inittab first (`cp -p /etc/inittab /etc/inittab.old`).

Q: When trying to view a multicast from:

```
http://my_server_name/vs_public/cgi-bin/iscpfmct
```

I get the popup message,"`Cannot open http:///vs_admin/cgi-bin/view Mcast_PF?ag1+testvc1+10.180.2.95+5555+1070000+TCP+199911242319.48 parameter is invalid`".

A: This can happen when the VideoCharger server and the client you are using to view the multicast are not set up to use a nameserver. If you cannot use a nameserver, you must edit the Web server configuration file. For IBM Internet Connection Server and for IBM Lotus Go server this involves editing the `/etc/httpd.conf` file. Add a line at the bottom of the file with the syntax:

```
"Hostname your_server_hostname"
```

Where `your_server_hostname` is the name returned when you type the command "hostname" on your server. For example if the hostname of your server is "video" then you would add the line "Hostname video" to the `/etc/httpd.conf` file.

After editing the file you must stop and restart the Web server by typing the command `refresh -s httpd`.

Q: When trying to start a multicast job on the "Add a Multicast Job" html page, I get the error message, "`VSSM 2100-840 cannot retrieve port name`".

A: This happens when the TCP/IP hostname of a LAN interface does not match the VideoCharger port name associated with that same interface. For example, your VideoCharger server might have an Ethernet interface (en0) which you have associated (either in the nameserver or the etc/hosts file) with the TCP/IP name "video0". In this case, the VideoCharger portname must also be "video0". You can check the names of your VideoCharger ports by using the VideoCharger administrator Web pages. Point your web browser to:

```
http://your_server_hostname/vs_admin/cgi-bin/vscfg_cgi/vscommport_cfg
```

Then select **List**. The "Name" for each port must match the name in the "Descriptor".

Note: The VideoCharger port name does not need to include the domain name.

If the port name does not match the TCP/IP name you must delete the port and then add it back. Both can be done using the Web page:

```
http://your_server_hostname/vs_admin/cgi-bin/vscfg_cgi/vscommport_cfg
```

5.4.3 Encoding support

Q: What Optibase encoder cards does VideoCharger support?

A: IBM VideoCharger supports the following Optibase encoder cards:

- Forge (MPEG-2 half res & mpeg-1)
- Fusion (MPEG-2 full res & mpeg-1)
- MovieMaker (MPEG-1 only)

Only one Optibase card is supported in a single VideoCharger server. You may have one Optibase Encoder and one FutureTel Encoder, but not two Optibase or two FutureTel encoders in a single VideoCharger server. To encode MPEG2 with the Forge or Fusion cards, select a Mux Mode of either **program** or **transport** from the Modify Encoder Port Web page.

Q: What FutureTel cards does VideoCharger support?

A: VideoCharger VideoCharger supports FutureTel encoder cards PVH-55 or PVH-73 with the following driver:

- PrimeView (TM)
- MPEG System Stream Driver Version 3.4

To configure for MPEG2 (MPEG2 capable encoders only), define a port, and then use the "Modify Encoder Port" to change the configuration to MPEG2. Note: Multicast MPEG2 video is not supported.

We support FutureTel PrimeView NS320/325 Encoders with FutureTel PrimeWare: Recorder 4.0.1.

If you have already configured a FutureTel Encoder port with VideoCharger, and install FutureTel PrimeWare Recorder 4.0.1, you should run **Refresh Port Definition** from the **Encoder Port Configuration** Web page (`http://<hostname>/vs_admin/html/iscvsprt.html`) to ensure that multicasting directly from the encoder works properly. You may also need to modify your encoder port settings if the new driver has reset these values back to default settings.

5.4.4 Video Charger player

Q: I've installed the VideoCharger player on my system, but when I tried to play videos from my Netscape Browser, I received the following error message: `You have started to download a file of type video/x-ibm-lvs Click "More Info" to learn how to extend Navigator's capabilities`. How do I configure my browser to automatically start up the player?

A: This error usually happens because you have more than one copy of the Netscape Browser installed on your system. Click the **Pick App** button. Then type-in `c:\IBMIVSC\PROGRAM\iscoview.exe` in the space provided.

Note: If you installed the VideoCharger player in a directory other than c:\IBMIVSC, replace the c:\IBMIVSC with the appropriate directory.

Q: I received the following message when I tried to play the same video twice from the browser: `Streaming Network Interface received error from the Application Server, session connection is aborted. Check the application Server Log. RC=3F8 Secondary RC=290000C`. What needs to be done to fix this?

A: For security and billing reasons, each VideoCharger player must pass a "ticket" to the VideoCharger server in order to play a video. This ticket can only be used *once*. If the cache is turned on in your browser, the VideoCharger player will try to reuse the ticket saved in the cache. To resolve this error, the cache needs to be turned off.

If you use the Netscape browser, go to the **options** menu on your browser and bring it down to **Network Preferences**. Next choose the **Cache** tab and change the **Verify Documents** option to **Every Time**, then click **OK** to save your change.

If you use Microsoft Internet Explorer, go to the **View** menu on the top of your browser and select **Options**. Next select the **Advanced** tab on the Options menu and click **Every visit to the page** radio button under the Cache section on the Advanced panel, then click **OK** to save your change.

Q: Our PC clients are 133 MHz Pentium processors with MPEG decoding video cards. We believe that the MPEG decoding is being done by the VideoCharger client software (ActiveX?), and not making use of the card. Is there a way to configure the client software so that it makes use of the hardware decoding?

A: The VideoCharger player uses the SoftMPEG decoder installed with Active Movie. Hardware decoder will work only if it has Achievement filter support.

Q: I get the message `DDRAW.DDL initialization error` when using the Plug-in.

A: This is a Netscape problem for versions *below* 4.05. Please upgrade to Version 4.05 or above, and the problem will go away.

Q: I get the message Streaming network error: `Failed on a synchronous read when using the plug-in to view (via a special cgi-bin) multicast streams.`

A: This problem occurs for Internet Explorer Version 4. You can use Netscape Version 4.06 or above to bypass this problem.

Q: My VideoCharger client machine has two LAN adapters, and I am unable to play videos when both are enabled. When I try to play a video from the VideoCharger server, the player shows "connecting", then "complete", and then "stopped", all the while displaying a black screen for the video. How do I solve this problem?

A: Check the following:

1. For Windows NT: This problem can occur if the VideoCharger server cannot access the client through the client's default LAN adapter. To verify which adapter is the default, open a command prompt on the client and try pinging by the client's own hostname. The IP address that is pinged is the interface that the VideoCharger server will try to stream video to.

   For example, suppose your client machine is identified (as shown on the **Identification** tab on the **Network** dialog box) and has two network adapters: a token ring identified with IP address 9.112.18.100 and an ATM with IP address 9.112.55.10. If you ping and the address that is pinged is 9.112.55.10, that will be the interface (ATM) that the VideoCharger server will try to stream video to. If the server does not have access to the ATM interface of the client, then the video will not reach the client.

   The default address can be changed on NT clients that have Service Pack 4 or 5 installed by changing the binding order to TCP/IP protocol. Go to **Start > Settings > Control Panel > Network** and press the bindings tab. Show bindings for all protocols and then double-click on TCP/IP protocol. The adapter at the top of the list will be considered the default. Highlight the adapter you want to be the new default and use the **Move Up** button to put it at the top of the list. Click **OK** and the bindings will be changed (after a reboot).

   If you have Windows NT but don't have service pack 4 or 5, changing the order will not have any effect.

2. For Windows 95/98: There is no option to specify a default LAN adapter. Depending on the particular system, the only way to ensure that the video will stream to the right interface is to disable the other adapters temporarily. This can be done by right-clicking on the **My Computer** icon and selecting **Properties**. The System Properties window will appear. Select the **Device Manager** tab. Click **Network Adapters** and select the adapter you want to disable. Click the **Properties** button, and check **Disable in this hardware profile**.

Q: On the PC client, we enabled the window that shows networking statistics. We noticed that it will display a count of LOST packets, and we're wondering if "late" packets are considered lost. We aren't seeing a very smooth picture, so we're trying to determine if the information in this window is telling us that our networking is OK, or if it's just not telling us much at all. It only lost five packets out of thousands, but if a large percentage were late, this could account for the breakup in video.

A: More detailed networking statistics can be found under VideoCharger Player Options.

1. On VideoCharger player window, click **Options** and select **Defaults** on the pull-down window.

2. On the viewer defaults window, hold the Shift key on your keyboard and click the **Filters** tab. The screen should display selections for **Settings** and a button for **Properties**.

3. Select **Streaming source Filter** from **Settings** and click the **Properties** button. This will take you to the **Streaming Source Filter Properties** window.

4. Select **RTP** tab from the **Streaming Source Filter Properties** window and it will display more detailed networking statistics, such as Packets Discarded, Recovered, and so on.

Q: When I use ftp to bring assets into my AIX Video Charger server, sometimes the `vsparse` command fails to update the metafile. Why?

A: We have seen intermittent occurrences of `vsparse` failing when using the ftp method to bring assets into AIX VideoCharger. We do not have a conclusive rationale for this failure yet. Therefore, we strongly recommend that you use `vsload` to load assets into your AIX VideoCharger server instead of the ftp method.

Q: My VideoCharger player won't start. I get a Microsoft Visual C++ runtime error. How can I fix it?

A: We have seen his error when two files are different versions: mfc42.dll and msvcrt.dll. To see if your files are different versions, right-click on **My Computer > Explore**. Open the **Winnt/System32** directory and find the files. Right-click on each and view the **Version** tab in **Properties**. Go to product version on the left listing and check what it is. Both files should be the same product version, that is, both Version 4 or 5. If you find a version mismatch, contact your system administrator for assistance, because these are system windows files. In order for the player to work properly, both of these files need to indicate the same version, but can be different point releases.

Q: A client under MS NT workstation with Netscape Navigator 4 can play on demand files (MPEG1). The same file multicast results in the error: `rendering error` at the player. Why?

A: We suspect there is no sound card in your machine. Our software depends heavily on Active Movie filter developed by Microsoft. The filter is not solid, as we know, and does not handle very well when no sound card is installed in the machine.

Q: Can I play videos while they are loading to VideoCharger?

A: You need to verify that the data copy rate to VideoCharger is greater than the play rate of the video when you play the video while it is loading to VideoCharger. The following are ways to set up the load and play stream:

1. Use `vsload` with copyrate and load mode of RS: `vsload -a assetname -v videoname -i hostname -p password -m RS -r 3000000`, where:

    - assetname is the name of the video to be stored in VideoCharger.

    - videoname is the name of the video you load from.

    - hostname is the host name of the machine where the asset you load from.

    - password is the password of the machine where the asset you load from.

    - RS stands for Read Share.

    - 300000 is 3 Mb/s copy rate. Note that the copy rate should be greater than the play rate.

2. Use vsstage with copyrate and load mode of RS: `vsstage -a assetname -S servername -m RS -r 3000000`, where:

    • assetname is the name of the video to be stored in VideoCharger.

    • servername is the name of the server that the video is copied to.

    • RS stands for Read Share.

    • 3000000 is 3 Mb/s copy rate. Note that the copy rate should be greater than the play rate.

3. Use the real time encoder and play while it is encoded.

Q: How do I configure the America Online (AOL) browser to run VideoCharger player?

A: Please follow the following instructions to configure your AOL browser after you have downloaded the VideoCharger player:

Note: The following instructions apply to AOL Version 3.0.

1. Select/Click the **Prefs** button on the AOL browser. This will take you to the **AOL Internet Properties** panel.

2. Select the **Programs** tab on the **AOL Internet Properties** panel. It will show you options to set up **Mails and News** and **Viewers**.

3. Click the **File Types** button under **Viewers** located in the middle of the panel. This will take you to the **File Types** panel.

4. The **File Types** panel will have a scrollable window called **Registered file types** on the left, and buttons called **New type**, **Edit**, and so on, on the right. Select **IBM Internet Video** on the **Registered file types** window (you may need to scroll down the window to find it) and click the **Edit** button to the right of the window. This will take you to the **Edit File Type** panel.

5. Select **Enable Quick View** and deselect **Confirm Open After Download** on the **Edit File Type** panel and click **OK**. This will take you back to the **Edit File Type** panel.

6. At the **File Type** panel, click **OK** on the **File Types** panel and then click **OK** again on the next panel (**AOL Internet Properties**) to exit and save your change.

Now you should be able to watch a video using the VideoCharger player.

Q: The VideoCharger player will not work with Internet Explorer (IE4) but will work with Netscape. IE4 gives an error message referring to "permission" problems.

A: The error message is misleading, implying it was unable to write the temp file. The real reason it fails is that the location for installing the client is `..../Program Files/....` IE4 will not work in this case because of the SPACE in the directory name. IE4 will work if you go into the desktop, file types, and change the location of the client handling .ivs files to be surrounded by quotes, for example, `"..../Program Files/...."`.

Note: Netscape, it seems, does this by default, and IE4 does not.

To fix this problem, use the following procedure:

1. In **My Computer** on the View menu, click **Folder Options** (or **Options**).
2. Click **File Types** tab.
3. Find and click on **IBM Internet Video**.
4. Click **Edit**.
5. In **Actions**, click **Open**.
6. Click **Edit**.
7. Under Application used to perform action, put quotes around the application. After you added the quotes it might look something like this:
   `"C:\program files\iscview.exe"`
8. Click **OK**.
9. Click **Close**.
10. Click **Close**.

Now close Internet Explorer, and then bring it back up and try playing video again.

Q: The duration of the streamed video from the VideoCharger Server is shorter than the duration of the video when played locally on the client. What can I do to correct this?

A: The VideoCharger Server uses the estimated bit rate generated by the encoder to calculate the duration of the video. Some encoders estimate a higher bit rate than the actual one. In those cases, the duration of the streamed video is shorter than expected. To have the VideoCharger Player calculate the duration of the video using the actual bit rate, follow these steps with the IBM VideoCharger Player Version 2.0.5b or later:

1. Open the VideoCharger Player (**Start Menu** > **Programs** > **IBM VideoCharger Player** > **IBM VideoCharger Player**).

2. Click **Options** > **Preferences** on the main panel.

3. Click the **Network** folder.

4. Check mark the box **Do not use pre-parsed data from server for streamed file** under the section **Advanced Streaming Options**.

5. Press **OK**.

6. Close the VideoCharger Player.

Note: By choosing this option, you will not be able to play a video at the same time that it is being loaded into the VideoCharger server (load and play). Also, you may notice more delay in the time from when you initiate the playing of a video until the video actually starts playing.

5.4.5 QuickTime player

Q: I get error `11001` from the QuickTime player whenever I click on a QuickTime asset from the asset list Web page. How can I fix that?

A: VideoCharger CGI program will redirect the browser to a URL like `rtsp://vcserver.abc.def.com/movie.mov` after you selected a QuickTime asset. This URL is in turn handled by QuickTime player. If the TCP/IP configuration of your VideoCharger is not configured with the domain name, the URL would look like `rtsp://vcserver./movie.mov` (an extra *dot* is appended after the hostname without following any domain name), therefore, the error of failure to contact the VideoCharger server. On AIX, run `smitty tcpip` to configure the DNS entry. On Windows NT, go to **Control Panel > Network.** Open the **Protocols** tab. Go into your TCP/IP protocol line and under the **DNS** tab, enter a domain name.

Q: Will a Macintosh, with QuickTime V4.0 installed, be able to play the MPEG1 file already uploaded — files that the PC plays now with the VideoCharger player?

A: The QuickTime V4.0 player does not support streaming MPEG format yet. However, Apple is working on this feature, and it should be available shortly.

Q: Will MPEG files need an .mpg extension to be recognized by the QuickTime player?

A: We will not know until streaming MPEG is available for the QuickTime player.

Q: Will a Macintosh be able to play QuickTime .mov files uploaded to the VideoCharger? Will these have to be saved as a streaming QuickTime movie, which include a hint track, or will any type of QuickTime movie work?

A: You can use a Macintosh with QuickTime to play .mov files from VideoCharger. These assets, however, must include a hint track and they have to be prepared using the latest Quicktime version.

Q: Will a PC, with QuickTime V4.0 installed, be able to play back .movs from VideoCharger? If so, are they played back using the QuickTime player or the VideoCharger player?

A: The QuickTime player would be used (and therefore needs to be installed) on PCs playing Quicktime .movs on VideoCharger.

Q: Is there a way to download a stand-alone QuickTime 4 installer that does not require a live Internet connection?

A: Yes, go to `http://www.apple.com/quicktime/download/support/`

Q: Can I play videos while they are being loaded to VideoCharger?

A: The load and play of Quicktime media types, using Apple Quicktime player, is not supported in this release.

Q: Can I multicast Quicktime movies?

A: VideoCharger now supports multicasting of Quicktime movies.

Q: How do I prepare QuickTime Videos to use with VideoCharger?

A: Users can use the QuickTime client (provided by Apple) to play videos from the server. The assets have to be prepared using the latest QuickTime version, and then loaded on to the server.

To prepare the assets:

1. Open the asset as a file in the QuickTime client. For example, to prepare an asset called quicktime.mov, go to **File->Open** and enter Quicktime.mov with the right path.

2. Export the file as a self-contained prepared file. To do this, Under **File->export**, in the **Export** panel, select **Movie to Hinted Movie** and in the **Use** panel, select **Default settings**. Give the exported movie another name like quicktimep.mov, and save the file. (Make sure that the

self-contained check box is checked on, under the **Options** tab). Now the file quicktimep.mov is ready to be loaded as an asset into the VideoCharger server. Use the regular methods like `vsadd` or `vsload` to load this asset (quicktimep.mov) into the VideoCharger server.

There are a couple of ways to play the asset:

1. The usual method of launching the player by selecting the hypertext link of the assetname generated by the search script can now be used for playing Quicktime movies.

2. You have to know the name of the asset as it is listed in the Web pages or under `vslist` for this method. In the QuickTime client, under **File->OpenURL**, enter `rtsp://hostname/moviename.mov`. For example, if we are playing the movie prepared above, and if it was loaded from the command line using the command: `vsadd -a quicktimep.mov -v /[path]/quicktimep.mov`, then the RTSP URL would be: `rtsp://hostname/quicktimep.mov`.

   If there is an error in the 10000's, check to make sure that your RTSP daemon process is running under the **Task Manager->Process** tab panel. If it is not, then start it manually using either the start option in the services panel (look for lantv_rt) or the `vsstart` command line option. The other 3-digit error codes should map to rtsp rfc 2326 specification.

5.4.6 VideoCharger with Content Manager

Q: What should I use for my default collection for video files?

A: For streamed files, Content Manager's system admin has two new default collection classes: Media.Collectn.NoArchiv and Media.Collectn.Archive. Which one to set depends on whether or not your system includes the IBM 3466 Network Storage Manager (Netstore) as a tape archive. If it does, then select Media.Collectn.Archive. Otherwise, select Media.Collectn.NoArchiv. If you are using Netstore and you fail to select the proper collection class, your assets will not migrate from VideoCharger to Netstore.

Q: Can I have one object server integrated with two VideoCharger servers?

A: No, that is an unsupported configuration. However, you can have multiple object servers, each integrated to a separate VideoCharger server, or multiple object servers integrated to the same VideoCharger server. See Figure 13 on page 83 for supported and unsupported configurations.

Chapter 6. Customer scenarios

Here are three customer scenarios to give you an idea of how Content Manager and VideoCharger are being used in the market. For more details on these and other scenarios, see the Web page at:

`http://www.software.ibm.com/data/cm/casestudy.html`

6.1 Scenario 1

Scenario 1 encompasses content management for digitally archived commercials and production reels for a large advertising agency.

6.1.1 Environment

Scenario 1 has this hardware, software, and media environment.

6.1.1.1 Hardware
- IBM Netfinity servers

6.1.1.2 Software
- IBM Content Manager V6.1
- IBM Content Manager VideoCharger
- IBM DB2 UDB V6.1 for Windows NT

6.1.1.3 Number of media assets
From their desktops, employees at McCann-Erickson's New York City office have immediate, searchable access to 1,000 production reels and 3,000 commercials.

6.1.2 Business benefits
- Content retrieval time decreased from days to seconds

- Immediate access to broadcast commercial archives

- Reduction of expensive videotape storage space

6.1.3 Solution details

Reprinted from:

`http://www2.software.ibm.com/casestudies/swcsdm.nsf/customername`

"McCann-Erickson has created some of the world's best known television, radio and print advertising, and while doing so, has generated a massive amount of materials. Physically storing this material was not only

cumbersome, but it actually hindered the production process. The firm's development staff was spending too much of its time scouring production reels for the right sound bite, photo or video clip to define the images its clients were seeking. Always interested in new technologies, McCann-Erickson saw digital archiving as a way to provide fast, convenient desktop access to its vast creative resources.

At this time, McCann-Erickson's long-time business associate, AdWare Systems, Inc., an IBM Business Partner was developing such an archival solution. By combining AdVISUAL, the company's proprietary front-end interface software, with IBM Content Manager, Adware had developed a content management solution specifically suited for the archiving and retrieval of video assets.

AdWare and IBM worked closely together in the implementation of the AdVISUAL solution for McCann-Erickson's New York City office using IBM Content Manager Version 6.1, IBM Content Manager VideoCharger and IBM DB2 Universal Database Version 6.1 running on IBM Netfinity servers at AdWare.

Creative development at McCann-Erickson has been dramatically enhanced as searching through archived footage, which could take days before, is now done in just seconds.

When a user performs a search, AdVISUAL queries the library server and object server at AdWare, both of which are running DB2 Universal Database and Content Manager for Windows NT on Netfinity servers.

Here, the digitized content at McCann-Erickson is indexed in various ways. For example, producers can search by keyword, by client or by type of media. Content Manager VideoCharger facilitates the streaming of the content across the local area network (LAN) connection at McCann-Erickson and brings it to the desktop."

6.2 Scenario 2

Scenario 2 is a university-based, digital library, information resource for Malaysia's major industries.

6.2.1 Environment

Scenario 2 has this hardware, software, and user environment.

6.2.1.1 Hardware
- IBM RS/6000 cluster

6.2.1.2 Software
- IBM Content Manager
- IBM Content Manager VideoCharger
- IBM DB2 UDB for AIX
- IBM Cryptolope

6.2.1.3 Number of users
The digital library will be available to more than 28,000 students and corporate researchers.

6.2.2 Business benefits
- Increased revenue opportunities in industrial and international markets

- Decreased research time

- Scalable foundation for online learning

6.2.3 Solution details
Reprinted from:

http://www2.software.ibm.com/casestudies/swcsdm.nsf/customername

"All over the world, the rapid advancement of technology is fostering a closer relationship between the business community and institutions for higher learning. In Malaysia, the government is working to ensure its most prestigious university is equipped to support the country's largest industries, which include electronics, petrochemicals and manufacturing. One of the ways they are doing this is by sponsoring the development of a digital library at the Business & Advanced Technology Centre (BATC) of Universiti Teknologi Malaysia (UTM) in Kuala Lumpur, Malaysia.

The digital library is a complete IBM solution designed and implemented by Mesiniaga Bhd, a leading IT company in Malaysia and an IBM Business Partner. It uses IBM DB2 Digital Library (now a part of IBM Content Manager) and IBM DB2 Universal Database to provide both students and corporate researchers online access to the BATC's vast stockpile of courseware, research and publications. The project will also serve as a model for digitizing the university's main library, as well as providing the foundation for the university's online learning programs.

By providing more precise and focused information, the digital library will make it convenient for industry employees, many of whom cannot make it to the campus, to stay current on changing world market conditions.

Catalogued in the digital library so far are course notes for master's and doctoral degrees in engineering and business management, as well as various journals and research reports related to manufacturing. UTM students can subscribe to the digital library and access its contents over the Internet.

The subscription fees are used to purchase publications for the university's archives. Research performed at UTM and other universities will be stored in the BATC library as well.

Jointly funded by the government and by various industries, the digital library is supported by a cluster of IBM RS/6000 servers. One machine runs Content Manager and the object server, while another runs IBM Content Manager VideoCharger. The object server uses DB2 to maintain the index of the document images. Archived images are stored in an optical jukebox. Users access the library through Web browsers, with IBM Cryptolope technology ensuring secure delivery of the digital content over the Internet."

6.3 Scenario 3

Scenario 3 encompasses on-demand access to Web-based multimedia archives at a university.

6.3.1 Environment

Scenario 3 has this hardware, software, network, and user environment.

6.3.1.1 Hardware
- IBM RS/6000 (2)
- IBM ThinkPad

6.3.1.2 Software
- IBM Content Manager
- IBM Content Manager VideoCharger

6.3.1.3 Network
Northwestern's robust network infrastructure integrates leading edge optical carrier level 12 (OC-12), asynchronous transfer mode (ATM) and synchronous optical network (SONET) technologies.

6.3.1.4 Number of users

The material is available to more than 17,000 students and more than 6,000 faculty and staff.

6.3.2 Business benefits

- Enhanced educational environment
- Low cost of application deployment and maintenance
- Simple management of user rights and privileges

6.3.3 Solution details

Reprinted from:

http://www2.software.ibm.com/casestudies/swcsdm.nsf/customername

"Patience may be a virtue, but it's not a quality typically associated with today's "show-it-to-me-now" generation of computer-savvy college students. Fortunately, when the issue is access to a rich array of online educational resources at Northwestern University, patience isn't a requirement. Taking advantage of its high-speed, high-bandwidth network, the university's IT organization has incorporated live data streaming and video-on-demand technology to enhance the school's learning environment. And, to deploy its host of video-on-demand applications--from language instruction to a video encyclopedia to live broadcasts of university events--and enable students to call them up on their computer screens in just seconds. Northwestern chose IBM DB2 Digital Library (now referred to as IBM Content Manager) and IBM DB2 Digital Library VideoCharger (now referred to as IBM Content Manager VideoCharger).

Northwestern is a technology-rich university with a nationally recognized network system that supports learning, research and administration for students, faculty and staff. The university uses Content Manger to store its multimedia assets on an IBM RS/6000 server. Its data streaming applications, running Content Manger VideoCharger 2.0, reside on another RS/6000 server.

One important advantage of DB2 VideoCharger is that it delivers digital audio and video over the Internet using conventional Web browsers, enabling Northwestern's students, faculty, staff and collaborative partners to view high quality MPEG-1 video files (and soon, higher-quality MPEG-2 files)--whether they're on campus, in downtown Chicago or across time zones in Korea.

And, instead of waiting for data to download to the viewer's hard drive, VideoCharger uses standards-based technologies to deliver real-time

multimedia data streams through a standard Web browser. Users need only acquire a free plug-in to be able to begin accessing the files. This eliminates the cost of application distribution and maintenance.

VideoCharger provides tools that allow the IT team to easily manage user access rights and privileges for individual projects and establish rules to protect copyright ownership. It also provides a highly scalable platform for delivering high quality audio and video streaming to a large audience.

Northwestern is now deploying IBM Content Manger with Content Manger VideoCharger in a growing number of educational projects that complement campus coursework and provide resources for students and faculty around the world. Some of these projects include:

- The creation of an ongoing video record of university "happenings." This online resource documents seminars, guest lectures and other events that have been captured and encoded into digital format using a video camera and an IBM ThinkPad 770 laptop. In addition to being broadcast live, the events are also stored for future on-demand viewing.

- A Video Encyclopedia comprising 2,500 clips--83 hours worth--highlighting key events throughout the 20th century. Students can search by keyword on a variety of topics, including baseball milestones, Supreme Court rulings, the civil rights movement, the Vietnam War protests and many others.

- A Web-based compendium of one of the nation's most widely used political science texts, Challenge of Democracy, which is co-authored by two Northwestern University faculty members.

- Access to previews of television commercials and other advertising resources for students of a popular marketing class at the Northwestern University Kellogg Graduate School of Management. The application requires high video quality to accurately duplicate the viewing experience of consumers whose purchasing patterns are shaped by advertising.

- VideoSpace--a video chronicle of the Internet2 project. Led by the University Corporation for Advanced Internet Development (UCAID), the project is building a next-generation, high-speed Internet Protocol (IP) network for education and research. Using VideoCharger, Northwestern is creating a history of the project, providing interested individuals with synopses and video clips of technology demonstrations that take place at Internet2 meetings."

Chapter 7. Backing up a VideoCharger configuration

Even though the VideoCharger system is configured for maximum reliability, we recommend that you perform a system backup prior to making major system changes. These changes would include making significant configuration changes or performing disk maintenance. Backing up ensures that you have a copy of your system that reflects current information should you need to restore VideoCharger.

You do not need to use this procedure before making minor changes, such as adding or deleting ports or adjusting bandwidth. In this case, use the backup capability provided through the HTML forms (Backup/Restore Configuration).

If you restore from a backup that does not reflect the current state of the assets in the multimedia file system (for example, you added or deleted assets after the backup was taken) consistency between the multimedia filesystem catalog and the multimedia filesystem assets will be compromised.

If you want to backup the whole VideoCharger system, you should take the following backup:

- AIX system
- The configuration information of the multimedia file system
- Assets

7.1 Backing up a VideoCharger system

To backup the VideoCharger to tape, use the SMIT Backup the System menu. You may need more than one tape.

1. Log on as root user.

2. Insert the first blank backup tape into the tape device.

3. At the command prompt, enter `smit mksysb`.

4. Use **F4** to select the device name needed for the backup DEVICE or FILE field.

5. Press the Tab key once to change the value for the "EXPAND/tmp if needed?" field to **yes**. Press the Tab key to set "Create MAP File"=**yes**.

6. Press Enter to begin the system backup process.

7. The **COMMAND STATUS** screen appears, displaying status messages while the system makes the backup image.

8. The system may prompt you to insert the next tape during the backup by displaying a message similar to the following: `Mount next Volume on Dev/rmt0 and type return`. If this message appears, remove the tape and label it, including the version number of the base operating system (AIX Version 4.2). Then insert another tape and press Enter. When the backup process finishes, the COMMAND field changes to **OK**.

9. Press F10 to exit `smit` when the backup completes.

10. Remove the last tape and label it. Write-protect the backup tapes.

7.2 Restoring VideoCharger from backup

This section describes how to install the base operating system (BOS) from a backup image of a previously installed system.

7.2.1 Introduction to backup installations

This section describes the procedure for installing a backup image stored on tape. A backup can be used to restore a corrupted system. This discussion refers to a source system and a target system. The source system is the system from which you created the backup copy; the target system is the system on which you are installing the backup copy. In most instances, the source system and the target system are the same machine.

The procedure in this chapter requires the backup copy to be created using the SMIT Backup the System menu. See the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871, for more information about this topic.

7.2.1.1 Installing the base operating system from backup
- Start the system.
- Specify system settings.
- Begin the installation.
- Go to customizing your installation.

Prerequisites
The following conditions should be met before beginning the procedure:

- All hardware must already be installed, including external devices, such as tape and CD-ROM drives.
- Obtain the system key for the lock (if present) on your system unit.
- Obtain your system backup image on tape by using the `smit` Backup the System menu.

7.2.2 Start the system

Use this procedure to start your machine:

1. If you have a new system or your system is turned off, skip to Step 3. If the system is already turned on, do the following to put the backup tape in the tape drive and then shut down the system:

   - Log in as root user.

   - Put the backup tape in the drive.

   - Enter the following command:

     `shutdown -F`

   - The `Halt completed...` message appears when the shutdown process completes.

2. Turn the system key (if present) to the Service position.

3. Turn on all attached external devices, such as terminals, CD-ROM drives, tape drives, monitors, and external disk drives. Do not turn the system unit on until Step 6. Turning on the external devices first is necessary so that the system unit can identify them during the startup (boot) process.

4. If you have not already put the backup tape in the drive, do so now.

   Note: You may find that on specific hardware, the tape drive door will not open while the system unit is turned off. If you have trouble opening the tape drive door during installation, use the following procedure:

   - Turn the system unit on.

   - Put the tape in the drive.

   - Turn the system unit off and wait 30 seconds.

   On some models that have a door to the tape drive, there may be a waiting period of up to three minutes before the tape drive door opens after you have pressed the button to open the tape drive. Some models also require that the button for the tape drive door be held in the pressed position for a few seconds before the tape drive door will open.

5. If you are not using an ASCII terminal, skip to Step 6. If you are using an ASCII terminal, set the communications options as follows:

   - Line Speed (baud rate)=9600

   - Word Length (bits per character)=8

   - Parity=no (none)

   - Number of Stop Bits=1

   - Interface = RS-232C (or RS-422A)

Set the keyboard and display options as follows:

- Screen = normal
- Row and Column =24 * 80
- Scroll = jump
- Auto LF (line feed) = off
- Line Wrap = on
- Forcing Insert = line(or both)
- Tab = field
- Operating Mode = echo
- Turnaround Character = CR
- Enter = return
- Return = new line
- New Line = CR
- Send = page
- Insert Character = space

Note: If your terminal is an IBM 3151, 3161, or 3164, press the Ctrl+Setup keys to display the Setup Menu and follow the on-screen instructions to set these options. If you are using some other ASCII terminal, refer to the appropriate documents for information about how to set these options. Some terminals have different option names and settings than those listed here.

6. Turn the system unit power switch from Off (0) to the On (I) position. The system begins booting from the backup tape, which might move back and forth. After several minutes, C31 is displayed in the LED.

7.2.3 Prompted installation

The Welcome to the Base Operating System Installation and Maintenance screen is the first screen to appear for prompted installations. This and subsequent screens provide help text, which you can view by entering 88. See Figure 26.

```
┌─────────────────────────────────────────────────────────────┐
│           Welcome to Base Operating System                   │
│              Installation and Maintenance                    │
│                                                              │
│                                                              │
│  Type the number of your choice and press Enter.             │
│                                                              │
│                                                              │
│ 1. Start Install Now with Default Settings                   │
│                                                              │
│ 2. Changes/Show Installation Settings and Install            │
│                                                              │
│ 3. Start Maintenance Mode for System Recovery                │
│                                                              │
│                                                              │
│                                                              │
│ 88   Help ?                                                  │
│ Choice:                                                      │
└─────────────────────────────────────────────────────────────┘
```

Figure 26. Base operating system installation and maintenance

1. Choose the **Change/Show Installation Settings and Install** option.

   The System Backup Installation and Settings screen appears. See Figure 27.

```
┌─────────────────────────────────────────────────────────────┐
│          System Backup Installation and Settings             │
│                                                              │
│   Either:type 0 and press Enter to install with current settings, or type │
│   the number of the setting you want to change and press Enter. │
│            Setting:                      Current Choice(s)    │
│     1. Disk(s) Where You Want to Install.............hdisk0   │
│         Use Maps...............................Yes           │
│     2. Shrink File Systems....................No            │
│                                                              │
│ >>> 0 Install with the settings listed above.               │
│                                                              │
│     88 Help ?                                                │
│     99 Previous Menu                                         │
│                                                              │
│ >>> Choice: 0                                                │
└─────────────────────────────────────────────────────────────┘
```

Figure 27. System backup installation and settings

This screen shows the current settings for the system. An ellipsis follows the disk listed in the first line if there is more than one disk selected.

2. Enter 1 in the System Backup Installation and Settings screen to specify disks where you want to install the backup image. The Change Disk(s)

Where You Want to Install screen appears This screen lists all available disks on which you can install the system backup image.

The >>> (three greater-than signs) mark each selected disk.

3. The hdisk0 disk is selected. Press Enter after you select the disks.

4. Enter `0` to accept the settings in the System Backup Installation and Settings screen.

The Installing Base Operating System screen appears, reporting the rate of completion and duration. See Figure 28.

```
                    Change Disk(s) Where You Want to Install

    Type one or more numbers for the disk(s) to be used for installation and press
    Enter.To cancel a choice,type the corresponding number and press Enter.At
    least one bootable disk must be selected.The current choice is indicated by>>>


          Name        Location Code      Size(MB)   VG Status  Bootable  Maps
>>>1   hdisk0      00-00-0S-0,0         80         rootvg       yes       yes
    2   hdisk1      00-01-00-1,0         60         not in VG    yes       no


>>> 0 Continue with choices indicated above.

    66  Disks not known to Base Operating System Installation
    88  Help ?
    99  Previous Menu

>>>Choice [0]:
```

Figure 28. Change disk(s) where you want to install

The `Please Turn the System Key to the Normal Position` message appears on the screen if the key is not already in the Normal position. You can turn the key at any time while the screen is showing. The installation continues regardless of the key position.

The system reboots automatically when the installation completes.

The reboot is automatic if the system key (if present) is in the Normal position. Otherwise, a new screen directs you, at the end of the installation, to turn the key to Normal and press Enter. The system reboots, in this case, when you press the Enter key.

5. After the installation is complete, log in as root and enter the following commands:

```
bootlist -m  normal hdisk0 hdisk1
lsfs -v mmfs
```

The `lsfs` command will return the multimedia file systems that were defined before the backup. Following is an example output from this command:

```
NAME                    NODENAME                        MOUNT  PT       VFS
/dev/sg0                                                /mmfs/sg0        mmfs
```

The first element in the output will be a device entry that must be recreated.

6. Enter the following command to recreate the device entry for each file system: `/usr/lpp/mmfs/bin/mmfsmknod Device`.

   For example: `/usr/lpp/mmfs/bin/mmfssmknod /dev/sg0`

7. The file system is not set to automatically mount when the system boots. Enter the following command for each multimedia file system to set it to automatically mount when the system boots:
   `chfs a mount =true Device`

   For example: `chfs -a mount=true /dev/sg0`

8. Enter the following command to ensure consistency between the catalog and the assets stored on your data disks:

   `smitty mmfs_repair`

The Check/Repair File Screen screen appears. See Figure 29.

```
┌──────────────────────────────────────────────────────────────────┐
│                    Check/Repair File System                        │
│                                                                    │
│     Type or select values in entry fields                          │
│     Press Enter AFTER making all desired changes                   │
│                                                                    │
│                                                    [Entry Fields]   │
│ * File System Name                        []                        │
│ * Recover lost blocks only?                                        │
│                                                                    │
│                                                                    │
│     F1=Help       F2=Refresh      F3=Cancel      F4=List            │
│     F5=Undo       F6=Command      F7=Edit        F8=Image           │
│     F9=Shell      F10=Exit        Enter=Do                          │
└──────────────────────────────────────────────────────────────────┘
```

Figure 29. Check/repair file system

Press the **F4** with the File System Name field highlighted to display a list of available file system names.

Highlight the Recover lost blocks only field, and then use the Tab key to select report and take corrective action automatically.

9. Enter the following commands:

```
mount -t mmfs
stopsrc -g vs
startsrc -g vs
```

Note: Steps 6 through 8 return internal consistency to the system; however, if assets were added to the file system or deleted from the file system after the backup tape was created, those assets will not be available.

7.3 Backing up or restoring a file system configuration

This chapter describes how to backing up and restoring the MMFS (Multimedia File System) file system configuration. To backup/restore configuration information about the MMFS file system, use the following procedure:

1. Use the `smit mmfs` fast path to access the Multimedia File System menu.

2. Select **File System Operations**.

3. Select **Back up (or Restore) a File System Configuration**.

7.4 Backing up and restoring assets

As far as backing up and restoring video assets, use `tstar` command. for more detail about this command, refer to "tstar Command" in the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871.

Chapter 8. IBM VideoCharger solution architecture

In this chapter, we discuss VideoCharger architecture and solutions for markets and industries.

8.1 VideoCharger architecture overview

This section gives a VideoCharger architecture overview of these topics:

- Video vocabulary and the process
- Video distribution bandwidth
- Video solution segments
- VideoCharger architecture
- Video distribution mechanisms

8.1.1 Video vocabulary and the process

A lot of 'work' goes on prior to our being able to view a video. Figure 30 shows the relationship between the process and the digital technologies.

The video is created, using analog or digital technology. If using analog technology to create, the video can now be edited to its final form. Editing results in the creation/deletion/sequencing of scenes or frames. Frames may be modified by changes to layer's.

When digitizing and compressing, the audio comes through one channel while the video is captured using another. These are encoded and then put together into a single stream, that is, multiplexed.

Video is digitized and compressed to a common file format standard. There are many standards for file formats which will be addressed later. For example, to get VHS/TV quality videos, you will most likely compress these into MPEG-1 format.

A movie must then be logged. This simply means entering the movie into the digital repository, along with appropriate indexing information so that the video can later be identified and retrieved. Logging may be done at the film level, for example, title, director, leading actor(s). Logging can also be done scene by scene. This allows for more precise retrieval of the information desired.

Once a video is stored, it can be accessed by a user. In the analog world, this includes physically copying master tapes and physically distributing them to viewing sites. In the digital world, the user might access the video from his

computer over a network. The process follows the reverse process as capturing the data. The video is delivered over the network, is separated into audio and video streams (demultiplexed) and decompressed, then delivered to the appropriate devices (speakers and display).

Create - Capture - Compression - Logging - Editing -Distribution - Viewing
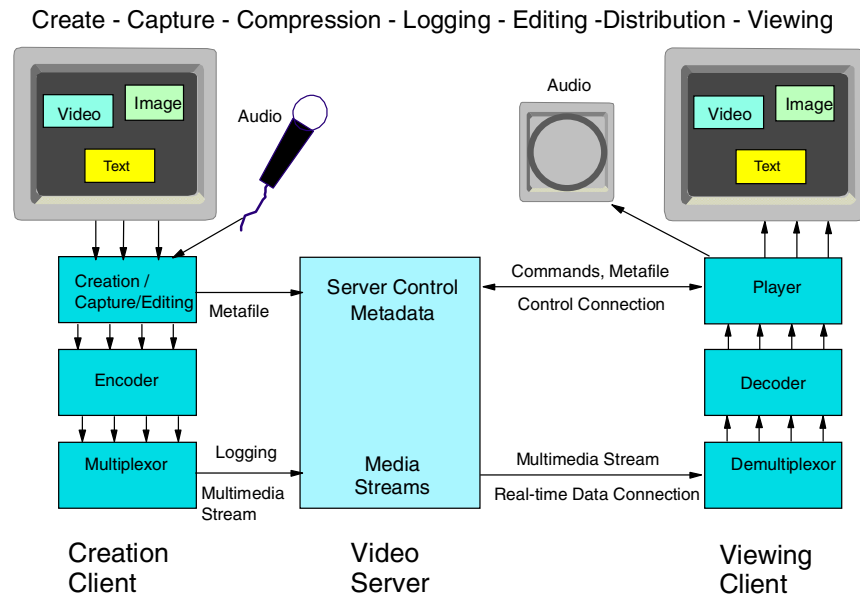
Figure 30. Video vocabulary: the process

8.1.2 The balance of video distribution bandwidth

When designing a video delivery solution, it is important to balance the purpose of the solution with the quality of the delivery and the bandwidth available to the viewers.

For example, it would be premature to attempt to delivery art quality video over the intranet today. On the other hand, it is unnecessary to subject art students to Low Bit Rate video at on-campus viewing stations.

So when determining your audio/video needs, all those factors need to be taken into account.

IBM VideoCharger is focused at the internet/intranet market and streams audio from low bandwidth for use over the internet and modems, to high quality MPEG-2 at 15 Mbps. Figure 31 shows the balance of video distribution bandwidth.
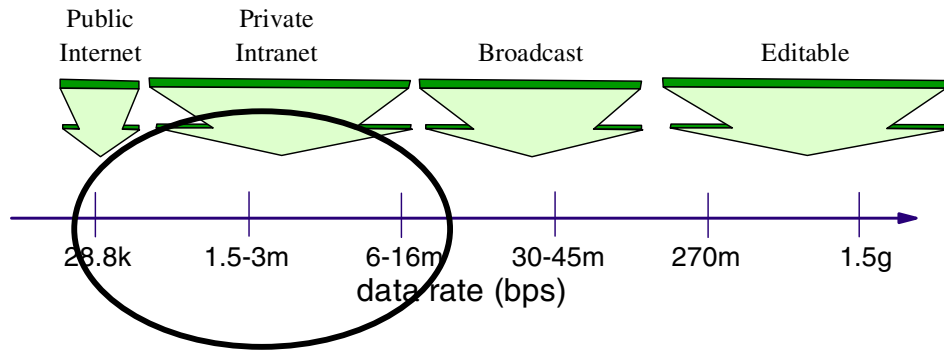
Figure 31. The balance of video distribution bandwidth

8.1.3 Video solution segments

The audio/video market is segmented into three areas:

Very high quality
This segment requires very good quality video at very high data rates in the range of 45Mbps. IBM VideoCharger only touches the very bottom of this market segment with its support of MPEG-2 data streams. At 8Mbps, it could be used for previewing the higher quality videos at a lower data rate. For example:

- Broadcast
- Cable TV
- Entertainment - Media production

High quality
In this area, the ability to distribute video to large number of clients is very important. The quality is usually VHS quality and distributed over a LAN. This is the segment at which VideoCharger is targeted. For example:

- Multicast/VOD
- Media Distribution - Low quality

Low quality
Low quality streams are what are used on the intranet today. Currently VideoCharger supports HotMedia, QuickTime4, AVI, WAV formats. There are many companies competing in this area, for example:

- Mass market - Internet Web page enhancement

8.1.4 Where does the VideoCharger solution fit?

The IBM VideoCharger is designed to meet the needs of both low bit rate and business quality audio/video distribution. From a bandwidth point of view, it can stream video up to 15 Mbps. Figure 32 shows the segment of VideoCharger solution.
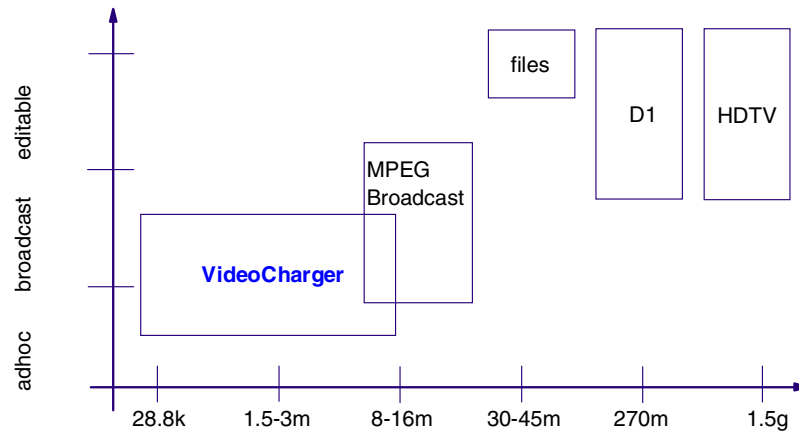
Figure 32. Where does VideoCharger fit?

8.1.5 IBM VideoCharger architecture

Figure 33 shows the architecture of VideoCharger. The components are described as the server and the client:

- Server
  - Content Management: Add, delete, change, view attributes of assets
  - Systems Management: Configure and manage the system
  - HTTPD: Enables communication between web browser and VideoCharger
  - Presentation Formatter: Controls how clients view information on available assets, selects assets for viewing.
  - Controller: Coordination
  - Control Server: Resource management, asset setup/delivery
  - Application Server: Handles communication with client
  - Data Pump: Combination of data storage disks and networking hardware/software used for asset delivery

- Multimedia File System (AIX version only): File system optimized for storage/delivery of audio/video

- Client
  - Web Browser
  - Video Viewer
  - Network Subsystem
  - Multimedia Subsystem
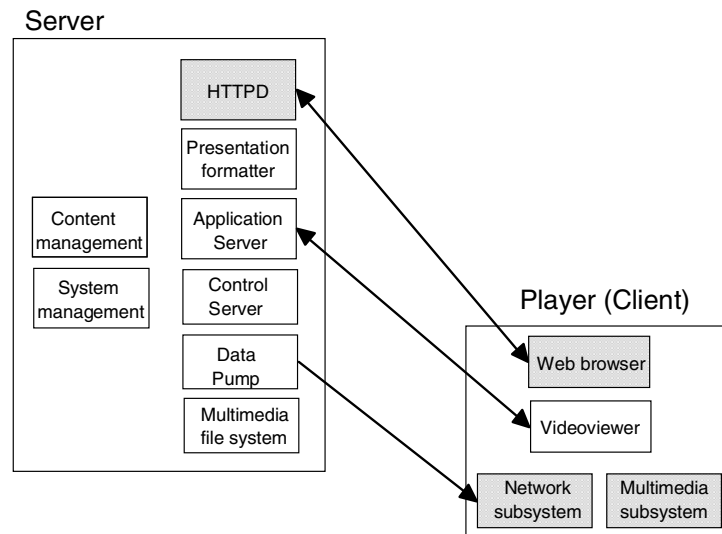
Figure 33. VideoCharger architecture

8.1.6 Video distribution mechanisms

There are two mechanisms that can be used to distribute video to the viewers.

Video on Demand or Unicast

Video on Demand (or unicast) allows a single viewer to watch a single video. So for each viewer there is a stream of video for that viewer. In the case of video on demand, the view requests the stream and it is delivered. In the case of unicast, a time is scheduled for the video the play, and at the appointed time it is streamed to the designated viewer.

With Video on Demand, the video can be stopped and started, seek forward and backward. Most VCR type functions are supported. The viewing window can also scale to full screen size.

The benefits are:

- Video-on-Demand, what you want, when you want
- Enable VCR-like commands, such as Play/Stop/FF/Rew/Pause and so on

Multicast

With multicast, one video is streamed onto the network and several viewers can connect to view that one stream. The advantage of multicast is that it conserves bandwidth on the network as there is only one stream and many viewers. Multicasts are scheduled events. The viewer has less control of the stream. He can start and stop the play, and play at full screen size, but rewinds and seeks are not possible.

Multicast can be compared to your television set. You turn the dial to get the program you want, then can watch it through.

The benefits are:

- Conserves bandwidth for live broadcasts
- High quality video delivery - constrained network
- Wide range of bandwidths supported
- Multicast streams will appear wherever enabled

VideoCharger on Windows NT also has the capability to capture content using the Futuretel MPEG encoder card or Optibase MovieMaker. This allows for real-time capture of presentations which are stored in MPEG (MPEG-1 or MPEG-2) on the VideoCharger server. This capability can be combined with multicast to provide a system for simultaneously capturing and distributing an audio or video stream. This might be used for an executive broadcast throughout a company site, therefore, eliminating the need for a conference room for all employees.

8.2 Market segments using video

There are many segments of the market that can use VideoCharger. Here we list these segments, how VideoCharger is used in each segment, the characteristics and components of solutions using VideoCharger in each segment. We also list some specific industries in which VideoCharger is used.

VideoCharger is used for several different applications across these segments:

- **Corporate training**: Delivers on-demand information when and where it is needed, whether on the plant floor or across the country.

- **Distance learning**: Enhances retention through compelling video/audio presentations of information, and can lower costs by allowing the presentation of information at a variety of locations simultaneously or when needed.

- **Merchandising**: Improves the reach to new audiences utilizing networked kiosks, or the Internet, and can lower costs through reduced expenses.

- **Video-on-Demand**: Provides delivery of high bit rate video to set-top-box configurations, for residence, business complex, hotel or hospital.

- **Internet video messages**: Through the use of IBM's HotMedia format, content owners can deliver streaming content to Internet clients using a transparent java client, eliminating the need of proprietary client software.

The major areas of the market in which VideoCharger is used are:

- Business media communications (the producers of media)
- Media Content Management
- Entertainment on demand (the providers of media)
- Content Network Distribution

Business media communications
- Applications

  - Corporate communication
  - Employee distance training and education
  - Integrated training management
  - Collaborative learning
  - Knowledge management
  - Media creation and management
  - Media ingest, classification and indexing
  - Media archive

- Solution characteristics

  - Intranet only (as opposed to internet)
  - Global network, using fibre WAN or satellite
  - Distributed streaming caches, or replicated servers
  - Functions: Video on Demand, multicasting of live and stored video
  - Integration with video conferencing
  - Integration with content and asset management
  - Commercial grade media

- Solution components

  - Products

    - VideoCharger
    - Content Manger and EIP
    - DB2
    - Apache
    - Tivoli
    - Websphere
    - Lotus Sametime, Lotus Notes
    - DMD
    - Intelligent Miner
    - Enterprise Media Beans
    - CueVideo

  - Services

    - Consulting on business transformation and architecture
    - Project management
    - Implementation, hosting

Media content management

- Solution characteristics

  - Commercial quality media
  - Metadata creation and management
  - Workflow
  - Integration with existing media businesses

- Solution components

  - Products

    - VideoCharger
    - Content Manager
    - MPS
    - HotMedia TV
    - DB2
    - Apache
    - Tivoli
    - Websphere
    - Lotus Notes
    - CueVideo
    - EMMS
    - DMD

- Services

  - Consulting on business transformation & architecture
  - Project management
  - Implementation, hosting

Entertainment on demand

- Applications

  - Movies, news, entertainment shows and music (streaming and download)

  - Program guide and entertainment search

  - Gaming

  - Targeted advertising

  - Infomercials

  - Increase revenue by monitoring customer behavior

- Solution characteristics

  - Entertainment quality media

  - Server and storage opportunities (media files are very large, and large number of streams is often needed)

  - Integration of entertainment and commerce services

  - IP networking to ADSL STBs increasingly in demand

  - Security/rights management key to deployment

- Solution components

  - Products

    - VideoCharger
    - EMMS
    - Servers
    - Content Manager
    - VideoHub
    - MARS
    - Tivoli

  - Services

    - Consulting
    - Architecture
    - Project management
    - Implementation, hosting

Content network distribution
- Applications

    - Content distribution network and utilities
    - Distributed hosting, including security and commerce
    - Connect content owners to their customers (outsourcing)

- Solution components

    - Products

        - Content Manager
        - WebSphere Edge Server
        - VideoHub
        - WASP
        - DMD

    - Services

        - Consulting and business transformation
        - Architecture
        - Project management
        - Implementation, hosting

8.2.1 Industries where VideoCharger based solutions are used

Here we list various industries in which video is used, and what it is used for in each industry.

- **Retail**: Fashion shoots, designer drawings, kiosk material, radio/tv advertising, sales training

- **Automotive**: Proof of delivery, dealer training/certification, advertising, security video

- **Banking**: ATM footage, audio conferences, SEC filings, investment proof

- **Utilities**: Grid bids, legal files, video conferencing, regulatory material

- **Manufacturing**: factory processes, robot monitoring

- **Transportation**: trucking regulations, weigh station video, DMV records

- **Government** (at a local and national level): Congressional sessions, audio documentation, voting, water, police, forest service, satellite data

- **Pharmaceutical**: FDA documentation, audio tapes, experiment footage, test results

- **Petrochemical**: Plant processes, regulatory material, security footage, safety training

- **Real Estate**: Visual aids, corporate relocation, chamber of commerce material

- **Higher Education**: distributed learning, multimedia courseware, library digitization

- **Health care**: training (in California, physicians are required to fulfill 100 hours of medical training every 4 years; Digital Pipe is a vertical offering which provides training via streaming media to the intranet environment), rich media applications directly to the desk top, radiology images, medical archive

- **Insurance**: Need to share documents video and audio, decrease claims processing time, increase claim fraud scrutiny

- **Broadcasting**: audio/video archive, production, promotes creation of digital files, content management (search/retrieval)

- **Publishing**: electronic newspapers, journal images, electronic yellow pages, online access, copyrights supported by watermarking

8.3 Example application in the entertainment industry

This section describes a solution using VideoCharger in the entertainment industry. The solution will enable the digitalization, cataloging, storage, access, retrieval and editing of video data.

8.3.1 Background

The customer has over 100,000 hours of video content and is adding approximately 60 hours per week. 35,000 hours of this video is at risk due to degradation. This content currently exists on videotape in either analog or serial digital format. The full utilization of this asset is hampered by difficulty in quickly and efficiently reviewing and accessing the contents of the video. The degradation of the original analog recordings is an even greater concern. The customer would like to digitize this content and store it in a "digital library" system over time.

8.3.2 Goals

- Digitize the existing video archive for preservation

- Segment video to create storyboards

- Augment existing descriptive information

- Store descriptive information (aka meta data) for efficient searching, including text created from speech-to-text analysis of audio content on video

- Provide fast and efficient access to the video archive

- Provide ability to create Edit Decision Lists (EDL) from proxy video source

- Enable the customer to maximize the use of its archive

- Provide upgrade path for future expansion

8.4 Proposed solution

The following solution is an end-to-end solution from analog ingest to digital editing, playback, and creation of broadcast quality segments. Also included is the ability to store the digitized videos in IBM's new LTO automated tape library and retrieve them for later viewing and use.

Conceptually the data flows through two parallel paths. One path, MPEG2, stores 'full' resolution data for broadcast quality uses. The other path, MPEG1/meta data, stores a compressed video summary and text descriptions intended to facilitate the editing and selection processes. The two paths are substantially independent, linked at the beginning by the video source and SMPTE time codes, and during the retrieval process via EDL.

The proposed solution consists of three main parts: Ingest, Storage, and Retrieval. Figure 34 shows the high level flowchart of this solution.
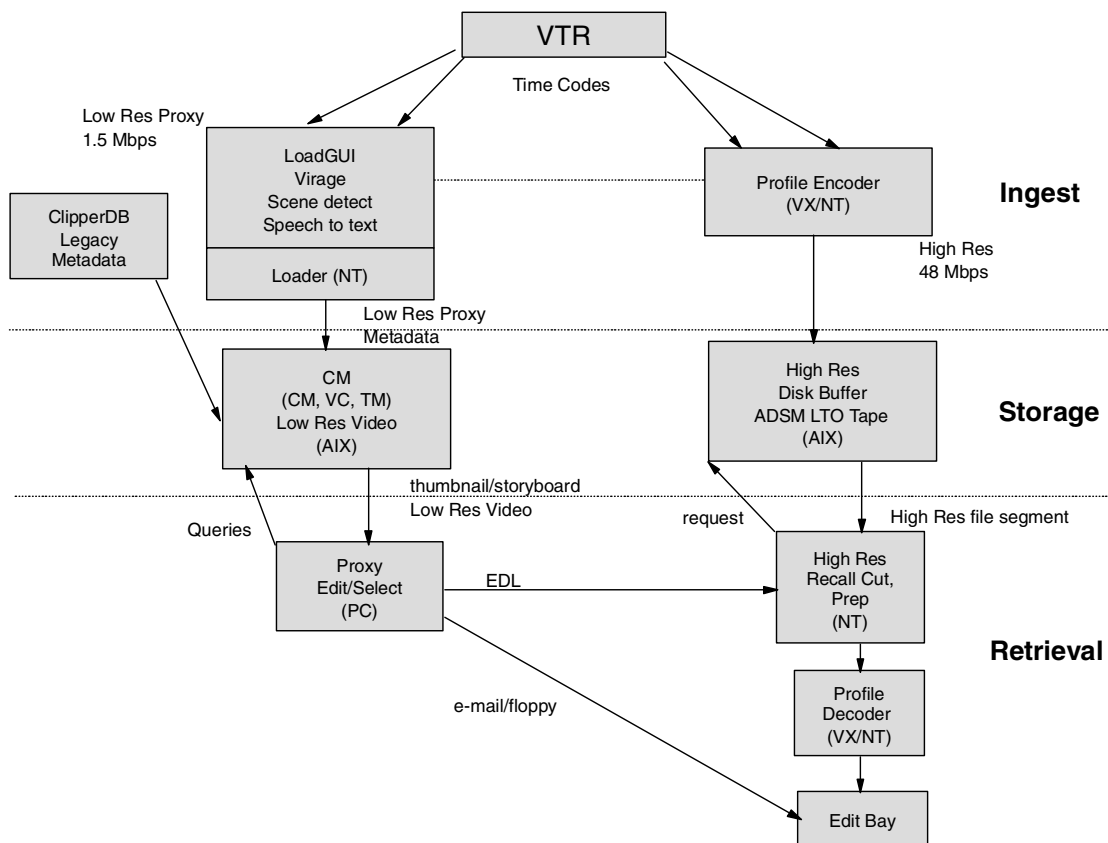
Figure 34. High-level flowchart

8.4.1 Ingest

The ingest operation handles the digitization of the incoming data and provides mechanisms for segmenting the video and augmenting the descriptive information.

The video will be encoded into both MPEG1 and MPEG2 formats. Each video will be annotated with user input, legacy data from a Clipper database, storyboards, and speech-to-text processing of the audio stream. Speech-to-text is supported for annotating the audio stream.

The MPEG1 and the meta data will be used to search and browse the video data for selection, while the MPEG2 will be used for final editing and broadcast. As a result, the time codes between the MPEG1 and MPEG2 need to be synchronized.

There will be three inputs to the ingest operation:

- The output of a video tape recorder (VTR), including four audio input paths.
- The output of a time code generator.
- Existing descriptive data originally from a Clipper database

There will be three outputs from the ingest operation:

- An MPEG2 I-Frame only data stream at 48 Mbps (Megabits per second) (MPEG2 path) nominal.
- An MPEG1 data stream at 1.5 – 2 Mbps (MPEG1/meta data path), with burned-in time codes
- Descriptive data including text files, attributes, and thumbnails (MPEG1/meta data path), with the text files having been created from either speech-to-text analysis of the audio content of the video, or from the any closed captioning included on the video.

8.4.2 Storage

Once the video is digitized and the descriptive data is collected and generated, the data will be stored in two main areas. The MPEG2 data will be sent to an archival storage system optimized for capacity and accessibility: a magnetic tape based system. The MPEG1 and descriptive data will be stored together on a system optimized for fast and flexible access: IBM CM (Content Manager) integrated with the IBM VC (VideoCharger).

The CM will provide an interface for searching and browsing the video meta data. The thumbnails and text descriptions that are presented as part of the search results will be stored on disk, within Content Manager, for fast access. The MPEG1 video will be kept on a tape library system, buffered on disk, and accessed as needed via CM.

8.4.3 Retrieval

The retrieval process consists of two main parts: the edit/selection operation (MPEG1/meta data path), and the batch retrieval operation (MPEG2 path).

The edit/selection operation will enable producers to search and browse the digitized archive and select segments for subsequent processing. Producers can search the IBM CM via text or attributes and get back a set of videos meeting the search criteria. Each video will be represented by a thumbnail and a text description. By selecting a particular thumbnail, a producer can request to see the storyboard for the corresponding video.

From the storyboard, the producer can then request to view the MPEG1 video of the scene. The video will begin playing at the scene selected within the storyboard. This view will either be partial-screen or full screen as determined by the user, 800 x 600 being the nominal resolution for full screen.

As the producer reviews the data, he can indicate which segments he would like to use by placing them into a candidate list, which is represented as an Edit Decision List (EDL) The producer will be able to order and trim the video segments in the candidate list to produce the output of the edit/selection operation: the final Edit Decision List (EDL).

The EDL is sent to the batch retrieval operation (MPEG2 path). The batch retrieval operation uses the EDL to retrieve the appropriate segments from the MPEG2 storage area. The segments are retrieved from tape, and sent to a Profile system for subsequent transmission to an edit bay for final editing.

8.4.4 The ingest operation

The ingest operation digitizes incoming video data and collects descriptive information from: operator input, existing descriptions (originally from the Clipper database), video image captures to create a storyboard and speech-to-text processing of the audio stream.

8.4.4.1 Ingest Hardware

There will be four video ingest stations. Each station will consist of:

- A video tape recorder (VTR)

- A PC based workstation running Microsoft Windows NT and video cataloging software driving a PCI MPEG1 encoder card.

- A link to a Profile machine driving an MPEG2 encoder or another comparable MPEG2 encoding solution, enabling a unified control of the system

Note: The Profile machines support the encoding of multiple MPEG2 streams. One machine will service several of the video ingest units.

The PCI cards for MPEG1 encoding and video processing will be compatible with the Virage scene detection and speech-to-text software. The station will interface with the Profile or other MPEG2 encoding solution to enable the simultaneous conversion of the video to MPEG2.

Use of the Profile for both MPEG2 encoding and decoding is preferred over a hybrid solution to reduce the probability of incompatibilities between different MPEG2 standards.

The solution being implemented will use a standard MPEG1 encoder and burn the timecodes into the video. The timecode would then be extracted from a selected frame using OCR technology. This solution is more cost and time effective since it eliminates the need for expensive proprietary MPEG1 encoders and integration of the proprietary MPEG1 standard with Video Charger; however, it is dependent on accurate results using OCR. If OCR proves successful in this application, it will be the preferred solution.

Regardless of the MPEG1 solution used, the encoding process will need to ensure that the capture timecodes align as much as possible. The intent is to be as frame accurate as possible subject to the capabilities of the chosen hardware and software.

The initial implementation will allow up to four MPEG2 encoding stations to operate concurrently. Network and server capacity will support up to 18 stations (eight MPEG2, and ten MPEG1 only).

8.4.4.2 Hardware Specifics
- Four IBM PC's
- One MPEG2 encoder system (e.g. Profile XP) supporting four MPEG2 streams
- Four PCI MPEG1 encoder cards
- Four 100 BaseT Ethernet adapters

8.4.4.3 Ingest Software
The ingest application software will be developed by IBM and will consist of the integration and customization of several modules. The base of the software will be the Virage video logger and its Software Developer's Toolkit (SDK). The ingest application will use the Virage SDK and supports the data model. The application will provide user interfaces for user input, collect the descriptive information for each video and feed it into a loader for the IBM CM. The application will also need to ensure that the MPEG1 and MPEG2 encoders are kept synchronized to the external time code.

8.4.4.4 Software Specifics
Each ingest station will have the following software:
- Microsoft Windows NT Workstation 4.0 w / service packs

- Virage Video Logging Software w / SDK

- Java, C or C++ compiler compatible with Virage SDK (JRE 1.1.8 from IBM)

- IBM Ingest Application, including unified control of MPEG1, Profile MPEG2 data streams, and the VTR

8.4.5 Storage

Storage is a key part of this solution. With ultimately 100,000 hours of video encoded in both 1.5 Mbps MPEG1 and 48 Mbps I-Frame only MPEG2, the total solution will require over two petabytes of storage. As part of this project's deliverables, the system will be capable of storing 35,000 hours of video.

In order to efficiently encode, store and retrieve this video, the storage will not only need to be of sufficient capacity, but will also need to efficiently transfer files from ingest to tape and fulfillment. Below are descriptions of the hardware and storage schemes for both MPEG1 and MPEG2.

8.4.5.1 The Case for a Storage Area Network (SAN)

A significant amount of disk storage will be required by several different systems. Large amounts of data will move between the systems. It is therefore paramount that a flexible, scalable, storage architecture be implemented.

Initial disk storage projections are 1.5 TB as:

- 700 GB IBM Video Charger on AIX
- 200 GB IBM Content Manager on AIX
- 600 GB TSM / LTO Tape buffer on AIX

Additionally, there may be >100 GB on the Profile machine

A SAN device, 7133-D40, will consolidate the storage which will interface to the systems via Serial Storage Architecture (SSA). The SAN device will appear to the systems to be local disk drives.

The SAN will provide several significant advantages:

- Storage can be allocated to the systems as needed, allowing efficient allocation of disk space. Systems won't run out and won't have excess space.

- A system's storage can be increased without opening it to add more drives.

- The SAN provides RAID, hot-swap, hot-standby, redundant component and performance monitoring capabilities.

- By externalizing the data, a system failure does not preclude access to the data.

- Externalized data facilitates high availability architectures.

- Future capabilities will allow systems to share the same data so only single data writes will be required.

8.4.5.2   Hardware specifics
- IBM 7133-D40 Disk units
- SSA Host Adapters

8.4.5.3   Storage of MPEG1 and metadata
The MPEG1 files and associated metadata will be stored in IBM VC managed by IBM CM. The IBM CM solution will be resident on a two systems: one for CM and one for VC. Each will be resident on a R/6000 machine running AIX.

Staging and buffering will be on disk. The LTO Tape Library and TSM will be used for long term storage. Thumbnails and metadata used for search results will be kept on disk to ensure efficient search times. The VC will have disk buffer capacity for 1000 hours of MPEG1 video available for immediate streaming. Additional video will have to be staged from tape.

Hardware specifics
- 2 R/6000 Model H50 for CM and VC (1 each)
- Ultra-SCSI link to TSM / LTO tape library (see MPEG2 Section below)

Software specifics
- IBM Content Manager (Library Server, Text Search Server, Video Charger, Cliette)

8.4.5.4   Storage of MPEG2
The MPEG2 data will be stored on a R/6000 system running AIX and TSM. Initial staging and buffering will be to disk with a LTO tape library for long term storage.

Hardware specifics
- R/6000 Model H50, 4x604e, 1 GB memory, 9G disk

- Tape library system with LTO tape cartridges

  - With sufficient number of drives and robotics to support the documented workflow scenarios as provided by the customer

- With sufficient number of cartridges to store 35K hours of MPEG2 data

- 600 GB hard disk space allocated from SAN

- Fibre Channel card for connection to Profile

- 1000BaseT Ethernet

Software specifics
- AIX 4.3.2
- Storage Manager (TSM)

8.4.6 The Edit/Selection operation

The Edit/Selection Stations will facilitate the location, review and selection of the archived video assets. The producer can search via text strings and keywords and then review the returned thumbnails, text descriptions and storyboards to narrow down his selections. Once sufficiently narrowed, he can view the MPEG1 video to make final decisions on which segments to use. Selected segments will be placed in a candidate list for use in generating an EDL. The producer will be able to view, select, trim and order segments from the candidate list to produce the final EDL. At any point in this process, the producer can review the current EDL. The resulting EDL will be used as a reference for which MPEG2 files to recall from tape. Since the EDLs will be stored on a Server, they are accessible by any station on the network.

The search, browse and EDL creation operations will be provided via a combination of Web, Java and/or C applications. The final EDL format will be an EDL standard specified by the customer for consistency with existing applications. It will consist of a simple non-hierarchical list of video segments with file names and start and stop timecodes and will not support more complex features such as transitions.

8.4.6.1 Edit/Select hardware
The Edit/Selection stations will each consist of existing Pentium II PC's running Windows 98 and MS Internet Explorer V5.0 with Java 1.1.8 capability. Depending on the software chosen, additional PCI cards may be included, but it is not expected at this time. It is estimated that 25 stations, out of 50 configured, will be running Edit/Select operations concurrently.

8.4.6.2 Hardware specifics
The Edit/Selection stations will run on Pentium II workstations.

8.4.6.3 Edit / Select software

The Edit/Selection station software will be developed by IBM and will integrate several underlying components.   The software will interface with the user, providing him the ability to do text based searches, review the results, select segments, generate EDLs and then send the EDLs to the MPEG2 recall operation. A diskette-based distribution of the EDL will also be supported for the standalone Edit Bays.

Additional software will allow users to search the archive and update the metadata associated with each video. In particular, they will be able to replace thumbnails, modify Clipper type attribute data, and text sources produced from speech-to-text annotation and video analysis. Text will only be modified via keyboard input. Speech-to-text annotation will only be available on the Ingest stations as it is part of the Virage software.

The search client will be an application connecting to the IBM Content Manager and Video Charger.

8.4.6.4 Software specifics
- Internet Explorer V5.0
- Java Runtime Environment 1.1.8
- IBM Developed Integrated Software and Player

8.4.7 The MPEG-2 recall operation

The MPEG2 Recall station receives the EDL from the Edit/Selection station. Based on the contents, the Recall station initiates the recall of the MPEG2 files from tape to storage on disk. The station will then ensure the proper delivery of the MPEG2 to the profile machine.

Handles will be placed at the beginning and end of each video segment. The resulting time codes of each segment will be used to calculate byte offsets within the MPEG2 file. Only the desired part of the file will be retrieved from tape. This sub-file retrieval operation is supported within the Tivoli Storage Manager (TSM) client.

The segment with handles will be reformatted into a valid profile MPEG2 format file. If the destination editing machine requires a particular MPEG2 format that is different from the stored MPEG2 format, a conversion will have to take place.

8.4.7.1   MPEG2 recall hardware

The MPEG2 Recall station will be a PC running Windows NT. No specialized hardware is anticipated for this application.

8.4.7.2 Hardware specifics
- IBM PC Server
- 1000BaseT Ethernet connectivity

8.4.7.3 MPEG2 recall software
Software will be custom written by IBM.

8.4.8 System and data reliability and backup considerations
Because this system is considered critical to the production process, the number of single points of failure must be minimized. While efforts will be made to maximize reliability, the inherent complexity of hardware and software systems preclude 100 percent reliability. The customer is strongly cautioned to have contingency plans prepared to handle the failure of key components of the system. IBM will assist in failure scenarios and contingency risk identification and assessment.

8.4.8.1 Prevention
Redundancy and its ability to reduce system down time, are integral parts of the architecture. Specifically the following will minimize downtime:

- AIX / R/6000 combination for improved reliability

- RAID-5 on the 7133 disk units, a single disk failure will not cause an outage

- Hot spare drives will automatically take over for a failed drive (performance will be slowed until the data is rebuilt)

- Hot-swappable disk drives

- Redundant, hot-swappable power supplies on the 7133's

- SSA configured in a loop, in case of a single break in the loop, the systems will automatically re-route to use the alternate path

- Dual SSA cards per R/6000,

- Dual SCSI cards to access the LTO tape unit

- Multiple CPUs per system, system can be restarted on the remaining CPU

- Redundant, hot-swappable power supplies in the R/6000's

- Tivoli Storage Manager copy storage pool provides redundancy for MPEG1 video data

- External disk storage provides data access independent of R/6000 system operation

- All data accessible by at least two systems

- All programs can be run on at least two systems

8.4.8.2 Storage
These are storage considerations for disk, tape, and systems. We discuss the failure mode and solutions.

Disk
- Failure mode: hardware failures, for example, disk drive crash, power supply, and so on

- Solution: Disk Storage will be consolidated in the 7133 SAN. The SAN storage provides RAID capability which guards against individual drive failures. It also provides redundant components such as controllers, power supplies, and so on.

Tape
- Failure mode: tape cartridge becomes unreadable

- Solution: An unreadable tape can be sent to IBM's data recovery services which will hopefully be able to retrieve most of the data. Because of the difficulty in recovering from data loss, for the MPEG1 data tapes which hold MPEG1 files from the VC, a backup copy via Tivoli Storage Manager copy storage pools will be implemented.

  An unrecoverable failure of an MPEG2 tape will require the associated source material to be re-digitized. Due to the size of the data, a backup copy is not practical.

Systems (Content Manager, Video Charger, TSM, LTO)
- Failure mode: R/6000 hardware failures

- Solution: The 3 R/6000 H50 systems will be clustered together to provide backup. If one system fails, one of the other 2 can take up its workload. The Tivoli Storage Manager machine will provide failover support for either the CM or VC server. The CM server will provide failover support for the Tivoli Storage Manage server. Concurrent failure of 2 or more systems will result in system unavailability.

- Failure mode: R/6000 software failure (AIX, CM, Tivoli Storage Manager, VC, and so on)

- Solution: The latest code levels and recommended fix packs will be installed. However the complexity of the software makes this the most likely failure cause.

- Failure mode: Tivoli Storage Manager/LTO database

- Solution: The Tivoli Storage Manager/LTO database catalogs what file is on what tape. It will be setup as mirrored volumes and exported on a regular basis.
- Failure mode: LTO robot
- Solution: Manual retrieval of tapes

Appendix A. Environment, procedures, and technical tips

During this project, we had access to several pieces of equipment and our own network. We were able to set up various configurations which are detailed later in this appendix. We also experimented with various performance scenarios. In this appendix, we will document our hardware, software, and network specifications, as well as some of the procedures we followed and tips we discovered that we would like to pass along.

A.1 Overview of creating video clips

In Figure 35, you can see the general workflow of multimedia capture and delivery.
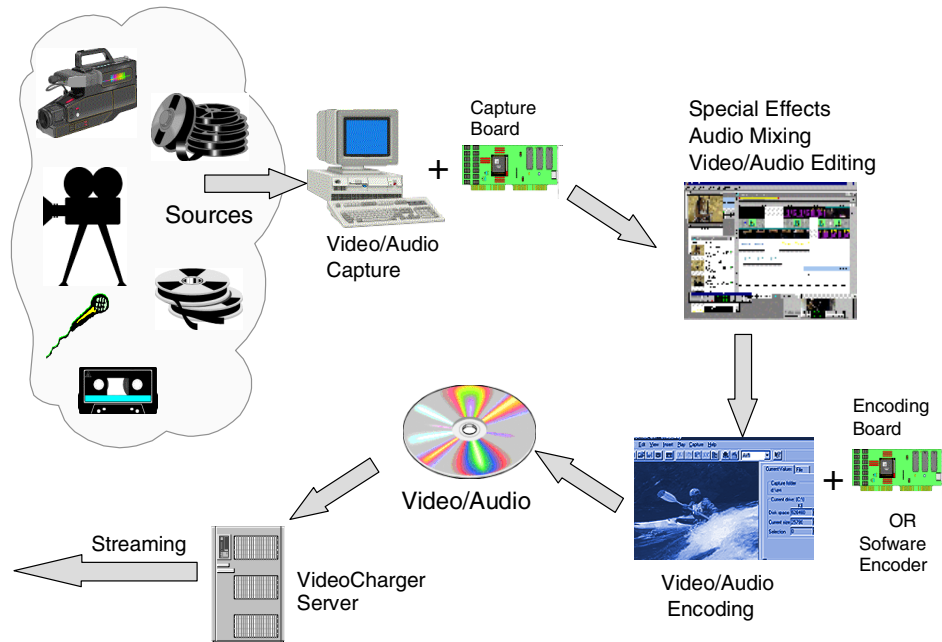
Figure 35. Multimedia capture and delivery workflow

Starting from the source:

- Digitize the source (Results are AVI or MJPEG video files).
- Edit your raw video clip.
- Transcode or Recompress the edited video clip. (As uncompressed multimedia eat up a huge amount of disk space and network bandwidth, you need to compress it by using a hardware or software encoder.)

- Store the encoded video in an archive and upload to the VideoCharger server so that it is recognized as an asset.

A.1.1 Capturing video clips

Sources like traditional VHS tape or BetaCam, or newer sources like DV tape, DVD, or CD-ROM, can all be captured and stored digitally on a computer. The quality of the captured video depends on:

- Your source quality
- The interface between the capture card and the source (for example, IEEE 1394, composite, or S-Video)
- The compression ratio and method used during capture
- The CPU and disk speed

If you use a DV-Camera and an IEEE 1394 interface attached capture board, you are guaranteed that the picture is captured digitally.

A.1.2 Editing video clips

You can use Adobe Premiere 5.1 to edit your clip. In fact, this is a fully functional and versatile editing tool. If your capture board came with an Adobe Premiere plug-in, you can capture, edit, and output (encode) in one single operation.

A.1.3 Codecs

A.1.3.1 Codec overview

There is no generic set of steps or settings that will work for any movie. The only way to get the best results is to examine your source media carefully, and apply the right pre-processing and compression settings based on the characteristics of the source material and your delivery needs.

While you are selecting your various parameters, it is important that you make sure that these settings will produce movies that will play properly on your target machine. Each architecture and codec may have slightly different options or requirements. Testing is the best way to ensure that you are getting the optimal result for the selected architecture.

A.1.3.2 Data rate

One of the most important decisions you must make when preparing the movie is the data rate. The data rate has more effect on the final image and sound quality of your movie than any other parameter. It also affects the final

size of your movie, as well as what playback methods will be able to effectively deliver the movie to your target architecture.

Note: There are two methods for measuring data rates. Multimedia developers work with *kilobytes* per second (KB/s), while developers working with Internet/network video specify files in *kilobits* per second (Kb/s). A byte is eight bits, so it is very important to understand in which unit a data rate is specified.

The data rate you specify depends on the purpose of the video. The following list is a guide to some uses.

Videotape production: The data rate should fall within the capabilities of the computer that will play the clip during videotape recording.

Hard disk playback: If the final video will be played back from a hard drive, determine the typical data transfer rate of the intended playback platform and set the data rate accordingly.

CD-ROM playback: The data rate for video played from a CD-ROM depends on the speed of the drive. For example, if you are preparing a video file for a quad speed CD-ROM (1,200 KB/s), you might specify a data rate of between 600 to 800 KB/s to account for both the data rate of the drive and the system overhead.

Intranet playback: The data rate can be 100 Kb/s, depending on the speed of your intranet.

Streaming video over the WWW: The data rate should account for real-world performance at the target data rate. For example, the data rate for streaming video designed for a 28,800 *bits per second* (bps) is usually set to 20,000 bps. Factors such as data volume and line quality often prevent telephone-based Internet connections from consistently achieving their stated data rate.

A.1.3.3 Codec overview

A *codec* (compressor/decompressor) is a specific method of handling compression and decompression. Some are built into QuickTime or Video for Windows, and others are available as plug-in software modules. A wide range of codecs is available because there is no single codec that is the best for all situations. For example, the best codec for compressing cartoon animation is usually not very efficient for compressing live-action video.

Some examples are:

A.1.3.4 Video for Windows video codecs (Windows only)

Intel Indeo 5.03: Useful for video distribution over the Internet to computers with MMX or Pentium II processors.

Intel Indeo Video Raw R1.1: Useful for capturing uncompressed video with Intel video-capture cards.

Intel Indeo Video Interactive: Similar to the Intel Indeo 5.03 codec, Indeo Video Interactive supports advanced features such as transparency, multiple version movies, and playback effects.

Microsoft RLE: Useful for compressing frames that contain large areas of flat color, such as cartoon-style animation.

Microsoft Video 1: Useful for compressing analog video.

Intel Indeo Video R3.2: Useful for compressing 24-bit video for playback from CD-ROM discs. This codec gives higher compression ratios, better image quality, and faster playback speeds than the Microsoft Video 1 codec.

Cinepak Codec by Radius: Useful for compressing 24-bit video intended for CD-ROM discs or for downloadable Web video files. This codec gives higher compression ratios and faster playback speeds than the Video codec.

A.1.3.5 Video for Windows audio codecs (Windows only)

Intel Audio Software: Used for music and speech distribution over the Internet.

True speech: Useful for speech over the Internet at low data rates.

MS-ADPCM: Useful for speech, used in Europe for telephony.

Microsoft IMA ADPCM: A Microsoft implementation of Adaptive Differential Pulse Code Modulation (ADPCM), a common digital audio format capable of storing CD-quality audio.

Lucent Technologies SX8300P: Useful for speech over the Internet at low data rates.

elemedia TM AX2400P: Useful for high-quality non-streaming music files over the Internet.

Voxware audio codecs: Useful for speech over the Internet at low data rates.

A.1.3.6 QuickTime video codecs

Component video: Useful for capturing, archiving, or temporarily storing video. It has a relatively low compression ratio, so it requires large amounts of disk space.

Video: Useful for capturing and compressing analog video. This codec results in high-quality playback from hard disk, and moderate quality playback from CD-ROM.

Animation: Useful for clips that use large areas of solid color, such as cartoon-style animation.

Motion JPEG A and motion JPEG B: Useful as transcoders, for transferring video-capture files to other computers equipped with video-capture cards, particularly across platforms. These codecs are versions of JPEG implemented by many video-capture cards.

H.263: Useful for video conferencing at low data rates. Not recommended for video editing.

Cinepak: Useful for compressing 24-bit video intended for CD-ROM disks or for downloadable Web video files. This codec gives higher compression rates and faster playback speeds than the Video codec. You can set the data rate for playback, but picture quality drops noticeably at data rates below 30 KB/s.

Sorenson video: Useful for compressing 24-bit video intended for CD-ROM disks or for downloadable Web video files. This codec gives higher compression rates and faster playback speeds than the Video codec. Similar to Cinepak, this newer codec is designed for high quality at data rates under 200 KB/s. It requires more compression time than Cinepak.

Planar RGB: A lossy codec effective for frames that use large areas of solid colors, such as animation. It uses run-length encoding and is an alternative to the Animation codec.

A.1.4 Encoding video clips

You can finalize your movie clip directly from your editing tools. That means when you output the movie, you specify the codec for the output. However, there are occasions when you may want to encode your clip using other codec that is not provided by the editing tools. For instance, MPEG codec is not a standard plug-in for Adobe Premiere 5.1.

In this section, Quicktime Pro Player (which is in fact not only a player, but also an editing tool and software encoder) was used as an example to illustrate how you can encode your video clips in such a way that the resulting video can be uploaded to VideoCharger and streamed out. Therefore, the target video would be in QuickTime 4.0 format.

A.1.4.1 Methods to encode a hinted QuickTime 4.0 movie

In order to stream QuickTime 4.0 video, the video must contain:

- A video track
- An audio track
- A timing track, called a "hinted track"

Hinting analyzes the media data within a movie and creates hint tracks which tell the streaming server software how to package the data to send over the network. The hinting process will create a hint track for each media track you wish to stream. The hint tracks are stored within the same movie — the hinted movie — as the media tracks.

To check whether your QuickTime contains hinted tracks, use the following steps:

1. Open the movie from QuickTime Pro player.

2. Select **Get Info** from **Movie** manual.

3. Press the top left-hand combo box of the new window and you should see the Hinted Video Track and Hinted Audio Track.

There are at least three methods you can use to create a QuickTime 4.0 hinted movie. Whatever method you decide to use, you should note the following **do not do's**:

- **Do not** check the option **Optimize Hint for server** in hint exporter setting window. Otherwise, movie files produced by this option will not parse under VideoCharger. (See Figure 37 on page 195).

- **Do not** check the option **Use native encoding if possible**. Check the option **Always use QuickTime encoding** (Options are found in RTP track setting window). Otherwise, you may not be able to see the video stream. (See Figure 37 on page 195 and Figure 40 on page 197.)

You should also observe the following **do's**:

- **Do** check the option of **limit data rate** so that you have control over the resulting bit rate (in KB/s) of the video. This option also overrides the quality slide bar.

- **Do** choose the **frame rate** to fit your clip.

Method 1. Export hinted movie directly

If you already have a finalized AVI or QuickTime clip, use the following steps to obtain a hinted QuickTime 4 movie:

1. **Import** the source movie.

2. Choose **File -> Export**

3. Pull down the export menu from the Diag window and choose **Movie to Hinted Movie**. (See Figure 36).
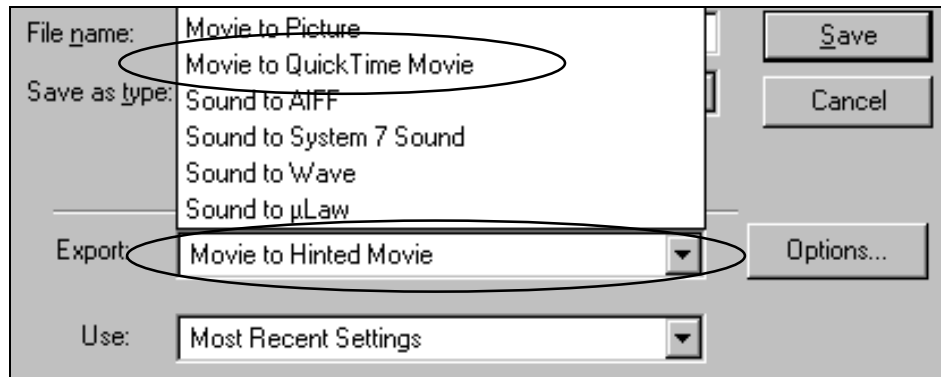
Figure 36. Export file option

4. Click **Options** to check for the hint exporter setting. It should look like the one shown in Figure 37.
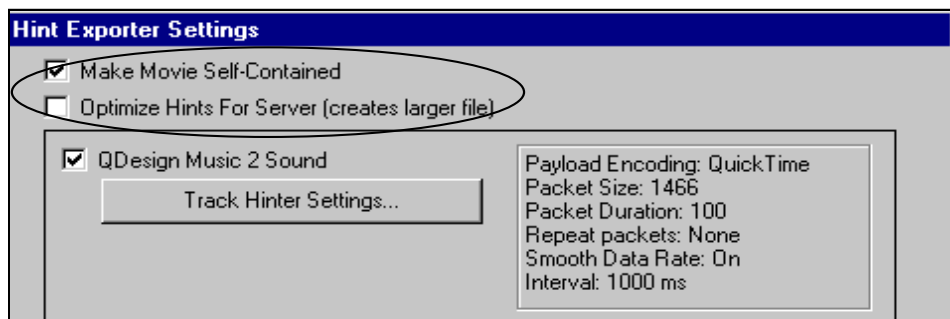
Figure 37. Hint exporter settings

5. Click **Track Hinter Settings** of Video Codec. It should look like the one shown in Figure 38.
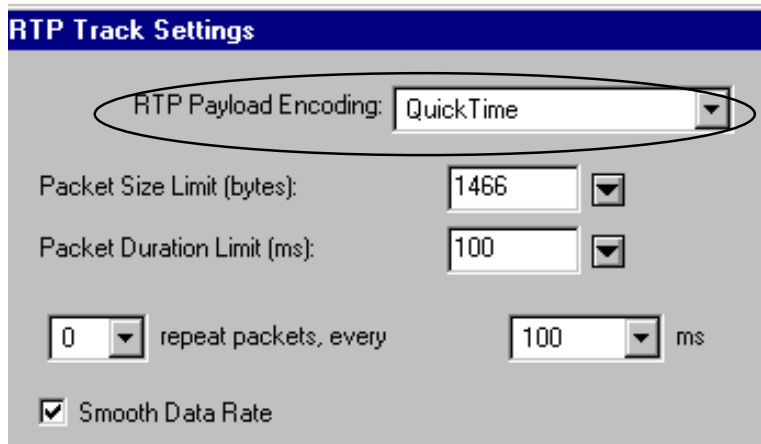
Figure 38. RTP track settings

6. Feel free to modify the other settings and then complete the export.

Method 2. AVI > QuickTime hinted streaming movie

If you have an AVI clip and want to convert it to a QuickTime 4 movie so that you can further change the codec, data rate, key frame, and so on (attributes of the movie), you can use this method:

1. **Import** the source movie.

2. Choose **File -> Export**

3. Pull down the export menu from the Diag window and choose **Movie to QuickTime Movie.** (Refer to Figure 36 on page 195).

4. Click **Option** to open the Movie setting window. Check the option **Prepare for Internet Streaming** (located at the bottom of the window), and choose **Hinted Streaming** from the combox box. (See Figure 39).
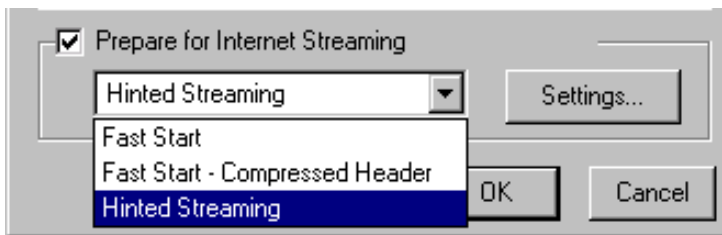
Figure 39. Movie setting window: streaming option

5. Click **Settings** to enter the Hint exporter setting window. (Make sure your settings looks like those shown in Figure 37 on page 195.)

6. Click **TrackHinter Settings** and enter the RTP track settings window. (Make sure your settings look as shown in Figure 40).
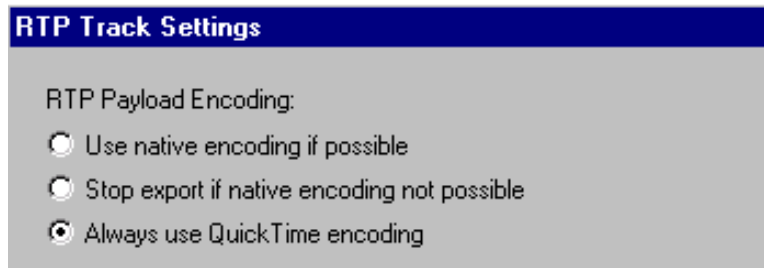
Figure 40. RTP track settings for exporting QuickTime movie

7. Feel free to modify the other settings, and then complete the export.

Method 3. AVI > QuickTime > Hinted movie
This method basically combines the steps you need to do for the previous two methods:

1. Do Steps 1 - 3 of Method 2.

2. Click **Option** to open Movie setting window. Check the option **Prepare for Internet Streaming** (located at the bottom of the window), and choose **any other 2 methods than Hinted Streaming** from the combox box. See Figure 39 on page 196.

3. Continue with Steps 5 - 7 of Method 2.

4. Use the resulting movie and follow all the steps of Method 1.

It does not matter to VideoCharger which of these three methods you use to encode your QuickTime movies (it only streams the data to the client).

The file produced by Method 3 is slightly larger than the file produced by Method 2. But the fast start option provided is not very striking for our case, and you must do more steps to accomplish a similar task. Method 1 assumes you do not have to recompress or reset some of the settings of the video, so this method is fastest and easiest, although your resulting file will be slightly larger. Otherwise, it is suggested to use Method 2 with suitable choice of codec, data rates, and so on. (More detailed information can be found in the following section.)

A.1.4.2 Comparison of codecs
In this section, you can find a comparison of the picture quality using different codecs from different sources using QuickTime Pro Player. You should bear in mind that the resulting picture quality depends on your video source, which

in some cases may bias a certain codec and hence the result. Therefore, the quality presented here is not absolute.

Low data rate codecs (H.261 and H.263)

All the four videos (1 - 4) are created from the same source (5) from Figure 41. While all other settings are kept the same, you may notice that for the same data rate video, H.263 encodes a better picture than H.261. See Figure 41 and Table 26 for details of the picture specifications.
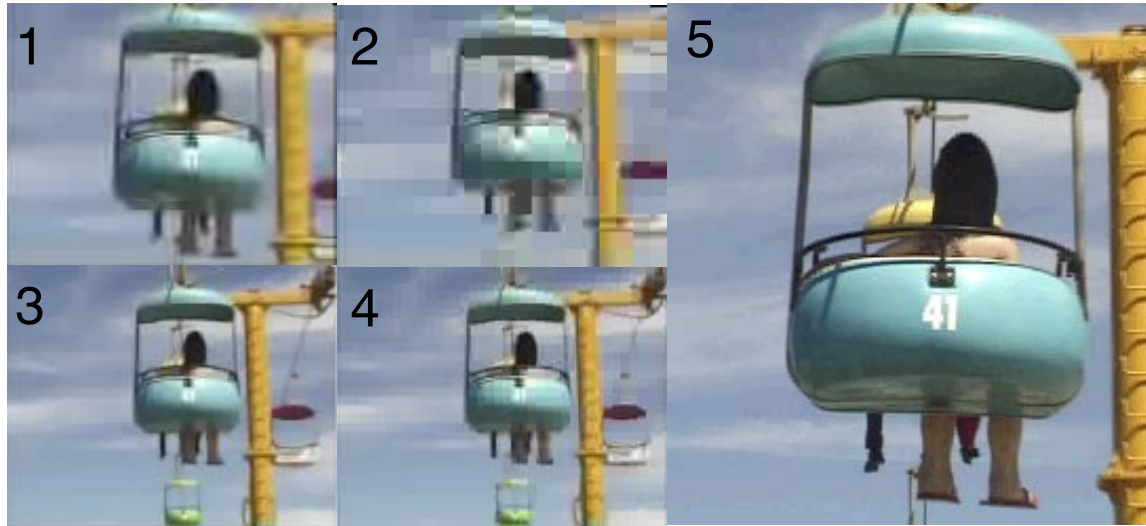
Figure 41. Still picture quality comparison of low data rate codec

Table 26. Summary of specification of video in low data rate codec comparison

| Movie | Video specification | | | | File size of 1 minute clip (Mb)[a] |
	Frame rate (f/s)	Data rate (KB/s)	Dimension (pixel)	Codec	
1	15	2.5	160x120	H.261	0.25
2	15	2.5	160x120	H.263	0.25
3	15	6	320x240	H.261	0.45
4	15	6	320x240	H.263	0.45
5 (SOURCE)	29.97	2500	320x240	Intel Indeo 5.1	151

a. For the source file, the audio track is not compressed. Movie 1 - 4 all compressed sound track using QDesign Music 2 of 8 KB/s data rate.

High data rate codecs (Intel Indeo 5.1, 4.4, Sorenson, Cinepak)

All four videos are encoded from the source by direct capture from Sony DV1000 using IEEE 1394 interface and Adobe Premiere 5.1. See Figure 42 for the comparison of still picture quality and Table 27 for a summary of specifications.

Figure 42. Still picture quality comparison of high data rate codec

Table 27. Summary of specification of video in high data rate codec comparison

Movie	Video specification				Encode speed	File size (Mb)[a]
	Frame rate (f/s)	Dimension (pixel)	Data rate (Kbyte/s)	Codec		
1	29.97	320x240	200	Intel Indeo 5.1	Medium	5
2	29.97	320x240	200	Intel Indeo 4.4	Medium	4.5
3	29.97	320x240	200	Cinepak	Slow	4.1
4	29.97	320x240	200	Sorenson	Slow	4.5
5 (Source)	29.97	720x480	3750	MiroVideo DV300	N/A	1900

a. For the source file, the audio track is not compressed and its duration is around 8 minutes. Movie 1 - 4 all compressed sound track using IMA4.1 of 22 KHz and 16 bit stereo setting for only 20 seconds.

It is hard to tell the difference between these four codecs, as their still picture qualities are all very good. However, you get a smaller file size using Sorenson and Cinepak codecs at the cost of a longer encoding time.

A.1.5 Tips to create video

This section summarizes the tips that you need to know to create your movie and deliver it to a user through VideoCharger.

1. Use a digital camera whenever possible and capture it through a firewire (IEEE 1394) interface.

2. After you complete your editing and are preparing to export the video, make sure you have the right encoding software/hardware installed. In case you need to export it to an intermediate file for subsequent encoding, do not apply any codec to it to prevent data loss.

3. Avoid recompressing a video using different codecs. You will have a bad quality or even a different color video. We attempted to feed an Intel Indeo 5.1 encoded AVI to the QuickTime Player and export it using Cinepak and Sorenson codecs. The output videos look bad and the color did not match the original.

4. Use commonly available codecs.

5. For MPEG encoding, pay special care to the GOP size and Sequence Header Interval setting. GOP size should be 15 frames for NTSC, and 12 frames for PAL and NTSC Film formats. Sequence Header Interval setting should be 0,1,2 or 3.

A.2 Summary of our video creation experiments

We took a video camera to Santa Cruz and shot about 25 minutes of film. Back at the office, we captured the film with Pinnacle microVIDEO DV tools capture software in several AVI clips (due to the filesize limit of 2 GB on windows). Each member of the team got to create their own video from these clips. We used several audio CDs to add a creative sound track.

Once created and encoded into their final format, these clips were loaded into VideoCharger and played back with either VideoCharger player or the Quicktime player as appropriate.

Using Adobe Premiere, we edited the film clips, added an audio track (from CDs digitized using Sound Blaster WaveStudio) and exported the project as an AVI. The first clip we attempted to export was approximately 10 minutes and 30 seconds. Choosing a compression mode of Indeo Video 5.10 at 100

percent quality, however, produced a clip over 2 GB. So, we reduced the total clip time to 8 minutes, 26 seconds and reduced the quality to 80 percent. This produced a 260 MB file with 15182 frames at 29.00frames/sec. The audio track was PCM,22050hz, 16bit stereo.

Note: This project was done by a novice in the area of film editing. It took four hours to create the 10 minute clip with sound to the artist's satisfaction. Creation of the preview step took 45 minutes. The export of the video clip through Premiere software took approximately 1.5 hours.

The second step was to encode the AVI into an MPEG1 file. We used Xing-MPEG encoder. The clip was captured at a frame rate of 29.97, data rate of 2351 Kb/s, with video at 2200 Kb/s and audio at 128 Kb/s. (The conversion step took approximately 1 hour). The size of the MPEG1 file was 145 MB. This was then loaded into VideoCharger and streamed through to a player. The quality was very good in the small screen, but somewhat grainy when enlarged to a full screen.

In an effort to see if the capture settings would improve this, the Adobe Premiere project files were re-exported to an AVI clip with the following specifications:

Compression Mode: Indeo Video 5.10 with 100 percent quality, frame size of 720h 480 v.

This MPEG clip was no better than the previous one. The next experiment was to try to lower the bit rate. We lowered the Xing-MPEG encoder settings to use a bit rate of 1.5Mb/s. The size of the file decreased to 94 MB, and this MPEG clip was much better. Apparently our original AVI clip did not have enough data to support the higher bit rate.

A.3 Environment — hardware configurations

VideoCharger servers
- **NT (two servers)**

    - Hardware:

        - Pentium II processor - 300PL (450MHz)
        - 128 MB of RAM
        - 20 GB IDE hard drive, split into two partitions, both formatted NTFS

            The first partition contains the OS and programs, the second is used for data.

        - Token Ring Adapter

- Software:

  - Windows NT V4.0 Server with Service Pack 6a
  - Internet Explorer V4.0
  - Microsoft Web and FTP Server from Option Pack
  - VideoCharger V7.1

- **AIX**

  - Hardware:

    - Multiple (4) Processor, Microchannel bus
    - 5 SCSI disk drives, 5 GB each
    - 500 MB of RAM
    - L2 cache
    - 3 Wide SCSI Controllers
    - Token-ring Adapter

  - Software:

    - AIX V4.3.3
    - Java Runtime Environment V1.1.8.0
    - VideoCharger Server V7.1
    - DCE Client V3.1.0.1
    - IHS http server V1.3.12.1
    - Multimedia File Manager (mmfs) V2.3.0.0

Content Manager server

- Hardware:

  - Pentium II processor - 300PL (450MHz)
  - 128 MB of RAM
  - 20 GB hard drive
  - Token Ring Adapter

- Software:

  - Windows NT V4.0 Server with Service Pack 6a
  - Internet Explorer V4.0
  - Microsoft Web and FTP Server (from option pack IIS install)
  - Microsoft Visual C++ Compiler V6.0 (From Visual Studio)
  - IBM UDB V7.1, Enterprise Edition
  - Content Manager V7.1 (all components installed on one machine, communicating with VideoCharger on a different machine)

Clients

- Hardware:

  - Pentium II processor (450 to 750 MHz)

- 384 to 584 MB of RAM
- Token Ring Adapter

- Software:

  - Windows NT V4.0 Workstation or server with Service Pack 6a
  - Internet Explorer V4.0
  - VideoCharger player V7.1
  - QuickTime Player V4.0

Capture/Encoding tools
- **Sony DV-1000 Digital Camera**

  - Hardware:

    - Pentium II 450
    - 192 MB RAM
    - Pinnacle miroVIDEO DV300 IEEE-1394 Adapter (digital capture)
    - Matrox Rainbow Runner (analog capture)
    - 5 hard drives: 3 IDE; 2 SCSI:
      - 1.5 GB IDE
      - 3 GB IDE
      - 9.5 GB IDE
      - 2 SCSI drives IBM DMVS18V 18 GB
    - 10/100 Ethernet PCI Adapter
    - Sound Blaster Card

  - Software:

    - Microsoft Windows 95
    - VideoCharger Player V2.0, Service Level 4
    - Quicktime Pro V4.0
    - XingMPEG Encoder
    - Adobe Premiere V5.1a
    - Pinnacle miroVIDEO capture software (digital capture)
    - Rainbow Runner capture software (analog capture)
    - Adaptex EZUse CD

- **SoundBlaster WaveStudio**

Appendix B. Sample VideoCharger configurations

Generally, when you plan to configure a VideoCharger system, you should consider the following:

1. Determine the number of concurrent streams at the bit rate (Mb/s) the customer needs. This will determine the size of the system and the networking requirements.

2. Determine the number of hours of media the customer needs to store, then multiply by the bit rate of the content. This will determine the size of the disk storage requirements. Should the assets all be online, or do we need to add the Archiver?

3. Determine the system requirements. Small (<20), Medium (<50), or Large (200+). Multiple Processors? High interactivity or low bit rate streams. Multiple Data Pumps (AIX only)?

4. Calculate the memory requirements. See page 17 of the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871 (duplicated in Figure 43 on page 219).

5. Calculate the required storage capacity: hours multiplied by bit rate. See the chart on page 23 of the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871 (duplicated in Figure 44 on page 220). Do we need to add Archiver capabilities? SSA, SCSI? Is RAID required?

6. Determine the LAN requirements and capabilities:

   • Ethernet 100 delivers a usable bandwidth of 45 Mb/s via a hub, or 65 Mb/s when switched. (When a collision occurs on an ethernet network, it causes artefacts in the video. These low numbers attempt to avoid collisions.)

   • ATM 155 (OC3) can deliver 120 Mb/s.

   • Utilize physical subnet isolation to force load leveling.

At the end of this appendix there is a sample questionnaire to help establish this information. Below are detailed some samples of VideoCharger configurations. These should be used only as a guide to the type of configuration you would need based on your streaming requirements.

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B.1 7043-140 VideoCharger server for AIX (small-level)

This configuration sample is based on the following assumptions:

- The VideoCharger server will be capable of simultaneously serving 20 video streams at 1.5 Mb/s.

- Multicast feature will be needed (multicast streams are considered one stream even though many users may view it).

- It will store 25 hours of video content at 1.5 Mb/s configured for RAID-5.

- Network connection via Ethernet 10/100.

B.1.1 Hardware

RS/6000 model 7043-140

233MHz, 128MB RAM, 2 x 4.5GB SCSI Disks, 10/100Mb Ethernet

Note: The integrated SCSI adapter to run the standard 4.5 GB HDD is to be used for the operating system and VideoCharger base software. The additional 9.1GB HDDs are to be used for content storage (mmfs) and are dedicated to that task.

- 7043-140 RS/6000 43P Model 140
    - Base 1 MB L2 Cache
    - CD-ROM Drive
    - 1.44 MB 3.5-inch Diskette Drive
    - Integrated SCSI-2 Fast/Wide Adapter
    - Integrated Ethernet Adapter
    - 2838 POWER GXT120P Graphics Adapter (PCI)
    - 2913 9.1 GB 1" Ultra SCSI Hot Swap Disk (2)
    - 2907 4.5 GB Ultra SCSI Hard Disk Drive Select
    - 2968 10/100 Mb/s Ethernet Adapter
    - 3623 P72 Color Monitor, Stealth Black
    - 4102 Select 128 MB DIMM
    - 4315 Select 233 MHz Pluggable Processor
    - 5005 Pre install
    - 6159 12 GB/24 GB 4mm Tape Drive
    - 8700 Quiet Touch Keyboard, Stealth Black - English
    - 8741 3-Button Mouse - Stealth Black
    - 9300 Language - English (US)
    - 9800 Power Cord - US/Canada (125V,15A)

B.1.2 Software

- 5765-C34 AIX Version 4
  - 4061 AIX 4.3 for 1-2 Users
  - 5005 Pre install
  - 9001 Asset Registration
- 5801-AAR Program Packages
  - 0340 IBM Content Manager VideoCharger for Multiplatforms V7.1 Server
  - 9001 Asset Registration
- 5807-AAR Use Based Features
  - 0342 IBM Content Manager VideoCharger for Multiplatforms V7.1 Concurrent Video Stream Usage (20)
- 5692-AIX System Software
  - 0598 AIX Welcome Center
  - 0838 AIX 4.3 Update CD
  - 0857 AIX 4.3 Server 1-2
  - 0859 Pre install AIX 4.3 Server Bundle
  - 0860 AIX 4.3 Bonus Pack - Non Export
  - 1004 CD-ROM Process Charge
  - 2924 English
  - 3410 CD-ROM
  - 5005 Pre install
  - 5924 AIX 4.3 PII - English
  - 9001 Asset Registration

B.2 7025-F40 Video Charger server (medium-level)

This configuration sample is based on the following assumptions:

- The VideoCharger server will be capable of simultaneously serving 60 video streams at 1.5 Mb/s.

- Multicast feature will be needed (multicast streams are considered one stream even though many users may view it).

- It will be able to store 55 hours of video content at 1.5 Mb/s configured for RAID-5.

- Network connection via Ethernet 10/100.

B.2.1 Hardware

RS/6000 Model 7025-F40

1-Way, 233MHz, 192MB RAM, 40.5GB SCSI Disk, 2 x 10/100Mb Ethernet

Note: The integrated SCSI-2 adapter 1 to run the standard 4.5 GB HDD is to be used for the operating system and VideoCharger base software. The integrated SCSI-2 adapter 2 is to run the four additional 9.1 GB HDD's. This storage space is to be used for content storage (mmfs at 36.4 GB) and these drives are dedicated to that task.

- 7025-F40 RS/6000 Model F40
    - CD-ROM Drive
    - 1.44 MB 3.5-inch Diskette Drive
    - Integrated SCSI-2 Fast/Wide Adapter 1
    - Integrated SCSI-2 Fast/Wide Adapter 2
    - Integrated Ethernet Adapter
    - 1001 Service Processor Option
    - 2446 PCI Ultra SCSI Adapter to First DASD 6-Pack Cab
    - 2838 POWER GXT120P Graphics Adapter (PCI)
    - 2902 4.5 GB Ultra SCSI Hot Swap Disk Drive Select
    - 2913 9.1 GB 1" Ultra SCSI Hot Swap Disk(4)
    - 2968 10/100 Mb/s Ethernet PCI Adapter(2)
    - 3623 P72 Color Monitor, Stealth Black
    - 4114 64 MB DRAM DIMM(2)
    - 4340 Select 233 MHz Processor, 1MB L2 Cache
    - 5005 Pre install
    - 6159 12GB/24GB 4mm Tape Drive
    - 6206 Ultra SCSI PCI-Bus Adapter
    - 6520 SCSI Hot Swap 6-Pack 1 Kit
    - 8700 Quiet Touch Keyboard, Stealth Black - English
    - 8741 3-Button Mouse - Stealth Black
    - 9080 Base 32 MB DRAM DIMM (2)
    - 9300 Language - English (US)
    - 9800 Power Cord - US/Canada (125V, 15A)

B.2.2 Software

- 5765-C34 AIX Version 4
    - 4061 AIX 4.3 for 1-2 Users
    - 5005 Pre install
    - 9001 Asset Registration

- 5801-AAR Program Packages
  - 0340 IBM Content Manager VideoCharger for Multiplatforms V7.1 Server
  - 9001 Asset Registration
- 5807-AAR Use Based Features
  - 0342 IBM Content Manager VideoCharger for Multiplatforms V7.1 Concurrent Video Stream Usage (60)
- 5692-AIX System Software
  - 0598 AIX Welcome Center
  - 0838 AIX 4.3 Update CD
  - 0857 AIX 4.3 Server 1-2
  - 0859 Pre install AIX 4.3 Server Bundle
  - 0860 AIX 4.3 Bonus Pack - Non Export
  - 1004 CD-ROM Process Charge
  - 2924 English
  - 3410 CD-ROM
  - 5005 Pre install
  - 5924 AIX 4.3 PII - English
  - 9001 Asset Registration

B.3 7026-H50 Video Charger server (high-level)

This configuration sample is based on the following assumptions

- The VideoCharger server will be capable of simultaneously serving 200 video streams at 1.5 Mb/s.

- Multicast feature will be needed (multicast streams are considered one stream even though many users may view).

- It will be able to store 120 hours of video content at 1.5 Mb/s. Can be configured for RAID-5.

- Can be scaled up, using additional 7026-H50 (additional Data Pumps).

- The two SSA Adapters should both be configured for performance reasons.

- For configuration completeness, VideoCharger Archiver has been added. This unit is capable of storing 12.9 TB or 19,110 hours of video (at 1.5 Mb/s).

- Network connection via Ethernet 10/100.

B.3.1 Hardware

RS/6000 Model 7026-H50

4-Way, 333MHz, 2GB RAM, 109GB SCSI Disk, 2 x 10/100Mb Ethernet

- 7026-H50 RS/6000 Enterprise Server Model
  - CD-ROM Drive
  - 1.44 MB 3.5-inch Diskette Drive
  - Base SCSI 6-Pack
  - Integrated SCSI-2 Fast/Wide Adapter 1
  - Integrated SCSI-2 Fast/Wide Adapter 2
  - Integrated Ethernet Adapter
  - Base AC Power Supply
  - Base 4.5 GB Ultra SCSI Disk Drive
  - 2838 POWER GXT120P Graphics Adapter (PCI)
  - 2901 4.5 GB Ultra SCSI Hot Swap Disk
  - 2988 Turboways 155 PCI MMF ATM Adapter(3)
  - 3623 P72 Color Monitor, Stealth Black
  - 4106 Select 256 MB (2x128MB) SDRAM DIMMs
  - 4110 256 MB (2x128MB) SDRAM DIMMs(7)
  - 4242 6 ft. 15-pin D-shell to 15-pin D-shell Extender
  - 4320 2-Way 604e 332MHz Processor Card, 2x256KB L2 Ca
  - 4338 2-Way 604e 332MHz Processor Card, 2x256KB L2 Ca
  - 5005 Pre install
  - 5520 Complete System Order
  - 6159 12GB/24GB 4mm Tape Drive
  - 6215 SSA Multi-Initiator/RAID EL Adapter (PCI)(2)
  - 6296 Redundant AC Power Supply
  - 8700 Quiet Touch Keyboard, Stealth Black - English
  - 8741 3-Button Mouse - Stealth Black
  - 9300 Language - English (US)
  - 9800 Power Cord - US/Canada
- 7014-S00 System Rack
  - 0126 Content: 7026-H50 (8 EIA)
  - 0156 Content: 7133-D40 (4 EIA)
  - 6171 Additional Power Distribution Unit, Side-Mounted
  - 9171 Power Distribution Unit, Side-Mounted, 1-Phase
  - 9300 Language - English (US)
  - 9801 Rack Power Cord - Watertight
- 7133-D40 Advanced SSA Disk Subsystem (Rack-Mounted)
  - 0987 Rochester Integration
  - 8022 50/60Hz AC, 300 VDC Power Supplies
  - 8031 Raven Black Drawer Cover

- 8209 One 9.1GB Advanced Disk Drive Module (12)
- 8802 2.5m Advanced SSA Cable (4)
- 9300 Language - English (US)

• 3466-C30 Network Storage Manager

- 2710 Remote Support Facility
- 3133 SSA Drawer Add (2)
- 3429 36 GB SSA Additional (9)
- 4402 Add storage Process complex
- 4986 Ethernet 10-100 Mb/sec.
- 5210 IBM Tape Storage Unit add (2)
- 5590 IBM Magstar Tape drive add (4)
- 6000 210 Magstar 10 GB tapes (6)
- 7420 Ethernet remote console su
- 9103 Software Pre-Load

B.3.2 Software

• 5765-C34 AIX Version 4
  - 4061 AIX 4.3 for 1-2 Users
  - 5005 Pre install
  - 9001 Asset Registration
• 5801-AAR Program Packages
  - 0340 IBM Content Manager VideoCharger for Multiplatforms V7.1 Server
  - 9001 Asset Registration
• 5807-AAR Use Based Features
  - 0342 IBM Content Manager VideoCharger for Multiplatforms V7.1 Concurrent Video Stream Use Auth.(200)
• 5692-AIX System Software
  - 0598 AIX Welcome Center
  - 0838 AIX 4.3 Update CD
  - 0857 AIX 4.3 Server 1-2
  - 0859 Pre install AIX 4.3 Server Bundle
  - 0860 AIX 4.3 Bonus Pack - Non Export
  - 1004 CD-ROM Process Charge
  - 2924 English
  - 3410 CD-ROM
  - 5005 Pre install
  - 5924 AIX 4.3 PII - English
  - 9001 Asset Registration
• 5765-D27 Network Storage Manager Software Package

B.4 VideoCharger server for NT (small-level)

This configuration sample is based upon the following assumptions:

- The VideoCharger server will be capable of simultaneously serving 30 video streams at 1.5 Mb/s.

- Multicast feature will be needed (multicast streams are considered one stream even though many users may view).

- It will be able to store 25 hours of video content at 1.5 Mb/s.

- Network connection via Ethernet 10/100.

- This Machine is dedicated to serving video with IBM VideoCharger.

- A standard disk drive is used for software and misc. Two additional drives are used for audio/video content and can be striped using Windows NT operating system software.

- Ethernet adapters are not shared with general networking traffic.

- Storage calculation: 36.2 GB/.675 GB hour= 53.6 Hours.

- One ATM adapter (Interphase ATM 155 5515 PCI MMF Adapter, PN 85H4042) can replace the two Ethernet 10/100 adapters if desired.

- Internal ATA adapter required to run the standard 6.4 GB HDD. It is to be used for the operating system and VideoCharger software. The additional SCSI PCI adapter required to run the two additional 9.1 GB HDD's. This storage space to be used for content storage. (18.2 GB).

B.4.1 Hardware

- PC 300PL (with Pentium II processors) (part no. 689220U)
    - 128MB 100MHz Non-Parity SDRAM DIMM Memory (part no. 01K1138)
    - P72 17" AG (16" VIEWABLE) PEARL WHITE (part no. 655603N)
    - EtherJet 10/100 PCI Adapter w/Wake on LAN (part no. 34L0201)
    - 2 9.1GB Wide Ultra SCSI HDD (part no. 01K1328)
    - 5.25 to 3.5 DASD Bay Conversion Kit (part no. 70G8165)
    - PCI Wide Ultra SCSI Adapter (part no. 76H3579)

B.4.2 Software

- Windows NT Workstation 4.0
- IBM Content Manager VideoCharger for Multiplatforms V7.1 Server (part no. 13P0340)
- 30 Concurrent Video Stream use (part no. 13P0342)

B.5 Netfinity 3000 VideoCharger server configuration (medium-level)

This configuration sample is based upon the following assumptions:

- The VideoCharger server will be capable of simultaneously serving 50 video streams at 1.5 Mb/s.

- Multicast feature will be needed (multicast streams are considered one stream even though many users may view).

- It will be able to store 50 hours of video content at 1.5 Mb/s.

- Network connection via Ethernet 10/100.

- Machine is dedicated to serving video with IBM VideoCharger.

- A standard disk drive is used for software and misc. Two additional drives are used for audio/video content and can be striped using Windows NT operating system software.

- Ethernet adapters are not shared with general networking traffic.

- Storage calculation: 36.2 GB/.675 GB hour= 53.6 Hours.

- One ATM adapter (Interphase ATM 155 5515 PCI MMF Adapter at $669.00, PN 85H4042) can replace the two Ethernet 10/100 adapters if desired.

B.5.1 Hardware

IBM Netfinity 3000 w Pentium II 400 MHz (847631U)

- Standard included features:
    - 64 MB 100 MHz SDRAM ECC
    - 9.1 GB Wide-Ultra SCSI HDD
    - Mini-Tower, PCI/ISA
    - Display adapter, AGP 4 MB
    - CD-Rom 32X
    - Mouse, Keyboard
- Additional optional components required:
    - 128 MB 100 MHz SDRAM ECC (part no. 01K1131)
    - 2 Ethernet 10/100 PCI Adapter (part no. 34L0901)
    - 2 18.2 GB #Wide Ultra2 SCSI HDD (part no. 20L0554)
    - Misc. (Display, cables etc.)

B.5.2 Software

- Windows NT Workstation 4.0
- IBM Content Manager VideoCharger for Multiplatforms V7.1 Server (part no. 13P0340)
- 50 Concurrent Video Stream use (part no. 13P0342)

B.6 Netfinity 7000 VideoCharger server configuration (high-level)

This configuration sample is based upon the following assumptions:

- The VideoCharger server will be capable of simultaneously serving 300 video streams at 1.5 Mb/s.

- Multicast feature will be needed (multicast streams are considered one stream even though many users may view).

- It will be able to store 100 hours of video content at 1.5 Mb/s, configured to use Raid 5.

- Network connection via Ethernet 10/100.

- Machine is dedicated to serving video with IBM VideoCharger.

- A standard disk drive is used for software and misc. Two additional drives are used for audio/video content and can be striped using Windows NT operating system software.

- The internal SCSI adapter is configured to run the internal (booth) drive. The additional adapter is configured to run the 5 additional drives in a RAID-5 configuration. This is to be used for content storage.

- Ethernet adapters are not shared with general networking traffic.

- Storage calculation: 36.2 GB/.675 GB hour= 53.6 Hours.

- One ATM adapter (Interphase ATM 155 5515 PCI MMF Adapter at $669.00, PN 85H4042) can replace the two Ethernet 10/100 adapters if desired.

B.6.1 Hardware

Netfinity 7000 M10 (4x) Intel Xeon processors, 450 MHz, 2 GB of memory.

- IBM Netfinity 7000 M10 450/2MB Xeon,256MB (part no. 86805RU)
- 3 Netfinity 7000 450MHz/2MB Xeon Processor (part no.10L5897)
- IBM Netfinity 400W Hot-Swap Red. Power Supply II (part no. 01K7951)
- 2 1GB (4x256MB) EDO DRAM DIMM - 50ns (part no. 01K8046)
- 2 IBM Netfinity 4.5GB Wide Ultra SCSI SCA-2 HDD - 10K RPM (SL) (part no. 01K8009)

- IBM Netfinity Server RAID-3H Ultra2 SCSI Adapter (part no. 01K7207)
- 7 IBM Netfinity 10/100 Ethernet Adapter (PCI) (part no. 08L3341)
- Serve RAID-3H 32MB/Battery-Backup Cache (part no. 28L1003)
- 3520-2RU Netfinity EXP15 Storage Expansion Unit (part no. 35202RU)
- IBM Netfinity 2M Ultra2 SCSI Cable (part no. 03K9310)
- 10 Netfinity EXP10 9.1GB 10K Wide Ultra SCSI SL SCA- 2 Hot Swap HDD (part no. 01K8499)
- IBM Net MEDIA Storage Expansion Unit EL (part no. 3551001)
- IBM 35/70GB Black Internal DLT Tape Drive (FH) (part no. 04K0149)
- 2 IBM Netfinity 2M Ultra2 SCSI Cable (part no. 03K9310)
- Space Saver Black Keyboard (part no. 28L3640)
- G54 - 15(13.7) in. Color Monitor, Stealth Gray (part no. 65464AN)
- Netfinity Rack (part no. 9306900)
- Rack/Stack Options
    - PC Server Rack Side Panel Kit (part no. 94G6669)
    - Fixed Shelf for Netfinity Rack (part no. 94G7442)
    - PC Server Rack Monitor Compartment (part no. 94G7444)
    - PC Netfinity Rack Keyboard Tray (part no. 28L4707)
    - 4 Power Cable Type A14 (part no. 94G6667)
- 1 APC Smart UPS (Rack Mount) 3000MB (120V)(35 min. rt) (part no. 94G6676)

B.6.2 Software

- Windows NT Workstation 4.0
- 5801-AAR Program Packages
    - IBM Content Manager VideoCharger for Multiplatforms V7.1 Server (part no. 13P0340)
- 5807-AAR
    - 200 IBM VideoCharger Concurrent Video Stream Use Authority (part no. 13P0342)

B.7 Sample questionnaire for configuring VideoCharger systems

This sample questionnaire for customers is very useful to configure and determine VideoCharger systems.

1. What do you want the VideoCharger to deliver?

    - Plain video, audio and video mixed?
    - Audio only?
    - Video only?

- Audio and Video separated in elementary streams?
- Other?

2. How are the videos distributed?

- To Internet?
- To intranet?
- To Satellite?
- To CD-ROM?
- Other?

3. What is the type of local network?

- 10 Mbps, 100 Mbps or 1 Gbps Ethernet
- 25 Mbps or 155 Mbps ATM
- 16 Mbps Token ring
- FDDI or CDDI 100 Mbps
- TCPIP or ...?
- Hub or switch?
- Other?

4. Is your customer going use modems?

- Standard 56.6 Kbps.
- ISDN 112 Kbps.
- Cable modems at ___Mbps receive and ___Mbps transmit.
- Satellite at ___Mbps receive and ___Mbps transmit.
- DSL/ADSL at ___Mbps receive and ___Mbps transmit.

5. What bit rates do you need? _____Mbps

- Low bit rates only, up to 1.0 Mbps.(HotMedia, QuickTime4, or Other?)
- MPEG1, bit rates, from 1.5 Mbps to 3 Mbps.
- MPEG2, bit rates, from 4.0 Mbps to 15.0 Mbps.

6. How many hours of the above bitrate clips need to be stored and available immediately? _____Hours.

7. If you have a Tape Archive device, how many hours are to be stored on it? _____Hours.

8. Will this application require RAID 5 for redundancy? ___Yes, ___No.
   Will Hot-sparing be included? ___Yes, ___No.

9. How many simultaneous streams are required? _____Streams.

10. Are you going to use multicast? ___Yes, ___No.

11. What is the typical clip length required? Expressed in seconds duration. _____Sec.

12. Are you going to use the IBM Content Manager product in conjunction with VideoCharger? ___Yes, ___No.

13. Will you include an Archiver (NetStore/TSM device)? ___Yes, ___No.

14. Are there any existing systems in place, and if so what? Should they be abandoned, phased out, migrated?

15. Any other comments, question, things we should consider while doing your configurations?

Appendix C. VideoCharger sizing on AIX

The following sections are included from the *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871, for your convenience and to help you determine the memory, storage and bandwidth requirements. Refer to Figure 43, Figure 44 and Figure 45.

C.1 Configuring VideoCharger memory

Configuration	Number/Type of Streams	Memory Required
All components on one AIX server (RS/6000 43P/C20)	170 at 22.7 Kb/s	192 MB
All components on one AIX server (RS/6000 595)	170 at 384 Kb/s 80 at 1.5 Mb/s	256 MB
A Controller/Presentation Formatter Server on AIX (RS/6000 43P) supporting two Data Pumps on AIX (two RS/6000 59H)	40 at 22.7 Kb/s 60 at 1.5 Mb/s	128 MB for the Controller/Presentation Formatter Server 192 MB for each Data Pump

IBM VideoCharger Administrator's Guide and Reference Chapter 2. Planning   P17

Figure 43. VideoCharger memory requirements

C.2 Configuring VideoCharger disk storage requirements

	Bytes per				
Rate in bps	1 second	30 seconds	1 minute	1 hour	2 hours
6.4K	800	24K	48K	2.88M	5.76M
22.7K	2.05K	61.5K	123K	7.38M	14.8M
64K	8K	240K	480K	28.8M	57.6M
128K	16K	480K	960K	57.6M	115M
256K	32K	960K	1.92M	115M	230M
384K	48K	1.44M	2.88M	173M	346M
1.5M	192K	5.76M	11.5M	691M	1.38G
2.0M	250K	7.5M	15M	900M	1.8G
3.0M	375K	11.3M	22.5M	1.3G	2.7G
4.0M	500K	15M	30M	1.8G	3.6G
6.0M	750K	22.5M	45M	2.7G	5.4G

Notes:

* This table assumes:
   - 1K bits/Bytes = 1,000 bits/Bytes
   - 1M bits/Bytes = 1,000,000 bits/Bytes
   - 1G bits/Bytes = 1,000,000,000 bits/Bytes
* The estimates of disk storage do not include the small fractions of additional space required to store file system metadata

IBM VideoCharger Administrator's Guide and Reference Chapter 2. Planning P23

Figure 44. VideoCharger disk storage requirements

C.3 Configuring VideoCharger sample disk bandwidth requirements

SCSI type	The disk block sizes of multimedia file system		
	32 KB block size	256 KB block size	Sequential throughput (for reference)
SCSI I 2GB disks	1.2 MB/sec	2.8 MB/sec	3.75 MB/sec
SCSI II (Fast/Wide), SSA	1.8 MB/sec	5.0 MB/sec	6.9 MB/sec

For example, to support a stream total of 40 Mbps, you need a disk or disks with a total bandwidth of 5 MB/sec (40 Mbsp divided by 8 bits per byte).

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Figure 45. VideoCharger sample disk bandwidth requirements

C.4 System management commands for VideoCharger on AIX

Use the no command to configure Path MTU configuration parameters. The no command sets or displays current network attributes in the kernel. This command only operates on the currently running kernel. The command must be run again after each startup or after the network has been configured. Whether the command sets or displays an attribute is determined by the accompanying flag. The -o flag performs both actions. It can either display the value of an attribute or set a new value for an attribute.

For more information on how the network attributes interact with each other, refer to the *AIX Version 4 System Management Guide: Communications and Networks*, SC23-2526.

Purpose: Configures network attributes.

no command (additional attributes for path MTU only)

Syntax:

no { -a | -d Attribute | -o Attribute [= NewValue] }

Attention: Be careful when you use this command. The no command performs no range checking, therefore it accepts all values for the variables. **If used incorrectly, the no command can cause your system to become inoperable.**

Flags:

-a Prints a list of all configurable attributes and their current values.

-d Attribute Sets Attribute back to its default value.

-o Attribute [= NewValue] Displays the value of Attribute if NewValue is not specified else sets Attribute to NewValue.

Tip: Do not enter space characters before or after the equal sign. The command will fail.

Parameters: Below are the supported parameters, and examples of how several are used. For full information on the no command, see the *AIX Version 4 Commands Reference,* SBOF-1851, which is found online at:

```
http://www.austin.ibm.com/resource/aix_resource/sp_books/essl/sessl/ess
l311/essl3409.html.
```

- **pmtu_default_age** — Specifies the default age for the Path MTU value for UDP paths.

  After the expiration, Path MTU reduction discovery will be initiated. Since the Don't Fragment (DF) bit is always set in the case of TCP (when Path MTU Discovery is enabled), there is no aging of Path MTU for TCP paths. The default value is 10 minutes; specifying a value of zero implies infinite age and no explicit Path MTU reduction discovery will be initiated.

  The value specified by this parameter is used as the default Path MTU age for all UDP paths. However, UDP applications can specify the Path MTU age on a per session basis using the IP level IP_PMTUAGE option. This is particularly helpful in situations where UDP applications do not wish to set the DF bit. These applications can specify smaller values for the Path MTU age so that reduction discovery can be initiated more frequently.

- **pmtu_rediscover_interval** — Periodically restarts the discovery with MTU of the first hop link as the estimate.

  Typically, the objective of a restart is to discover increases to the Path MTUs. The default value is 10 minutes; specifying a value of zero implies infinite age and no explicit Path MTU increase discovery will be initiated.

- **route_expire** — Specifies the number of minutes before the route expires. A value of zero implies that the route never expires.

- **tcp_pmtu_discover** — Enables or disables TCP traffic. The default value is 0 (disabled).

- **udp_pmtu_discover** — Enables or disables UDP traffic. The default value is 1 (enabled). Applications, however, have to do an IP_FINDPMTU setsockopt() call along with this parameter for the option to be enabled.

Examples:

- **To turn on TCP traffic:**

  `no -o tcp_pmtu_discover=1`

- **To turn off UDP traffic:**

  `no -o udp_pmtu_discover=0`

- **To change the default age for the path MTU value to 5 minutes:**

  `no -o pmtu_default_age=5`

Appendix D. Filter architecture (deFilter)

The purpose of the deFilter architecture is to provide and SDK to enable user-written filters to be inserted into a media stream within the VideoCharger server. Each filter is interconnected with other filters to create a "filtergraph". The connections between a pair of filters is a "pipe". A filtergraph may be constructed for the purpose of loading, parsing or streaming one of more media objects. The filtergraph may have multiple inputs which may be of a variety of types. Examples of inputs to a filtergraph are files, encoders, or network connected media sources. The filtergraph may also have multiple outputs which may also be of a variety of types. Examples of outputs to a filtergraph are files, decoders and network connected media players.

Filtergraphs are constructed by a controller application or by the Graph Manager. The Graph Manager is a component of the VideoCharger Control Server which can instantiate a filtergraph based on a definition of filters and pipes.

Figure 46 shows an example of what is possible. The top section is the parts that exist within the VideoCharger server, the lower, grey section is the parts that could be implemented as filters.
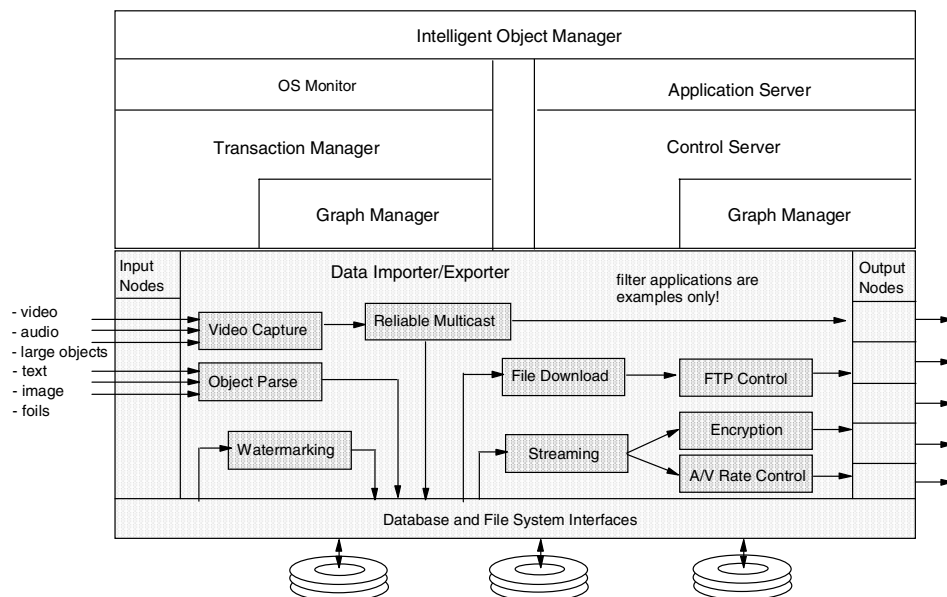
Figure 46. Filter architecture for VideoCharger possibilities

D.1 Examples of filters

Here are two examples of the use of filters.

D.1.1 Example 1: Layered multicast for heterogeneous networks

As an example of the use of filters, we build an MPEG multicasting system where clients can trade-off video quality with connection bandwidth. The MPEG stream will be split into layers, where each additional layer enhances the quality of the previous layers. This way, clients with poor connection bandwidths may choose to join only the basic layer, and clients with good connections may join all of them.

We will start with the mpgadapt.dll filter, which builds an index of the audio frames and video frames in the MPEG stream. Since there are three types of video frames (I, P and B) four layers can be defined immediately:

- Layer 0: audio only
- Layer 1: audio + I frames
- Layer 2: audio + I and P frames
- Layer 3: audio + I, P and B frames (that is, full quality)

Four levels will suffice for our demonstration, more layers could be defined by looking at subsets of frames in a group of pictures or even further by looking at the slices in the video frames.

The mpgadapt.dll filter will be extended to support four output ports, one for each layer. State will have to be added so the filter can keep track of each of the four streams. Each layer stream will be extracted from the main stream using the MPEG index and the deBuffer class cloning mechanisms.

At the application driver level, we can extend ipplay.exe to open four RTP multicast ports and connect them to the four filter output ports.

If it is too much trouble to change the client to listen on multiple ports, we can bundle a layer together will all the lower layers, so a only single port need to be open on the client side.

D.1.2 Example 2: Adaptive MPEG RTP streaming to the QT5 player

The MPGADAPT filter has been used to demonstrate MPEG streaming with bandwidth adaptation. Adaptation allows an asset to be played through connections that are congested or provide significantly less than the encoded bandwidth, all this with a minimum degradation in playback quality. This demonstration was done over a TCP connection with the stream analysis and adaptation done on line. The drawback of this demo is that doing the MPEG

stream analysis on line requires significant CPU horsepower and thus cannot produce a scalable server that can send many of these streams. The solution to this problem is to run the media asset through a hinting process (before streaming), where the stream is analyzed and split into RTP packets. Information will be stored alongside these RTP packets, indicating how packets can be discarded to reduce the bandwidth but maintaining the best possible quality.

What we need to do is:

- Extend the MPEG hinter to store a priority value with each RTP packet. The priority indicates how essential the packet is to the integrity of the stream, for example audio packets will have the highest priority, followed by I-frame packets, P-frame packets and last B-frame packets.

- Make sure the feedback from the RTP connection is sent upstream in the filter graph, so the streaming filter (QFILTER) knows when to adapt. We mush check that the RTP end node filter is receiving RTCP statistics correctly.

- Extend the QFILTER to make adaptive decisions from the RTP packet priority and the connection state feedback received from downstream in the filter graph.

Appendix E. Special notices

This publication is intended to help technical staff to plan, install and configure IBM VideoCharger. The information in this publication is not intended as the specification of any programming interfaces that are provided by the IBM VideoCharger product. See the PUBLICATIONS section of the IBM Programming Announcement for IBM VideoCharger for more information about what publications are considered to be product documentation.

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Appendix F. Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

F.1 IBM Redbooks

For information on ordering these publications see "How to get IBM Redbooks" on page 237.

- *Getting Started with Digital Library V1.0*, SG24-2243
- *Digital Library for Windows NT: Building a Collection Treasury Application*, SG24-5555
- *Image and Workflow Library: Capacity Planning and Performance Tuning for VisualInfo and Digital Library Servers*, SG24-4974
- *Image and Workflow Library: SmartGuide to EDMSuite System Managed Storage*, SG24-5159
- *Implementing Netfinity Disk Subsystems: ServeRAID SCSI, Fibre Channel and SSA*, SG24-2098
- *Enhanced IBM Magstar Virtual Tape Server: Implementation Guide*, SG24-2229
- *RISC System/6000 Model S70 Handbook*, SG24-5113
- *Implementing IBM VideoCharger*, SG24-4992
- *IP Network Design Guide*, SG24-2580
- *Local Area Network Concepts and Products: LAN Architecture*, SG24-4753

F.2 IBM Redbooks collections

Redbooks are also available on the following CD-ROMs. Click the CD-ROMs button at **ibm.com**/redbooks for information about all the CD-ROMs offered, updates and formats.

CD-ROM Title	Collection Kit Number
IBM System/390 Redbooks Collection	SK2T-2177
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IBM Transaction Processing and Data Management Redbooks Collection	SK2T-8038
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IBM RS/6000 Redbooks Collection	SK2T-8043
IBM Application Development Redbooks Collection	SK2T-8037
IBM Enterprise Storage and Systems Management Solutions	SK3T-3694

F.3 Other resources

These publications are also relevant as further information sources:

- *IBM VideoCharger Administrator's Guide and Reference Version 7 Release 1,* SC27-0871

- *AIX Version 4 System Management Guide: Operating System and Devices*, SC23-2525

- *IBM Content Manager for Multiplatforms: Messages and Codes Version 7.1*, SC27-0870, which is found online at:
  `http://www-4.ibm.com/software/data/cm/pubs/cm71/cmmc/cmmc.pdf`

- *IBM Content Manager C Application Programming Reference for Workstation, Volume 1,* SC27-0865, which is found online at:
  `http://www-4.ibm.com/software/data/cm/pubs/cm71/aprvc1/aprvc1.pdf`

- *IBM Content Manager: Planning and Installing Content Manager Version 7.1,* GC27-0864

- *AIX Version 4 System Management Guide: Communications and Networks*, SC23-2526

- *AIX Version 4 Commands Reference,* SBOF-1851, which is found online at:

  `http://www.austin.ibm.com/resource/aix_resource/sp_books/essl/sessl/essl311/essl3409.html`

F.4 Referenced Web sites

These Web sites are also relevant as further information sources:

- `http://www.software.ibm.com/data/videocharger`
  Content Manager VideoCharger

- `http://www.software.ibm.com/network/dce/support/fixes/dceaix.html`
  DCE for AIX Code fixes

- `http://www.apache.org/dist`
  Apache 1.3.19 available; Apache 2.0.15 Alpha available for alpha testing

- `http://www.software.ibm.com/webservers/httpservers/download.html`
  IBM HTTP Server

- `http://www.iplanet.com/downloads`
  iPlanet downloads

- `http://www.ibm.com/java/jdk/download`
  Java technology: Tools and products - Developer kits

- `http://www.hummingbird.com/products/nc/ftp/index.html`
  Hummingbird FTP for Windows Explorer

- `http://www.storage.ibm.com/hardsoft/diskdrdl/library/whitepap/fcal/fcal.htm` Fibre Channel-Arbitrated Loop: A cost-effective, high-performance hard disk drive interface

- `http://www.software.ibm.com/data/videocharger/tigershark.html`
  White Paper: Tiger Shark—A scalable file system for multimedia

- `http://www.storage.ibm.com/hardsoft/diskdrdl/library/whitepap/lvd/lvd.htm` Ultra2 SCSI (LVD): A faster, more reliable disk drive interface

- `http://www.scsita.org`
  SCSI Trade Association (STA)

- `http://www.apple.com/quicktime`
  QuickTime hot picks

- `http://www.software.ibm.com/data/cm/casestudy.html`
  Content Manager Product Family: Case studies

- `http://www2.software.ibm.com/casestudies/swcsdm.nsf/customername`
  Data Management Case Studies: Customer

- `http://www.server.com/index.html`
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- **Fax Orders**

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Outside North America	Fax phone number is in the "How to Order" section at this site: http://www.elink.ibmlink.ibm.com/pbl/pbl

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We accept American Express, Diners, Eurocard, Master Card, and Visa. Payment by credit card not available in all countries. Signature mandatory for credit card payment.

Glossary

A

accessory script. A CGI script program that processes SEARCH, POST, PUT, or DELETE requests. The accessory scripts process requests that are not explicitly mapped to a CGI script program named on an EXEC directive.

address. The unique code assigned to each device or workstation connected to a network. A standard Internet address (or IP address) is a 32-bit address field containing two parts. The first part is the network address; the second part is the host number. See also IP address.

admission control. The process used by the server to ensure that its bandwidth needs are not compromised as new requests for assets arrive.

Advanced Interactive Executive (AIX). Operating system that exists between the hardware and the application programs.

aggregate bandwidth. Total throughput, in megabits per second, which moves through a server or server subsystem. See also bandwidth.

AIX. Advanced Interactive Executive.

alias. A name assigned to a server. The alias makes the server independent of the name of its host machine. The alias must be defined in the domain name server.

American National Standard Code for Information Interchange (ASCII). The standard code, using a coded character set consisting of 7-bit coded characters (8 bits including parity check), that is used for information interchange among data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters.

analog video. Video where the information that represents images is in a continuous-scale electrical signal for amplitude and time.

API. (1) Application program interface. A functional interface supplied by the operating system or by a separately orderable licensed program that allows an application program written in a high-level language to use specific data or functions of the operating system or the licensed program. (2) Application programming interface. The interface through which an application program interacts with an access method.

Application Server. Software that handles (1) communication with the client requesting an asset and (2) queries of the Content Management.

ASCII. American National Standard Code for Information Interchange.

asset. A digital multimedia resource that is stored for later retrieval as requested by an application. An example of such a resource is a digitized video or audio file. An asset is stored as a file in a multimedia file system supported by the Data Pump.

asset group. An organizational grouping within the multimedia file system that allows you to set default information about the type of assets that will be stored in the multimedia file system. An organizational grouping within the multimedia file system that allows you to allocate resources of a Data Pump. For example, you could establish two Asset Groups representing two distinct departments whose assets should be kept separate for security or billing purposes.

asymmetric video compression. In multimedia applications, the use of a powerful computer to compress a video for mastering so that a less powerful (less expensive) system is needed to decompress it.

Asynchronous Transfer Mode (ATM). A multimedia subnetworking technology that addresses the demand for high-speed, high-bandwidth networks. ATM is proposed as both a WAN and LAN architecture.

attributes. Information about a file in a multimedia file system, such as title, running time, encoding type (MPEG1, H.263, and so forth).

audio. The sound portion of a video signal.

available bandwidth. The bandwidth which is actually available for valid transmissions.

Audio/Video Interleaved (AVI). A RIFF file specification that permits audio and video data to be interleaved in a file. This format permits data to be interleaved in a file, and for the separate tracks to be accessed in alternate chunks for playback or recording while maintaining sequential access on the file device.

Audio-Video Subsystem (AVS). AVS files can contain video and audio data, video only data, audio only data, or image data (a single still image). AVS files can be processed by the ActionMedia II digital video device.

AVI. Audio/Video Interleaved.

AVS. Audio-Video Subsystem.

B

background. The conditions under which low priority, noninteractive programs are run.

bandwidth. The speed at which the Video Server Complex can stream data.

baseband. (1) A frequency band occupied by a signal, or by a number of multiplexed signals. (2) A frequency band that uses the complete bandwidth of a transmission.

batch. A processing method in which one or more programs processes records with little or no operator action.

bitmap. A file format for displaying graphics.

block. A block is a unit of data to be written or read. There are various block sizes, depending upon the media and software. Disk device drivers currently use a block size of 32K or 256K bytes to write to the disk.

broadband. (1) A frequency band broad enough to be divided into several narrower bands, each of which can be used for different purposes or be made available to different users. Synonymous with wideband. (2) A frequency band divisible into several narrower bands so that different kinds of transmissions such as voice, video, and data transmission can occur at the same time. Synonymous with wideband. See also baseband. (3)Transmission media and techniques that use a broad frequency range, divided into sub-bands of narrower frequency, so that different kinds of transmission can occur at the same time.

browser. A client program that initiates requests to a server and displays the returned information.

C

cache. A special-purpose buffer storage, smaller and faster than main storage, used to hold a copy of data that may be frequently accessed. Use of a cache reduces access time, but may increase memory requirements.

caching proxy server. A proxy server that can store the documents it retrieves from other servers in a local cache. The serve can then respond to subsequent servers. This can improve response time.

CDS. Cell Directory Services.

Cell Directory Services. A distributed service that tracks and manages all available services for Distributed Computing Environment (DCE).

Common Gateway Interface (CGI). A standard interface between Web servers and external programs. CGI scripts are programs that use this interface to perform tasks not usually done by the server, such as form processing.

CGI. Common gateway interface.

CGI program. A program that uses the common gateway interface (CGI) to perform tasks not usually done by the server, such as form processing. CGI programs can be written in any language supported by the operating system on

which the server is run. The language can be a scripting language or a programming language.

client. A functional unit that receives shared services from a server.

client/server. In communications, the model of interaction in distributed data processing in which a program at one site sends a request to a program at another site and awaits a response. The requesting program is called a client; the answering program is called a server.

codec. A processor that can code analog audio or video information in digital form for transmission, and decode digital data back to analog form.

compressed audio. A method of digitally encoding and decoding several seconds of voice quality audio per single videodisc frame. This increases the storage capability to several hours of audio per videodisc. Sometimes referred to as Still Frame Audio or Sound Over Still.

compressed video. A video resulting from the process of digitally encoding and decoding a video image or segment using a variety of computer techniques to reduce the amount of data required to represent the content accurately.

compression. Compression techniques use hardware or software implemented algorithms that are able to reduce the amount of storage needed by data. The reduction in space is dependent upon the data used, as well as the compression algorithm. Contrast with decompression.

Controller. The functional component responsible for resource management (load balancing and admission control). The Controller communicates with one or more Data Pumps to initiate and terminate connections to clients.

D

Data Pump. The combination of the disks that hold the data and the networking hardware and software required to deliver assets to clients.

data rate. The rate at which data is transmitted or received from a device. Interactive applications tend to require a high data rate, while batch applications can usually tolerate lower data rates.

data striping. Where information is split into blocks (a fixed amount of data) and the blocks are written to (or read from) a series of disks in parallel.

data transfer rate. This is the rate at which data can be moved from the host system to a device. It is normally measured in KB/sec or MB/sec.

DCE. Distributed Computing Environment.

decode. (1) To convert data by reversing the effect of some previous encoding. (2) To interpret code. See also decompression. Contrast with encode.

decompression. This is the process of restoring compressed data to its original state, so that it can be used again. Contrast with compression.

default. A value, attribute, or option that is assumed when none is explicitly specified.

device driver. A device driver is a piece of software written to assist in the management of a specific device. Other software will use the device driver as the interface to the device for reading, writing, and control functions.

digital. A method of signal representation by a set of discrete numerical values.

digital audio. Audio tones represented by machine-readable binary numbers rather than by analog recording techniques. Analog audio is converted to digital by sampling the audio signal. Its amplitude is measured and described numerically with the resulting number stored. More frequent sampling results in a more accurate digital representation of the signal.

digital format. Used in an audio or video context to describe sounds and images that are stored and used in binary data format.

digital video. Video in which the information (usually including audio) is encoded as a sequence of binary digits. The information is usually compressed. It can be stored and transported just as any other digital information.

Viewing digital video involves decompressing the video data, converting it back to an analog form, displaying the video on a monitor, and playing the sound through an amplifier and speakers.

digitize. To convert analog video and audio signals into digital format.

digitized image. An image derived from a scanning device or a digitizing card with a camera.

disk. A magnetic storage device for a computer.

Distributed Computing Environment. A set of services that together make up a high-level, coherent environment for developing and running distributed applications.

document root directory. The primary directory where a Web server stores accessible documents. When the server receives requests that do not point to a specific directory, it tries to serve the request from this directory.

domain. In an internet, a part of the naming hierarchy. A domain name consists of a sequence of names (labels) separated by periods (dots).

domain name. A name of a host system in a network. A domain name consists of a sequence of names (labels) separated by periods (dots).

domain name server. A server program that supplies address-to-name translation by mapping Internet addresses to domain names. Use of a domain name server allows users to request services of another computer using a symbolic name, which is easier to remember than an internet address.

dotted-decimal notation. The syntactical representation for a 32-bit integer that consists of four 8-bit numbers, written in base 10 and separated by periods (dots). It is used to represent IP addresses.

E

encode. To convert data by using a code in such a manner that reconversion to the original form is possible. Contrast with decode. See also compression.

encoding. A file format specific to its associated decoder.

Ethernet. A 10 or 100 megabit baseband local area network that allows multiple stations to access the transmission medium at will without prior coordination, avoids contention by using carrier sense and deference, and resolves contention by using collision detection and transmission.

Ethernet network. A baseband local area network with a bus topology in which messages are broadcast on a coaxial cable using a carrier sense multiple access.

external data representation (XDR). A standard developed by Sun Microsystems, Incorporated, for representing data in machine-independent format.

F

FDDI. Fiber distributed data interface is an ANSI standard for 100 megabit per second LANs using fiberoptic cabling or copper wire.

file extension. The last part of a file's name, following the period (dot). For example, in the filename welcome.html, the file extension is html.

file system manager. The component that manages the multimedia file system.

file system. See multimedia file system.

File Transfer Protocol (FTP). In Transmission Control Protocol/Internet Protocol (TCP/IP), an application protocol used for transferring files to and from host computers. FTP assumes the Transmission Control Protocol is the underlying protocol.

firewall. A computer that connects a private network, such as a business, to a public network, such as the Internet. It contains programs that limit the access between two networks.

FPS. Frames per second. The number of frames

per second displayed. Gives the illusion of motion.

fragment. The smallest unit of file system disk space allocation. A fragment can be 512, 1024, 2048, or 4096 bytes in size. The fragment size is defined when a file system is created.

frequency coupler. Term for F-coupler.

FTP. File Transfer Protocol.

full-motion video. Video reproduction at 30 frames per second (fps) for NTSC signals or 25 fps for PAL() signals. Also know as continuous-motion video.

G

gateway. A functional unit that connects a local data network with another network.

GB. Gigabyte.

gigabyte (GB). 1,073,741,824 in decimal notation when referring to memory capacity in bytes; in all other cases, it is defined as 1,000,000,000 in bytes.

H

home page. The welcome page on the document root directory of a Web server. Commonly used as the entry point for the contents of the server.

host. A computer, connected to a network, which provides an access point to that network. A host can be a client, a server, or a client and a server simultaneously.

host name. A name, such as trillian.austin.ibm.com, that is defined for an IP address, such as 9.67.97.103.

HTML (Hypertext Markup Language). A language used to create hypertext documents. Hypertext documents can include links to other related documents. HTML controls the format of text and position of form input areas, for example, as well as the navigable links.

HTML document. A document written in HTML that may contain links to other documents that contain additional information about related terms or subjects.

HTTP (Hypertext Transfer Protocol). The protocol used to transfer and to display hypertext documents.

HTTP method. An action used by the Hypertext Transfer Protocol. For example, HTTP methods include GET, POST, and PUT.

Hz. Hertz.

Hertz. (Hz). A unit of frequency equal to one cycle per second. Note: In the United States, line frequency is 60 Hz or a change in voltage polarity 120 times per second; in Europe, line frequency is 50 Hz or a change in voltage polarity 100 times per second.

I

I frame. In video compression a frame that has been compressed independently of any other frames. Also referred to as a reference frame, intra frame, or still frame.

I-node. An on-disk structure that contains information regarding the file and its physical location on disk. A file system entity that is used to locate a files data on the actual disk. It contains pointers to the physical disk blocks containing the data.

interactive video. Combining video and computer technology so the user's actions determine the sequence and direction the application takes.

intranet. A network using Internet Protocol that is geographically closer together than a WAN (for example, a campus environment).

Internet. A wide area network connecting thousands of disparate networks in industry, education, government, and research. The Internet network uses TCP/IP as the standard for transmitting information.

Internet Protocol (IP). In TCP/IP, a protocol that routes data from its source to its destination in an Internet environment.

IP. Internet Protocol.

IP address. The unique 32-bit address that specifies the actual location of each device or workstation in the Internet. For example, 9.67.97.103 is an IP address.

IP multicast. Transmission of an IP datagram to a set of systems that form a single multicast group. See multicast.

ISO-9660. Format used for files on CD-ROM. Used with DOS.

isochronous. A communications capability that delivers a signal at a specified, bounded rate, which is desirable for continuous data such as voice and full-motion video.

J

Joint Photographic Experts Group (JPEG). (1) A group that worked to establish the standard for the compression of digitized continuous-tone images. (2) The standard for still pictures developed by this group.

JPEG. Joint Photographic Experts Group.

K

KB. Kilobyte: One thousand bytes (usually 1024 bytes).

Kb. Kilobit: One thousand bits (usually 1024 bits).

Kbps. Kilobits per second.

L

LAN. Local area network.

latency. The time from the initiation of an operation until something actually starts happening (for example, data transmission begins).

LBR. Low Bit Rate.

local area network (LAN). A computer network located on a user's premises within a limited geographical area. Communication within a local area network is not subject to external regulations; however, communication across the LAN boundary may be subject to some form of regulation.

Low Bit Rate (LBR). A generic term for an interleaved H.263/G.723 stream. Low bit rate streams range from 6.4 Kbps up to 384 Kbps.

M

Management Information Base (MIB). A database used by SNMP to manage IP networks and network-attached devices.

MB. Megabyte: One million bytes (usually 1024 x 1024 = 1,048,576 bytes).

Mb. Megabit: One million bits (usually 1024 x 1024 = 1,048,576 bits).

Mbps. Megabits per second.

MCA. Micro Channel Architecture.

measurement. When the administrator uses throughput percentages to calculate how to optimize the sharing of system resources among the multimedia file system in a performance group.

media. Material or technical means of artistic communication using forms such as firm, art, voice, computer programming, and so on.

method. An action used by the Hypertext Transfer Protocol. For example, HTTP methods include GET, POST, and PUT.

MIB. Management Information Base.

MIB Variable. A managed object that is defined in the Management Information Base (MIB). The managed object is defined by a textual name and

a corresponding object identifier, a syntax, an access mode, a status, and a description of the semantics of the managed object. The MIB Variable contains pertinent management

information that is accessible as defined by the access mode.

MIME. Multi-purpose Internet Mail Extensions.

M-JPEG. Motion JPEG.

Motion JPEG (M-JPEG). Used for animation.

Moving Pictures Expert Group (MPEG). A group that is working to establish a standard for compressing and storing motion video and animation in digital form.

MPEG. Moving Pictures Expert Group.

MPEG format. A standard for compressing and storing motion video and animation in digital form.

MTU. Maximum Transmission Unit.

Musical Instrument Digital Interface (MIDI). A format used to store music. Can be used on a wide range of computers.

multicast. Transmission of the same data to a selected group of destinations.

multimedia. Combining different media elements (text, graphics, audio, still image, video, animation) for display and control from a computer.

multimedia file system. A file system that is optimized for the storage and delivery of video and audio.

Multi-purpose Internet Mail Extensions (MIME). An Internet standard for multimedia e-mail, including graphics, audio, and fax.

N

name server. A host that provides name resolution for a network. Name servers translate symbolic names assigned to networks and hosts into the Internet (IP) addresses used by machines.

noise. Random undesirable picture or sound interference.

P

page pool. The area in the shared memory segment from which buffers are allocated for data that is read from or written to disk. Page pool size is one of the file manager startup configuration parameters.

PAL. Phase alternation line. The television broadcast standard for European video outside of France and the countries of the former Soviet Union.

pattern-matching character. A special character such as an (*) or a question mark (?) that can be used to represent one or more characters. Any character or set of characters can replace a pattern-matching character. Synonymous with global character, wildcard character.

PCI. Peripheral Component Interconnect. A type of bus architecture.

peak rate. The maximum rate encountered over a given period of time.

performance group. A group of file systems sharing system resources that can affect file system performance.

pin. Keeping the program from being paged out once it is loaded into memory.

port. A network connection for playing, recording, or piping a media stream. Examples of ports are Asynchronous Transfer Mode (ATM), Internet, and analog video cards.

port group. A logical name used to group one or more ports (network devices or interfaces) of the same network type which can be used to reach a given end-user destination. For example, if multiple ATM adapters in the Video Server complex are connected to the same ATM networks, these adapters can be configured under the same port group. The Controller will choose which port to use based on load-balancing needs.

Presentation Formatter. A CGI-bin program that defines the forms used to select and present assets to clients.

protocol. The set of rules governing the operation of functional units of a communication system if communication is to take place. Protocols can determine low-level details of machine-to-machine interfaces, such as the order in which bits from a byte are sent; they can also determine high-level exchanges between application programs, such as file transfer.

protocol gateway. A type of firewall that protects computers in a business network from access by users outside that network. See also firewall.

proxy server. A server that can retrieve documents from other servers for its clients.

Q

Quality of Service (QoS). (1) A set of parameters that defines the performance requirements of an application. (2) The guaranteed performances provided by a system.

R

RAID (Redundant Array of Independent Disks). A collection of 2 or more disk drives that present the image of a single disk drive to the system. In the event of a single device failure, the data can be read or regenerated from the other disk drives in the array.

README file. A file containing information and instructions for using the associated program or programs.

real time. The processing of information that returns a result so rapidly that the interaction appears to be instantaneous.

Real-Time Transport Protocol (RTP). A protocol that provides end-to-end network transport functions suitable for applications transmitting real-time data, such as audio, video or simulation

data, over multicast or unicast network services. rebalance. Restriping and redistributing data across the available hard disks after a disk or disks have been removed from a file system.

remeasurement. When the administrator uses throughput percentages to calculate how to optimize the sharing of system resources among the file systems in a performance group. This is done when the user adds or deletes file systems.

Remote Procedure Call (RPC). A model for implementing communications between the client and server of an application in which the client makes what appears to be a normal procedure call. The RPC mechanism translates the procedure call into network communications. The server receives the RPC and runs the requested procedure. Any return value is transmitted back to the client.

request. The part of a URL that follows the protocol and server host name. For example, in the URL http://www.server.com/rfoul/sched.html, the request is /rfoul/sched.html.

ReSerVation Protocol (RSVP). A resource reservation setup protocol designed for an integrated services Internet. The protocol provides receiver-initiated setup of resource reservations for multicast and unicast data flows.

Resource Interchange File Format (RIFF). Used for storing sound or graphics for playback on different types of computer equipment.

restriping. Redistributing and rebalancing data across all available and defined disks in a multimedia file system. This is typically done when a disk is removed from a file system for repair or when a new disk is added to a file system.

RIFF. Resource Interchange File Format.

RLE. Run Length Encoding.

RPC. Remote procedure call.

RSVP. ReSerVation Protocol.

RTP. Real-Time Transport Protocol.

Run Length Encoding (RLE). A video codec from Microsoft. Provides up to 256 colors.

S

SCSI. Small Computer System Interface.

server. (1) A functional unit that provides shared services to workstations over a network; for example, a file server, a print server, a mail server. (2) In a network, a data station that provides facilities to other stations; for example, a file server, a print server, a mail server.

Simple Network Management Protocol (SNMP). An Internet-standard protocol used by network hosts to exchange information in the management of networks. SNMP network management is based on the client-server model that is widely used in TCP/IP-based network applications. SNMP uses a database of information called a MIB to gather status information, monitor performance, and configure network-attached devices.

Small Computer System Interface (SCSI). A method of connecting peripherals (disk drives and CD-ROM players) to a computer.

SMIT. System Management Interface Tool.

SNMP. Simple Network Management Protocol.

sticky pool. The part of the page pool that is made available to cache the first block of frequently used interactive files. Sticky pool size is one of the file manager startup configuration parameters.

stream. (1) Multimedia data sent over a network connection at a specified rate. A stream can be video only, audio only, or a combination of both video and audio in one stream. Data rates, which are expressed in bits per second, vary for different types of streams and networks. (2) To send multimedia data in a session, over a network connection, at a specified rate, to meet the requirements of a multimedia player on a client workstation.

streaming. The transmission of digital elements at a bounded throughput rate.

striping. Splitting data to be written into equal sized blocks and writing blocks simultaneously to separate disk drives. Striping maximizes performance to the disks. Reading the data back is also scheduled in parallel, with a block being read concurrently from each disk then reassembled at the host.

stripe group. A collection of disks that are grouped together for serving media streams. The multimedia file system uses stripe groups to optimize delivery of multimedia assets.

stripe width. The size of the block that data is split into for striping.

System Management Interface Tool (SMIT). A panel interface for system administration tasks. The SMIT panels can be used in both the ASCII-only and graphical user interface environments.

T

Tagged Image File Format (TIFF). A file format for storing high-quality graphics. Used with PCs.

TCP. Transmission Control Protocol.

TCP/IP. Transmission Control Protocol/Internet Protocol.

throughput. A measure of the amount of information transmitted over a network in a given period of time. For example, a network's data transfer rate is usually measured in bits per second. Throughput is a measure of performance. It is also measured in KB/sec or MB/sec.

TIFF. Tagged Image File Format.

token ring. A network with a ring topology that passes tokens from one attaching device to another.

token-ring network. (1) A ring network with a ring topology that allows unidirectional data transmission between data stations by a token passing procedure, such that the transmitted data returns to the transmitting station. (2) A network that uses a ring topology, in which tokens are

passed in a circuit from node to node. A node that is ready to send can capture the token and insert data for transmission.

topology. The physical or logical arrangement of nodes in a computer network. Examples include ring topology and bus topology.

Transmission Control Protocol (TCP). A communications protocol used in the Internet and in any network that follows the U.S. Department of Defense standards for inter network protocol. TCP provides a reliable host-to-host protocol between hosts in packet-switched communications networks and in interconnected systems of such networks. It assumes that the Internet protocol is the underlying protocol.

Transmission Control Protocol/Internet Protocol (TCP/IP). A set of communication protocols that support peer-to-peer connectivity functions for both local and wide area networks.

U

UDP. User Datagram Protocol.

Uniform Resource Locator (URL). The address convention that indicates the location of an item on the World Wide Web. It includes the protocol followed by the fully qualified host name, and the request. The server typically maps the request portion of the URL to a path and file name. For example, http://www.ibm.com/index.html.

URL. Uniform Resource Locator.

User Datagram Protocol (UDP). In TCP/IP, a packet-level protocol built directly on the Internet protocol layer. UDP is used for application-to-application programs between TCP/IP host programs.

V

VCR. Videocassette recorder.

Videocassette recorder (VCR). device for recording or playing back videocassettes.

video mixing. The process of dynamically inserting or combining multiple video objects into a single object for distribution. An example would be the mixing of commercials and broadcast programs for satellite distribution.

video object. The data file containing a program recorded for playback on a computer or television set.

Video-On-Demand (VOD). A service for providing consumers with movies and other programming almost immediately, per request.

video stream. The path data follows when read from the Video Server system to the display unit.

VOD. Video-on-demand.

W

WAIS. Wide Area Information Service.

WAN. Wide area network.

WAV. A format to store digitally recorded sound.

Web. The World Wide Web: the network of HTTP servers that contain programs and files, such as hypertext documents that contain links to other documents on HTTP servers.

Web server. A server on the World Wide Web. See also Web.

Wide Area Information Service (WAIS). A network information system that enables clients to search documents on the World Wide Web.

Wide Area Network (WAN). (1) A network that provides communication services to a geographic area larger than that served by a local area network or a metropolitan area network, and that may use or provide public communication facilities. (2) A data communications network designed to serve an area of hundreds or thousands of miles; for example, public and private pack-switching networks, and national telephone networks. Contrast with local area network (LAN).

wildcard character (*). See pattern-matching character.

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This book applies to Version 7.1 of the IBM VideoCharger licensed program, Program Number 13P0340, for use with Windows NT or AIX.