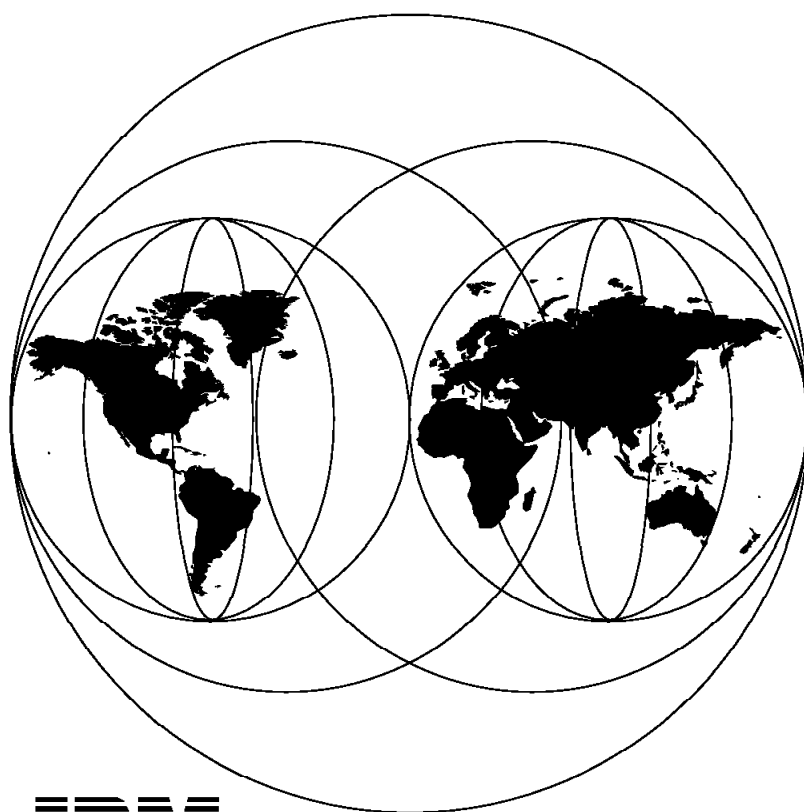


Implementing IBM VideoCharger

June 1997



IBM

**International Technical Support Organization
Poughkeepsie Center**



International Technical Support Organization

SG24-4992-00

Implementing IBM VideoCharger

June 1997

Take Note!

Before using this information and the product it supports, be sure to read the general information in Appendix A, "Special Notices" on page 101.

First Edition (June 1997)

This edition applies to IBM VideoCharger Version 1 Release 1 for AIX 4.2.

Comments may be addressed to:
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Preface

This redbook provides a comprehensive overview of the IBM RS/6000 video server product, VideoCharger Version 1 Release 1 for AIX 4.2. It takes you inside the physical system and shows you how to install, configure, and manage this innovative product.

The technology provided by the VideoCharger Server for AIX allows you to integrate multimedia into your products and services. You can deliver real-time (streamed) video and/or audio to Internet or intranet-connected clients by using a Web browser such as Netscape Navigator or IBM Internet Connection.

Explore the installation requirements for this system as you are taken on a step-by-step installation and configuration journey, based on the redbook test environment.

This redbook also helps you use and manage your system by exploring the application program interface (API) and by discussing environmental considerations. Examples of potential uses of the VideoCharger are given, along with application-specific configuration suggestions.

This redbook will be of value to application programmers, system integrators, multimedia broadband system consultants, telecommunication and media specialists, and value-add vendors.

The Team That Wrote This Redbook

This redbook was produced by a team of specialists from around the world working at the International Technical Support Organization Poughkeepsie Center.

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Thanks also to all of the other members of the Multimedia Server Product
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Chapter 1. Introducing the IBM Network Video Server (VideoCharger)

The VideoCharger Server for AIX® provides an outstanding solution for the delivery of audio and/or video media to Internet- or intranet-connected clients using a Web browser such as Netscape Navigator or IBM Internet Connection. The video is *streamed* (that is, delivered in real time) and does not require that the file be downloaded or saved before being played by the client software.

The video is *pushed* by the server over the network to the client. This approach is different from 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 where a video stream is started by a play command and continues until stopped.

The files, often called *assets*, can range from short clips (such as advertising spots), to full-length films. There is support for several *encoding formats*, including MPEG-1, H.263 video, and G.723 audio.

As previously mentioned, the VideoCharger Server for AIX offers a solution for both Internet and intranet environments.

For Internet clients, especially home Internet users who are typically connected via slower network connections, VideoCharger Server for AIX supports the delivery of Low Bit Rate (LBR) video. The LBR video is based on the industry standard H.263 video and G.723 audio from the video conferencing industry. This technology allows audio and video to be served to home Internet users connected with a 28.8Kbps modem connection.

The VideoCharger Server for AIX also supports video streams at rates above 28.8Kbps. For instance, stream rates from 28.8Kbps to 384Kbps are supported. Supporting various bit rate streams is ideal to serve existing and future network bandwidth capacities. In addition, it allows the appropriate quality of service decisions to be made according to client requirements. Using 16Kbps of bandwidth, the LBR video offers 8 KHz G.723 audio and 160 x 120 video at up to 7.5 frames per second.

For the intranet environment, VideoCharger Server for AIX provides support for higher quality/Higher Bit Rate (HBR) videos. In this environment, higher data rate video such as MPEG-1 content can be supported at rates of up to 1.5Mbps.

In addition to supporting industry standards for video, the VideoCharger Server for AIX supports the popular Internet and World Wide Web protocols, including IP and HTTP. This allows the product to be used with industry-standard applications, including such HTML Web browsers as Netscape Navigator and Microsoft Internet Explorer. It also allows the product to be used on a wide variety of network types, including the following:

- LANs, such as Ethernet, Token Ring and FDDI
- WANs, such as T1, E1, T3, and E3
- Asynchronous Transfer Mode (ATM)

The VCS is RSVP- and IP Multicast-ready. When routers support the RSVP protocol and clients for VCS are supporting IP Multicasting, these technologies within the VideoCharger Server for AIX will be enabled.

A variety of Internet Protocols (IP) are supported, including Real-Time Transport Protocol (RTP), ReSerVation Protocol (RSVP), and IP Multicast. RTP, which is at the heart of VideoCharger's ability to stream multimedia assets, also allows for additional services such as standard VCR functions, time stamping, and delivery monitoring. Support for IP Multicast allows the VideoCharger to be used as a broadcast-type server in the Internet environment.

Real-time applications such as remote video involve sending digitized video and audio over packet-switched networks. Today, the Internet offers only best-effort delivery, meaning your application may not consistently receive the bandwidth it needs. To promote *consistent bandwidth*, and thus better quality of service, the VideoCharger uses RSVP to reserve resources along the data path. In addition, Path Maximum Transmission Unit (Path MTU) support ensures packets are fragmented to the most efficient size on the server, thus reducing the burden on the network. In terms of content loading, RFC 1323 is automatically enabled with VideoCharger, allowing support for TCP extensions for high bandwidth content loading. Table 1 summarizes the IP protocol support.

IP PROTOCOL	RFC
RTP	1889
RSVP	Draft-ietf-rsvp
IP Multicast	1112
Path MTU	1191
TCP Extensions for High Bandwidth content loading	1323

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

Inherent in all components of the VideoCharger is the ability to provide a high-quality audio/video delivery, starting with a 64-bit multimedia file system that provides the real-time support for the playing and recording of continuous time media. It includes a network interface module that controls the rate at which the data is pushed over the network. It can also oversee the operation of the Video Server Complex, and it only allows the playback of a specific number of audio/video streams that can be adequately supported, ensuring that no degradation of existing streams will occur due to a high demand. The VideoCharger Server for AIX allows real-time control of the video stream between the server and the client. This support is provided two ways:

- Real-time feedback from the client networking subsystem to the server networking subsystem
- User interface (that is, VCR buttons) commands sent from the client to the Application Server

This support allows the video stream to be paused, stopped, started, paced, and positioned as required by the end user.

1.1 VideoCharger Components

The VideoCharger for AIX executes on any RS/6000™ uniprocessor supporting AIX 4.2 or later, and is comprised of two parts:

- **VideoCharger Server**

This enhanced HTTP server delivers streaming video and audio over Internet and intranet environments.

The server efficiently manages, stores, and distributes video and audio content for clients.

- **VideoCharger Player (for Windows 95)**

This IBM helper application player, provided at no additional charge, runs on Windows 95 clients that are using a browser such as Microsoft Internet Explorer or Netscape Navigator. The player selects, receives, presents, and controls the playback of video and audio data streams received from VideoCharger Server for AIX.

The VideoCharger Server is comprised of the following components that can be on a single machine, or on multiple machines:

- **Presentation Formatter Server**

This component runs the Presentation Formatters that control how clients view information on available assets, and select specific assets for viewing. This server also runs an *httpd* daemon to enable communication between the Web browser and the VideoCharger. Both the IBM Internet Connection Server for AIX and the Netscape FastTrack Server are supported as *httpd* daemons. Either of these, in turn, can be linked with an existing HTTP server running on any hardware/operating system combination.

- **Data Pump**

This component stores the multimedia files (assets) and delivers them to the client. It plays a file to a client across a network. 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 120Mbps of aggregate streams (10 to 170 streams) and add over one Terabyte (TB) of data storage (5000 hours of 1.5Mbps video content), depending on your configuration. Each additional Data Pump mirrors the data stored on the original Data Pump, thus increasing asset availability.

- **Controller**

As 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, including the selection of Data Pumps and command processing. By controlling the number of audio/video streams, it 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 content loading. In addition, it stores a catalog of multimedia assets available on the Data Pump(s). The Application Server handles communication with the client requesting an asset. For example, it receives requests from the client, and can issue VCR commands to control individual streams. It can also include an optional content management ASCII or DB2 database containing additional information about the available assets (for example, director, subject, and actors).

The initial release of VideoCharger Server for AIX provides support only for Windows 95 clients. The VideoCharger Player for Windows 95 is shipped with the VideoCharger Server for AIX licensed program product and is also available from the IBM RS/6000 Home Page. The client code is a self-extracting compressed file that can be downloaded, extracted, and installed.

Figure 1 on page 5 shows how the three main VideoCharger components interact to serve assets to a client. In this example, the components are running on different machines (although they can all run on a single machine).

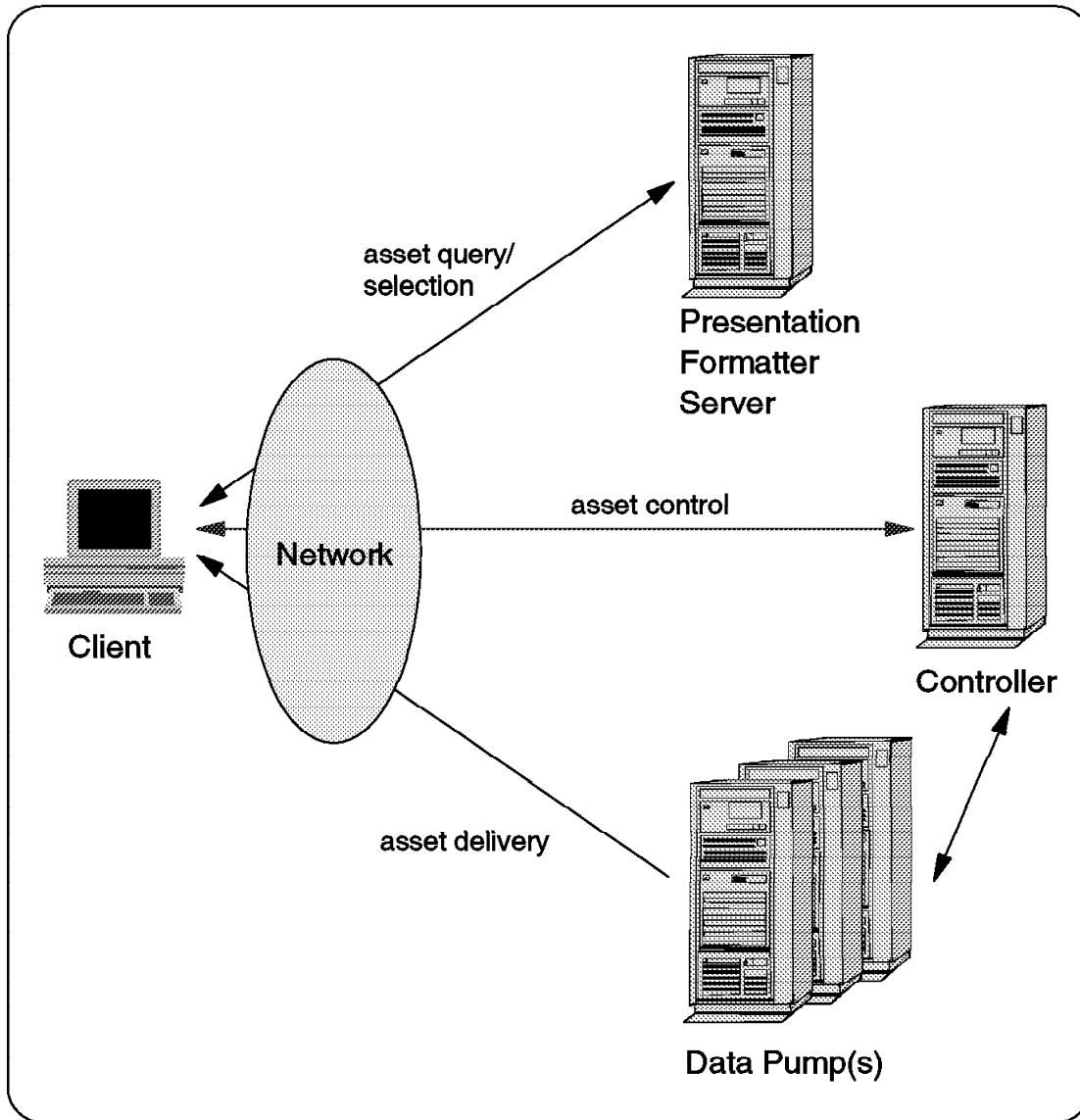


Figure 1. Interaction of VideoCharger Components

1.2 Loading and Managing Content

This section discusses in detail how system content is managed, how clients select assets, and how the preceding components interact.

Content management is handled through HTML forms on the VideoCharger home page. Users can add, delete, change, and view attributes of assets. Asset attributes include information such as encoding type, frame rate, and play rate. These attributes describe the characteristics of data in the file system and tell the VideoCharger how to serve actual multimedia data stored in the file system.

VideoCharger includes a tool that automatically determines the encoding type, frame rate, and play rate when content is loaded through the HTML forms. This

tool, *vspare*, can also be used on assets loaded through the content management commands or *ftp*.

The attributes for a file can be complemented by additional information describing the asset. This information, defined by the user, can include items such as:

- Title
- Subject
- Actors
- Director
- Date released

1.3 Storing Assets: A File System Optimized for Multimedia

At the heart of the VideoCharger is a high-performance file system optimized for the storage and delivery of video and audio. Your multimedia assets are placed in the file system for storage and retrieval using a method called *striping*. Striping spreads the content of a multimedia file across all of the disks in a file system, and:

- 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 their combined throughput. One disk is no more active than any other.
- Provides support for large amounts of data and larger files.
- Allows concurrent reads from the same file, which is very important when supporting multiple clients.

1.4 Viewing Multimedia Assets

VideoCharger client code is shipped with the server, or can be downloaded from the IBM RS/6000 Solutions Home Page. See 2.1, "Hardware and Software Requirements" on page 11 for information about client requirements.

Once outfitted with the VideoCharger client code, a client machine can access assets. As an administrator, you may want to download the client code and view a sample asset.

Additional information on how to install and use the client code is provided in *VideoCharger Player Version 1 for Windows 95: User's Guide*. Other references can be found in the IBM RS/6000 Solution Home Page at the following URL:

URL http://www.rs6000.ibm.com/solutions/videoservers/VideoCharger/player_download.html

VideoCharger creates a sample page that allows users to link to lists of available assets. A web page author can customize this sample page, or create new screens to link to specific assets. Links invoke Common Gateway Interface (CGI-bin) programs called Presentation Formatters, which define the forms used to select and present assets. These formatters are stored on the Presentation Formatter Server.

VideoCharger comes with three predefined Presentation Formatters:

- Video Selection

This formatter 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 requires no additional asset information to be 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 few assets and they are not added or deleted often.

- Video-on-Demand (VOD)

This formatter allows a 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. Use of this VOD Presentation Formatter requires that you create a database of additional asset information (title, subject, and so on) that can be queried by the client. This database must exist in the Application Server portion of the Controller, in the form of either an ASCII or a DB2 database. This formatter allow clients to search the Content Management database and view a list of only those assets that match their interests. For example, a client might search the system for all videos directed by Steven Spielberg and released after 1977.

- Multicast Video Guide

An administrator can schedule video broadcasts to a group of clients. This Presentation Formatter allows clients to view a list of currently scheduled jobs. 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 (API) calls provided with the VideoCharger.

1.5 How the Components Interact to Stream Assets

The following steps describe in detail the interaction processes among the VideoCharger components.

Steps 1 through 18 apply to delivery of an asset to the client through the VOD Presentation Formatter. When using the Video Selection Presentation Formatter, all video assets are selected, the process begins with Step 1 and then skips directly to Step 9.

1. The client Web browser requests from the Presentation Formatter Server an HTML page containing links to a Presentation Formatter.
2. The Presentation Formatter Server returns the page.
3. The client Web browser selects the Search function from the page, initiating a search of available assets.
4. The Presentation Formatter Server receives the request and runs the Video-on-Demand (VOD). DCE 2.0 Client Services, which comes with a copy of the AIX 4.2 OS, needs to be installed.
5. The VOD Presentation Formatter dynamically creates a search form based on the fields in the Application Server Content Management Database and returns the form (via the Presentation Formatter Server) to the client.

6. The client completes the search field and sends the data to the Presentation Formatter Server.
7. The Presentation Formatter Server receives the request and runs the VOD Presentation Formatter.
8. The VOD Presentation Formatter sends the query to the Application Server portion of the Controller, which in turn queries the content management database. The results are returned to the VOD Presentation Formatter, which dynamically builds an HTML page to return the search results to the client.
9. The Presentation Formatter Server returns this page to the client.
Note: Steps 3 through 9 can be repeated as necessary to narrow the search.
10. The client selects an asset from the HTML page.
11. The Presentation Formatter Server receives the request and runs the Video Selection Presentation Formatter.
12. 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 (via the Presentation Formatter Server) to the client.
13. The client's Web browser receives the HTML metafile and, based on the encoding type of the video, launches the VideoCharger client code.
14. The VideoCharger client code invokes a multimedia player on the client system to play back the asset.
15. 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.
16. 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.
17. The Data Pump streams the data to the client.
18. The client receives the data into its network subsystem, where the data is passed to the multimedia player for presentation.

1.6 Network Support

A variety of network types are supported, including the following:

- Telephone line modem
- LAN (Ethernet/Token Ring)
- ATM (through Classic IP)

1.7 Information Resources and VideoCharger Home Page

The home page provides a central location not only for configuring the system and client code, but also for product documentation. *VideoCharger Server Version 1 for AIX: Administrator's Guide and Reference* is available in HTML for Web viewing. In addition, on-line help is available to guide you through each configuration and management form.

The URL of the home page is:

`http://hostname/vs_admin/admin/vs.html`

where *hostname* is the IP hostname of the VideoCharger.

See also the product's README file in `/usr/lpp/avs/README.vc` for additional information.

Chapter 2. Planning

This chapter outlines the information you need to plan your VideoCharger system.

2.1 Hardware and Software Requirements

The following hardware and software components are necessary to use the VideoCharger.

2.1.1 Server

The VideoCharger requires an RS/6000 uniprocessor system with a minimum of 128MB memory. You need an additional 48MB if you will be using the Common Desktop Environment (CDE).

For best performance, use either SCSI-2 Fast/Wide or SSA disk drives. Also, disks used for the multimedia file system must be controlled by a dedicated disk controller.

In addition, a graphics display is recommended.

In terms of software, the system must have installed AIX Version 4.2 (or higher), IBM Internet Connection Server or Netscape FastTrack Server. If you plan on using a DB2 database for content management, you must also have DB2 (Version 2.01 with current maintenance installed) loaded on the Control Server.

2.1.2 Client

The client machine (PC) must be running Windows 95, along with either Netscape Navigator Version 2.02 (or higher) or Microsoft Internet Explorer Version 3.0 (or higher). In terms of hardware, this IBM PC-compatible workstation or PC should have at least:

- For Low Bit Rate assets at or below 22.7Kbps, a 486 DX2 66-MHz (or equivalent) processor
- For High Bit-rate assets, above 22.7Kbps, a Pentium 100-MHz (or equivalent) processor
- 16MB of memory
- 5MB of disk space
- SoundBlaster (or equivalent) sound card
- A network or modem connection (28.8Kbps or higher)

2.2 Planning Overview

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

Because of these characteristics, the planning of a VideoCharger complex and of the network for the VideoCharger are very important steps.

The critical areas that must be addressed and sized to handle a number of video streams include the following:

- Server software configuration (whether the Data Pump, Controller, and Presentation Formatter Server are on the same or different machines)
- Stream rates
- Host capacity
 - CPU speed
 - Main memory size
 - Disk throughput, number of disks, disk bus bandwidth, and disk adapter bandwidth
 - MCA or PCI bus bandwidth.
- Network interface capacity, which is the usable amount of one or more network interfaces in a server and how much of these interfaces can be consumed with serving video. This part of the VideoCharger must match the capacities the network is engineered to handle.

2.3 Network Requirements and Planning

Network capacity planning should be done by a network engineer. Video streams can consume large amounts of bandwidth, and are impacted not only by the features and capacity of the server, but by the features and capacity of the network, including routers, bridges, switches, and interfaces. This section provides information that will help you plan your network.

2.3.1 General Guidelines for Interfaces

You should not exceed 70% of the maximum interface bandwidth. For example, if using a 10Mbps Ethernet, you should run the interface at 7Mbps.

2.3.2 Admission Control and Load Balancing

When planning the network for the VideoCharger, the following two important characteristics of the Server software must be considered:

1. The VideoCharger admission controls apply only to the multimedia network traffic and/or the content loading under the direct control of the server. General TCP/IP network traffic, such as electronic mail, Telnet, FTP, NFS, and X Windows are not subject to admission control. It is the responsibility of the network designer to insure that the level of general network traffic does not interfere with multimedia delivery. This task can be accomplished in many ways.

Additionally, the VideoCharger is configurable so that only a percentage of a network interface is used for multimedia content. For example, the administrator can designate that 3Mbps of a 10Mbps Ethernet be used for multimedia. The remaining bandwidth of the interface could then be used for general network purposes.

2. The VideoCharger uses standard IP routing to determine which network interface to use to serve a particular multimedia client. This design allows the network administrator to use standard IP routing procedures to balance and distribute multimedia networking loads. (For detailed information on TCP/IP configuration and routing, see *AIX Version 4 System Management*

Guide: Communications and Networks.) This design also permits the administrator to use the same tools to manage both multimedia and general IP networking loads.

The VideoCharger will not override IP routing decisions. For example, if a server has two Ethernet networking interfaces but all of the multimedia clients are routed via one interface, multimedia traffic will be transmitted only on this interface. Also, it is possible for a multimedia client to be denied admission to the server even though some interface on the server may have excess bandwidth. This occurs when IP routes service to this client via an interface that is at capacity.

2.3.3 Dynamic Path MTU Discovery

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 used 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, thus 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. (For detailed information, see *AIX VideoCharger Administrator's Guide and Reference*.) If the routers and other network equipment can efficiently handle fragmentation themselves, you can maximize Data Pump efficiency by disabling path MTU.

2.3.4 ReSerVation Protocol

The ReSerVation Protocol (RSVP) is used by a host and the routers along the path of the data stream to deliver quality of service requests to all nodes along the path. RSVP also establishes and maintains these requests to provide the requested service. However, until the full implementation of RSVP protocol in the network guarantees bandwidth reservation on each network hub, only best-effort delivery is possible.

2.4 Determining Your Disk Storage Requirements

As your storage needs change, you may need to order additional disks, or Data Pumps.

The amount of multimedia content you can store at any given time is determined by the number of disks, and the bit rate and length of assets.

2.4.1 Estimation Table

Table 2 shows the amount of disk storage required for various bit rates versus various video lengths.

The rows are the stream bit rates. The first row is for Low Bit Rate (LBR) audio only. The next five rows are other examples of LBR.

The 22.7Kb rate is useful for serving Internet clients with 28.8Kbps modems. The next two (1.5Mb and 2.0Mb) are typical MPEG-1 rates (1.5 for USA and 2.0 for European countries).

Note: In the table, the estimations of disk storage do not include the small fraction of additional space required to store file system metadata.

Compression	Bits per Second	Bytes per Second	Bytes per Minute	Bytes per Hour
LBR	6.4K	800	48K	2.88M
	22.7K	2.05K	123K	7.38M
	64K	8K	480K	28.8M
	128K	16K	960K	57.6M
	256K	32K	1.92M	115M
	384K	48K	2.88M	173M
MPEG1	1.5M	192K	11.5M	691M
	2.0M	250K	15M	900M
	3.0M	375K	22.5M	1.3G
	4.0M	500K	30M	1.8M
	6.0M	750K	45M	2.7G

2.5 Determining Memory and Disk Bandwidth Requirements

This section provides information that will help you determine the memory requirements of the VideoCharger components, as well as the disk bandwidth required by your Data Pumps.

2.5.1 Memory Requirements for VideoCharger Components

General information on the memory requirements of each VideoCharger component is provided here. A number of variables, each discussed in the component subsections, impact the amount of memory required.

The calculation of the memory requirements depends on your configuration. If all VideoCharger components are running on one machine, you will need to add the requirements to arrive at the total memory requirement.

Note: If you are running the Common Desktop Environment (CDE), you will need 32-48MB in additional memory.

2.5.1.1 System-Level Examples

The examples listed in the following table involve machines that are not memory-constrained. The examples include memory required by AIX and a graphics console.

Configuration	Number/Type of Streams	Memory Required
Option 1: All components on one server (RS/6000 43P/C20)	170 at 22.7Kbps	192MB
Option 1: All components on one server (RS/6000 595)	170 at 384Kbps 80 at 1.5Mbps	256MB
Option 2: A Controller/Presentation Formatter Server (RS/6000 43P) supporting two Data Pumps (two RS/6000 59H)	40 at 22.7Kbps 60 at 1.5Mbps	128MB for the Controller/Presentation Formatter Server; 192MB for each Data Pump

2.5.1.2 Controller

The Controller software includes both the Control Server and the Application Server. For a lightly loaded Controller, for example 10 concurrent streams, you should allot 15MB of memory. For a more complex, heavily loaded Controller with DB2 for content management, you should allot 60MB of memory.

More than 60MB may be required for very large, complex systems, where one Controller serves a large number of Data Pumps and controls extensive content.

2.5.1.3 Presentation Formatter Server

The Presentation Formatter Server has an HTTP server running on it. To calculate the memory required for the Presentation Formatter Server, you should add 10MB of memory to the base requirement for your HTTP server (this base requirement depends on the HTTP server you use, and your use of that server).

2.5.1.4 Data Pump Memory and Page Pool Requirements

The Data Pump memory requirement varies widely. A number of factors impact the requirement, including:

- The number and bit rate of streams
- The block size of the multimedia file system
- The amount of content

The first factor to be considered in determining the total memory requirement is the base Data Pump requirement. Allot 20MB for a lightly loaded system, and 60MB for a heavily loaded system.

The next element is the page pool, which is a part of the multimedia file system that contains data buffers, metadata, and allocation maps. The default size for the page pool is 20MB. Memory requirements are as follows:

Data buffers	Amount of memory required depends on the number and bit rate of streams
Metadata	Amount of memory required depends on the number of streams and the block size of the file system
Allocation maps	Amount of memory required depends on the amount of disk space and the file system block size.

2.5.1.5 Page Pool General Requirements

The default 20MB page pool supports:

- 170 streams at rates of up to 128Kbps with 12GB of content (32KB block size)
- 40 streams at rates of up to 1.5Mbps with 100GB of content (256KB block size)

A page pool of 30MB supports:

- 170 streams at rates of up to 384Kbps with 12GB of content (32KB block size)
- 80 streams at rates of up to 1.5Mbps with 100GB of content (256KB block size)

For block sizes of 32KB, you should add 3MB of page pool memory for every 10GB of disk space. For block sizes of 256KB, you should add 3.5MB of page pool memory for every 100GB of disk space.

You can either use the guidelines provided or calculate a page pool size for your configuration based on the page pool formula, which you can find in the *VideoCharger Server for AIX Administrator's Guide and Reference*.

2.5.2 Determining Disk Bandwidth Requirements

The amount of disk bandwidth required is determined by the number and rate of peak streams to be played, along with any content-loading requirement. For example, if you need a total of 40Mbps in streams, you need a disk or disks with a total bandwidth of 5MBps (40 divided by 8).

The disk subsystem bandwidth is determined as described in the following sections.

2.5.2.1 Disks

Disk performance varies from 1.2MBps to 5MBps. Newer IBM disks (2.2GB and 4.5GB disks) have better qualities for playing video, including shorter, interruptible self-test periods.

The disk accesses (block sizes) with the multimedia file system are either 32KB or 256KB in size, and are random. For bit rates equal to or greater than 1 Mbps, 256KB block sizes should be used, resulting in higher per disk throughput. 256KB block sizes should also be used in cases where sufficient page pool memory is available.

Because the performance of different disks varies greatly, trying the multimedia file system on the disk is the best way to know what performance can be expected. The file system measures the performance of disks and stores performance information in a performance group.

The following are sample disk speeds:

- SCSI I 2GB disks
 - 32KB block size: 1.2MBps
 - 256KB block size: 2.8MBps
 - Sequential throughput (for reference): 3.75MBps
- SCSI II (Fast/Wide), SSA
 - 32KB block size: 1.8MBps

- 256KB block size: 5.0MBps
- Sequential throughput (for reference): 6.9MBps

The multimedia file system uses up to 85% of the full throughput for playing streams. For example, a SCSI II disk using a 256KB block size would use up to 4.25MBps of the available 5.0MBps.

2.5.2.2 Disk Adapter

The SCSI adapter is appropriate for low- to medium-throughput configurations:

- SCSI I and SCSI-2 8-bit maximum: approximately 6MBps
- SCSI II (Fast/Wide) 16-bit maximum: approximately 12MBps

The SSA adapter is appropriate for over 100Mbps MCA systems, or when more connectivity is required. The Enhanced SSA adapter can support up to 30MBps with sufficient disks.

2.5.2.3 Bus - MCA or PCI

For MCA machines, a single MicroChannel may become a bottleneck over 100Mbps with SCSI adapters for disk I/O. If only one MicroChannel bus is available, SSA disk subsystems are recommended.

2.5.2.4 RAID

SCSI RAID-5 subsystems are supported. RAID subsystems provide data loss protection in case of disk failures. This is often highly desirable in a video-serving environment. These subsystems may have glitches when failures occur, and throughput during reconstruction or rebuilding may not be sufficient to sustain all streams. The ability to provide data during reconstruction is dependent upon the RAID hardware and software implementation. Some RAID subsystems can be tuned.

2.6 Configuration Options

How you set up your VideoCharger depends on your needs. As you plan your configuration, you must consider what will provide the best scalability and quality of service within your cost constraints. This section discusses the three basic configuration options.

2.6.1 Option 1: One Server

This is a configuration of one machine, providing both storage and distribution of assets. This option serves the fewest number of streams, and the server must be dedicated entirely to VideoCharger operations to ensure an adequate quality of service. Figure 2 shows not only this consolidated system, but the client with which it interacts to serve multimedia assets. Gray-shaded boxes represent components that are not unique to the VideoCharger product.

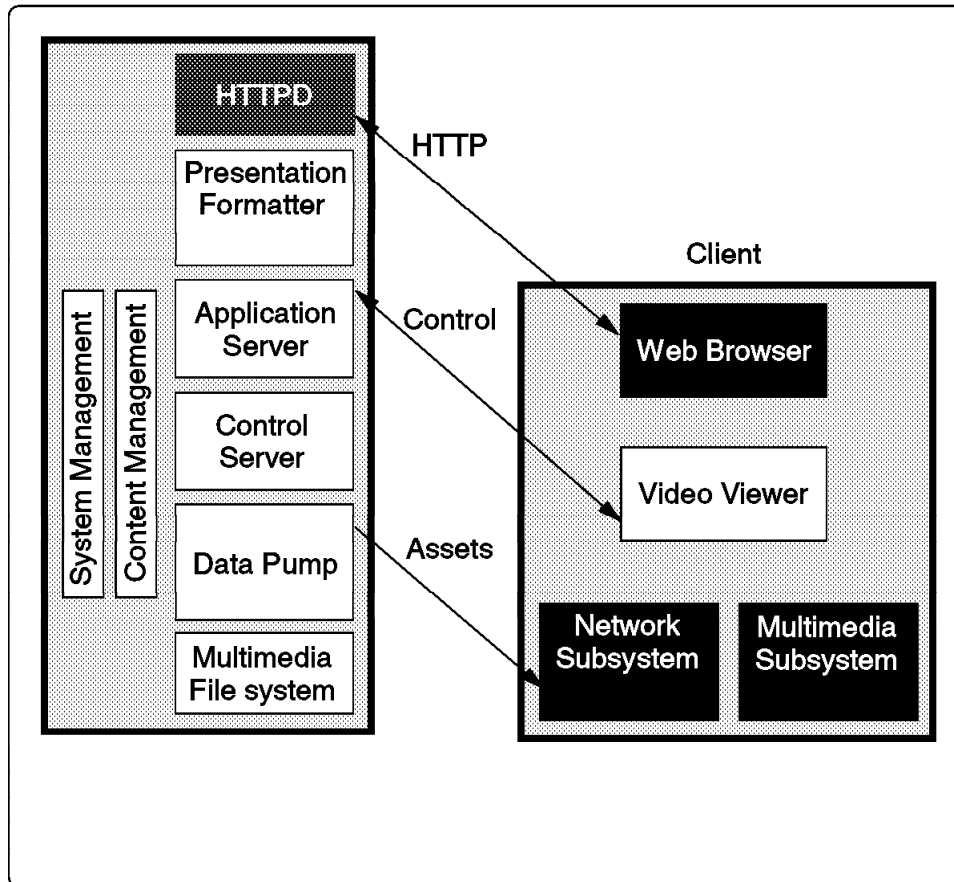


Figure 2. One Server

2.6.2 Option 2: Two or More Dedicated Servers

This is a configuration of two systems, one acting as a Presentation Formatter Server/Controller, and the other as a Data Pump or Pumps. This option offers high scalability, given that Data Pumps can be added as your needs grow. It also allows you to stream more data relative to Option 1, given that the Data Pump is dedicated to distributing assets. Figure 3 shows an example of an Option 2 configuration.

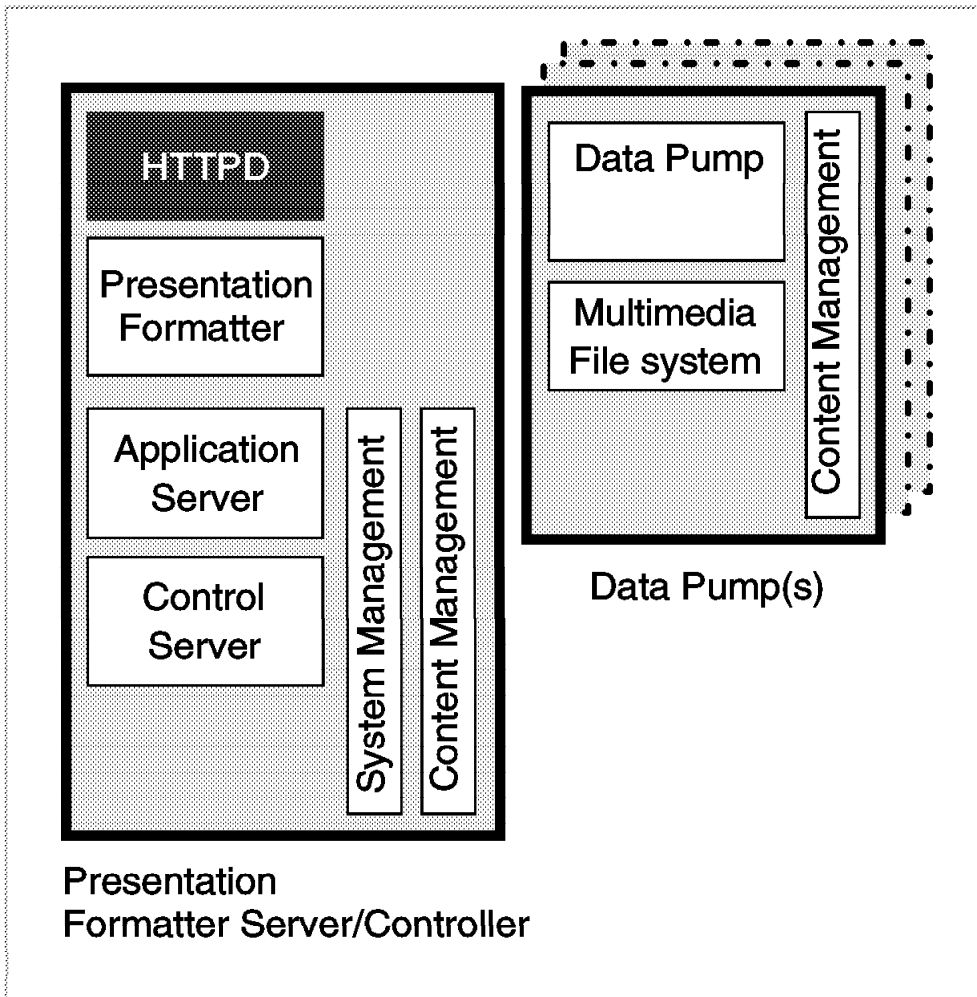


Figure 3. Two or More Dedicated Servers

2.6.3 Option 3: Three or More Dedicated Servers

This is a configuration of three or more systems, with the Presentation Formatter Server, the Controller, and the Data Pump representing different machines. In this scenario, one HTTP daemon runs on the Presentation Formatter Server (as the main web interface), while the other runs as part of the Controller and deals primarily with administration and content loading requests. This approach allows each server to perform a specialized role, and offers the highest level of scalability and quality of service. Figure 4 shows the software running on each of the servers.

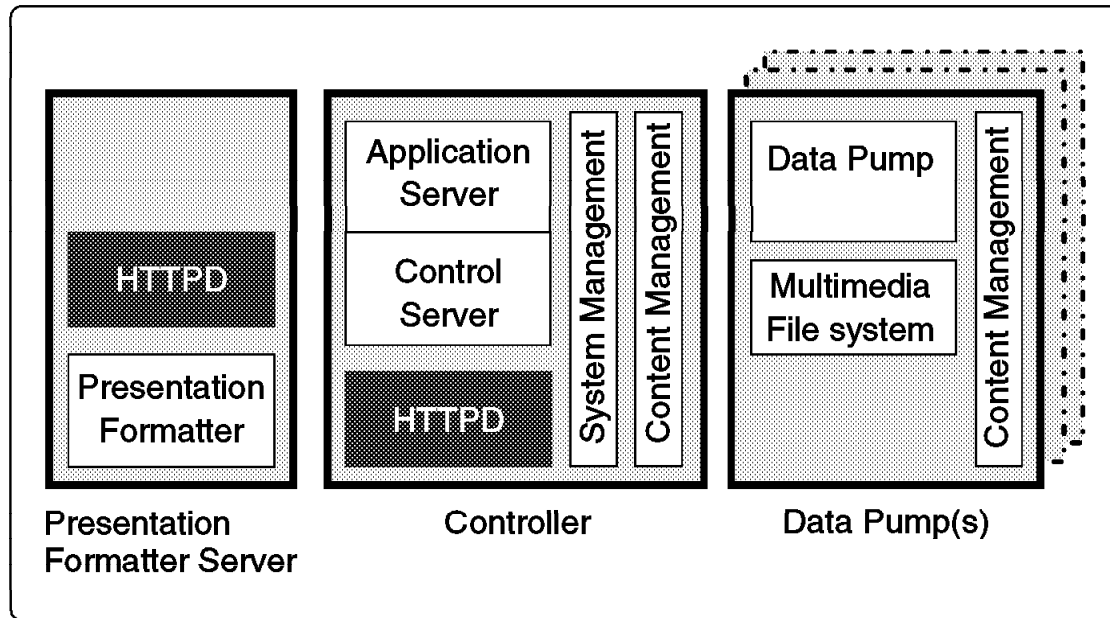


Figure 4. Three or More Dedicated Servers

2.7 Choosing the Best Configuration for Your Needs

Choosing the best configuration for your needs will depend on many factors, including:

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

In general, we recommend that the systems be devoted to serving video and that they not be used for running other applications. This will provide the highest number of simultaneous streams as well as the highest quality of service. The multiple system options provide the best solution for this by separating out the necessary components for streaming video into a system called the Data Pump.

The use of multiple data pumps will allow a VideoCharger Complex to serve more simultaneous clients, since each Data Pump can stream data independently. In addition, the use of multiple Data Pumps provides a higher level of availability. The multiple Data Pumps are under the control of the Control Server, which performs load balancing of video requests across the multiple Data Pumps.

Note: For the load balancing and overall management of the content to work properly, the Data Pumps must have identical content. This means that each Data Pump should be configured with the same amount of disk space. The Content Manager will insure that content loaded onto the VideoCharger will be replicated (that is, copied) across all Data Pumps. When an additional Data Pump is added to an existing VideoCharger Complex, the system will automatically “clone” the new Data Pump by replicating the content from an existing Data Pump to the new Data Pump. In environments where users are watching very short clips (30 or fewer seconds) with a high level of interactivity, a controlling system should be sized to support a small number of users (8 to 20). In cases where users are watching long video clips (20 or more minutes) and have low interactivity, a controlling system can support a much larger number of users (100 to 600). These estimates are based on a system having a 133Mhz 604 CPU.

The number of Data Pumps required to support a number of streams at given bit rates is sized separately. Putting the two sizings together will result in the appropriate number of Data Pumps per controller.

Option 1 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 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 services.

The decision to use Option 2 or 3 is based on the number of Data Pumps being controlled, the number of simultaneous clients expected, and the level of interactivity (that is, how often do they select/start/stop videos), as well as the amount of non-video related HTTP serving that you wish to provide.

Option 2 should meet your needs if:

- There are a small number of Data Pumps (1 or 2).
- You anticipate a small level of interactivity.
- You plan to do little non-video HTTP serving (that is, HTML text and graphics).

If there are more Data Pumps and you expect to also use the HTTP server heavily for non-video HTTP serving, then choose Option 3, which allows each system to specialize on specific functionality.

The level of Content Management Database access (that is, use of the Video-on-Demand Presentation Formatter explained in Chapter 6) may also affect the decision whether to go with Option 2 or 3.

The Content Management Database allows the videos to be queried and selected via an ASCII database or a DB2 database instead of explicit links within an HTML page. Given that updating and querying the database requires

Controller resource, you should consider Option 3 if you have an extensive database, a high number of queries, or both.

To help you plan, here are some additional factors that influence the decision on what configuration is best for you:

- Having the Controller and Presentation Formatter Server on different machines provides the following advantages:
 - Each system can handle a higher transaction throughput than having both servers on one machine.
 - The 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.
- If you plan to install a performance monitoring tool, such as PTX Manager, it is best to install it on a separate machine.

Chapter 3. VideoCharger Installation and Configuration

This chapter details the hardware and software needed to install and configure VideoCharger.

3.1 Installation

The main components (Presentation Formatter Server, Controller, and Data Pump) can be installed on a single server, or each can be installed on separate machines using predefined bundles. See Figure 5 on page 24 for more information.

3.1.1 Prerequisites

The VideoCharger requires the following software:

- AIX Version 4.2 (or higher) Server
- The following DCE client code packages:
 - dce.client
 - dce.pthreads
 - dce.compat
 - dce.doc
- bos.net.tcp.server fileset, from the bos.net package

All of these are included on the AIX Version 4.2 Server installation media.

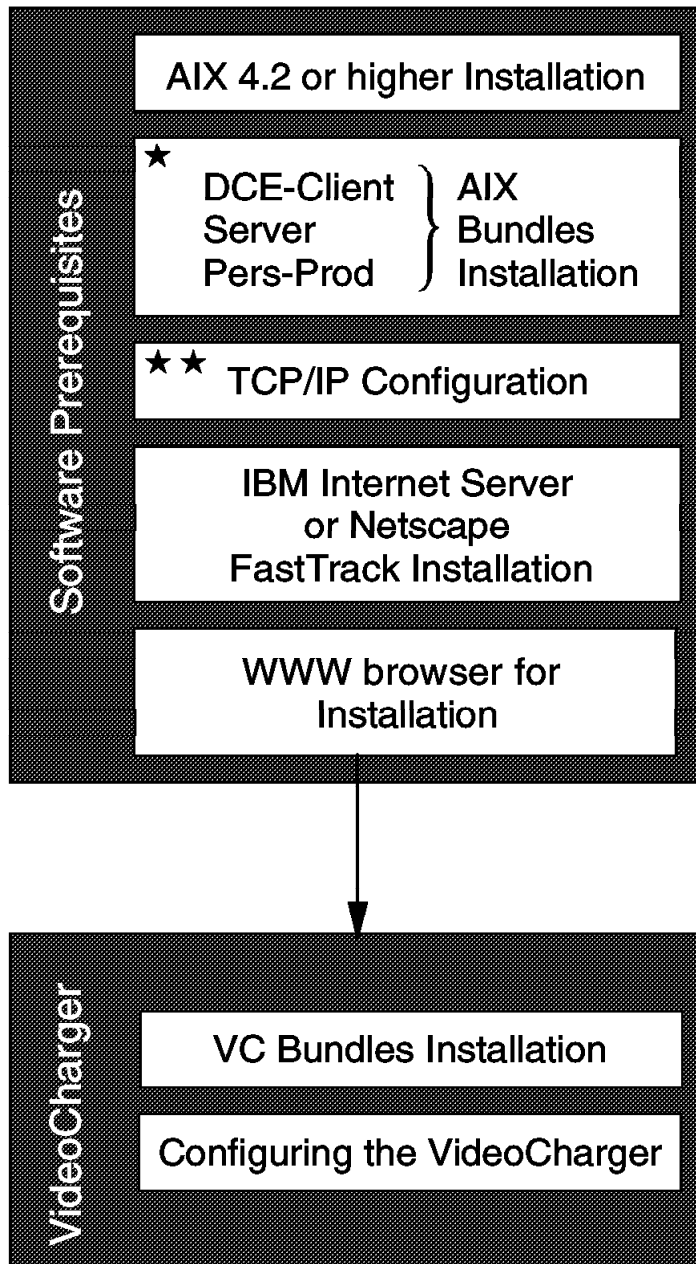


Figure 5. Installation Diagram Showing the VC Installation Path

Refer to the *AIX Version 4.2 Installation Guide*, SC23-1924 for detailed information on how to install the operating system.

3.1.2 Corequisites

The Presentation Formatter Server and the Controller require either IBM Internet Connection Server for AIX or Netscape FastTrack Server, both of which are shipped with the AIX Version 4.2 Server Bonus Pack. If you are using IBM Internet Connection Server for AIX, you should install it before you install the Presentation Formatter Server or the Controller bundle, to take advantage of the auto-configuration.

3.1.3 Installing

This section describes how to use the System Management Interface Tool (SMIT) to install the VideoCharger. You can also use the Visual System Management application, which can be invoked by entering `xinstallm -ez` from within AIX windows or the AIX Common Desktop Environment. For more information, see *AIX Version 4 System Management Guide: Operating System and Devices*.

The bundles listed in Table 3 have been created to enable you to install the product according to the number of machines in your configuration. See Figure 6 on page 31 for more information on basic configuration options.

Installing is a three-step process. First, if installing either a Presentation Formatter Server or Controller, you need to install either IBM Internet Connection Server for AIX or Netscape FastTrack Server from the AIX Version 4.2 Server Bonus Pack. Next, install definitions for the bundles available, and finally, install the actual bundles themselves.

Bundle	Install when Using:
Video-Server-All (all packages)	Option 1 (one server)
Video-Pres-Formatter	Option 2 or Option 3
Video-Controller	Option 2 or Option 3
Video-Data-Pump	Option 2 or Option 3

To install one or all of the bundles, follow these steps:

1. Log in as root, and enter `smit install` at the command line.
2. From the Software Installation and Maintenance submenu, select **Install and Update Software**, then select the **Install Software Bundle (Easy Install)** option. After the option is selected, a screen asking you to specify the input device or directory is displayed.
3. The INPUT device/directory for software option will be highlighted. Click **List** to display a list of the available input devices or directories. The input device is the tape or CD-ROM drive that you are using to install the software. The input directory is the directory on your system containing software for installation (for example, the `/usr/sys/inst.images` directory).
4. Select an input device or directory. The device or directory you selected is now displayed in the INPUT device/directory for software entry field. Select **OK**, and the Select a Fileset Bundle submenu is displayed.

Note: If you are installing from CD-ROM, the CD-ROM device must be mounted to a CD-ROM file system. SMIT automatically creates this mount point for you. If you install from the command line using the

installp command, however, you must specify the directory on which the CD-ROM is mounted with the `-d` option of the installp command.

5. From the Select a Fileset Bundle submenu, choose the **Media-Defined** option and click **OK** twice. This will install the bundle definitions, but not the bundles themselves. Click **Done**. To access the list of available bundles, repeat Steps 2 through 4.
6. Choose the appropriate bundle according to your configuration. If you are installing all VideoCharger components on one server, select the **Video-Server-All** option. Use the Page Up and Page Down keys or the arrow keys to scroll through the list.
7. Verify whether you want to keep the remaining default installation settings. Use the SMIT on-line help for each field to determine if you want to use the default setting. Click **List** to change the settings with a yes or no value.

If you wish to preview the results of the installation before actually installing the software, highlight the PREVIEW only field (the install operation will *not* occur) and change the setting to a **yes** value. The preview information indicates any software that is a prerequisite to the software you are installing.

8. Press Enter when you are satisfied with all the settings on this screen. The ARE YOU SURE? pop-up message is displayed to confirm that you want to continue with the installation.

If you set the preview function to **yes**, then installation will not actually occur. In this case, repeat this procedure with the preview function set to **no** when you want to install the software.

3.1.3.1 Completing the Installation and Reading the Status Messages

This section describes the system's activity and the actions required of you after the installation process has begun.

1. When you press Enter to start the installation, the COMMAND STATUS screen is displayed.

A series of messages are displayed as the installation proceeds. The amount of time the installation takes varies, depending on your system and the software you are installing and updating.

Note: The system may prompt you, with a message similar to the following, to insert the next CD or tape:

```
Mount volume 2 on /dev/rmt0.
```

Press the Enter key to continue.

When this message is displayed, insert the specified CD or tape and press Enter.

When the installation finishes, the Command: status field on the COMMAND STATUS screen changes to OK or FAILED. OK means the installation ran to completion, though some file sets may not have installed successfully. The FAILED status means that not everything you requested was installed. A preview install always finishes with an OK status.

2. When the installation halts or finishes, the screen returns to the top of the list of messages that are displayed during installation. You can review the message list as described in the next step, or you can exit SMIT and review the smit.log file (`/smit.log` or `/home/user_id/smit.log`).

3. Review the message list for error messages and software products or service updates that may not have been successfully installed. Use the following keys to review the system message list:

- Page Down shows the next screen of text.
- Page Up shows the previous screen of text.
- The Up and Down Arrow keys move through the message list line by line.

Use the following procedure to correct any errors in the installation:

- a. Look at the pre- and post-installation summaries at the end of the message list to see whether any installation failure occurred.
 - b. Use the message list to determine problems and find which software products or service updates were involved. For example, space limits may have been exceeded, or the requisites may not have been met for some software. The system lists how much extra space is needed and which requisite software products or service updates to install.
 - c. Any bundle that is marked as FAILED, BROKEN, or CANCELLED must be reinstalled. You do not need to reinstall any bundle that was marked as SUCCESS in the Installp Summary report. A common cause of failure is not having installed the prerequisites mentioned previously. If you need to perform the installation again, return to Step 6 and change the installation settings as appropriate. If there was not enough space to complete the installation, set the EXTEND file systems if space needed? field to **yes**.

If you need to perform the installation again and you have more than one tape or diskette, remove the tape or diskette from the drive, press PF12 to exit SMIT, and return to Prerequisites.
 - d. When all software has been installed successfully, continue with the next step.
4. If you have additional software to install that is on a different CD-ROM, tape, or diskette, do the following:
 - a. Remove the CD-ROM, tape, or diskette from the drive.
 - b. Insert the CD-ROM, tape, or diskette for the software you are installing into the drive.
 - c. Return to the previous screen and continue installing the software product or service update from tape or diskette.
 5. Press F12 to exit SMIT.
 6. Remove the installation media from the drive.
 7. Reboot the systems on which the VideoCharger software was installed.

3.1.3.2 IDs Used for Configuration, Administration, and Content Loading

In addition to the *root* user ID, two additional user IDs are created during the installation process: *vsadmin* and *vsloader*.

If you are using IBM Internet Connection Server as your Web server, the two IDs provide different permissions. The *vsadmin* ID provides the administrative authority needed to perform VideoCharger configuration and administration tasks

(including content loading), and vsloader provides permission to perform only content-loading tasks.

If you are using Netscape FastTrack Server, both IDs can perform configuration, administration, and content-loading tasks. You need to set passwords for both IDs; this is discussed in the next section.

3.1.4 Setting/Changing Passwords for User IDs

The IDs vsadmin and vsloader are defined both as AIX users and as Web administration IDs. As such, their authentication passwords are managed in two different environments. The AIX passwords for these users are maintained with the `passwd` command. The Web administration passwords are maintained with the `/usr/lpp/internet/server_root/cgi-bin/htadm` command.

The AIX IDs have no default password; if using IBM Internet Connection Server, the VideoCharger Web administration IDs have a default password of `vsibm`. If your system is attached to a public network, or you would like to restrict certain roles to certain individuals, it is recommended that you change the default passwords. It is also recommended that the AIX password match the Web administration password.

3.1.5 Changing the Passwords for AIX: IDs

Changing the Password for vsadmin ID: To change the AIX password for the vsadmin ID, do the following on each server:

1. Log in as root.
2. Enter the following command:
`pwdadm vsadmin`
3. At the password prompt, type the new password and press Enter.
4. At the password verification prompt, type the new password again and press Enter.
5. Enter the following command:
`pwdadm -c vsadmin`

Changing the Root Password: If you are changing the root password, repeat steps 2 through 5, substituting `root` for `vsadmin`.

Changing the Password for vsloader ID: If you are changing the vsloader password, do the following on each server:

1. Log in as root.
2. Enter the following command:
`pwdadm vsloader`
3. At the password prompt, type the new password and press Enter.
4. At the password verification prompt, type the new password again and press Enter.
5. Enter the following command:
`pwdadm -c vsloader`

6. If you are changing the password subsequent to initially configuring the Data Pump (.rhosts file must be configured before Data Pump), enter the following command:

```
chvsdp -l dp0 -w newpassword
```

Note: This procedure assumes that you have not changed the AIX ID used by the system to manage content. If you have changed the AIX ID used by content management (by using `chvsdp -l dp0 -i new_content_mgmt_AIX_ID`), then steps 1 through 6 should be performed when changing the password for the AIX ID specified for content management. To display the AIX ID currently being used for content management, run the `lsvsdp` command. The field containing the AIX ID is the `cmid` field.

3.1.5.1 Changing the Web Administration ID Passwords for IBM Internet Connection Server

After you have set the AIX password for both the `vsadmin` and `vsloader` users, you should log in as the root user to change the Web administration passwords. Use the `htadm` command to perform this task:

```
/usr/lpp/internet/server_root/cgi-bin/htadm  
-passwd /var/avs/config/vspasswd username password
```

where:

username is the user ID.

password is the AIX password for that particular user.

3.1.5.2 Changing the Web Administration ID Passwords for Netscape FastTrack Server

You can set and change passwords and IDs for the Netscape FastTrack Server through Access Control on the Netscape Server Selector main menu. Setting up the initial passwords and IDs is discussed in 3.2.6.3, “Notes on Configuring Netscape FastTrack Server” on page 35.

3.1.6 De-Installing VideoCharger

VideoCharger follows the standard AIX uninstall process, but you should keep the following in mind:

- The `vsadmin` and `vsloader` IDs will be deleted.
- The multimedia file system must be explicitly deleted.
- If you use DB2 as a content management database, the DB2 instance needs to be explicitly deleted.

Given these special considerations, de-install VideoCharger with the following steps:

1. Remove the file system on the Data Pump through the `smit mmcs fastpath`.
2. Using SMIT, de-install files beginning with either `mmfs` or `avs`.
3. If you use a DB2 database, run the following script to delete the DB2 instance:

```
/usr/lpp/avs/db2/rmdb2i.sh
```

3.2 Configuring the VideoCharger

Forms on the VideoCharger home page allow you to configure the product through an easy-to-follow interface. Each form includes help that walks you through the required tasks. However, certain tasks must be performed before configuring the VideoCharger software. Figure 6 on page 31 shows a flowchart of the basic configuration steps in chronological order.

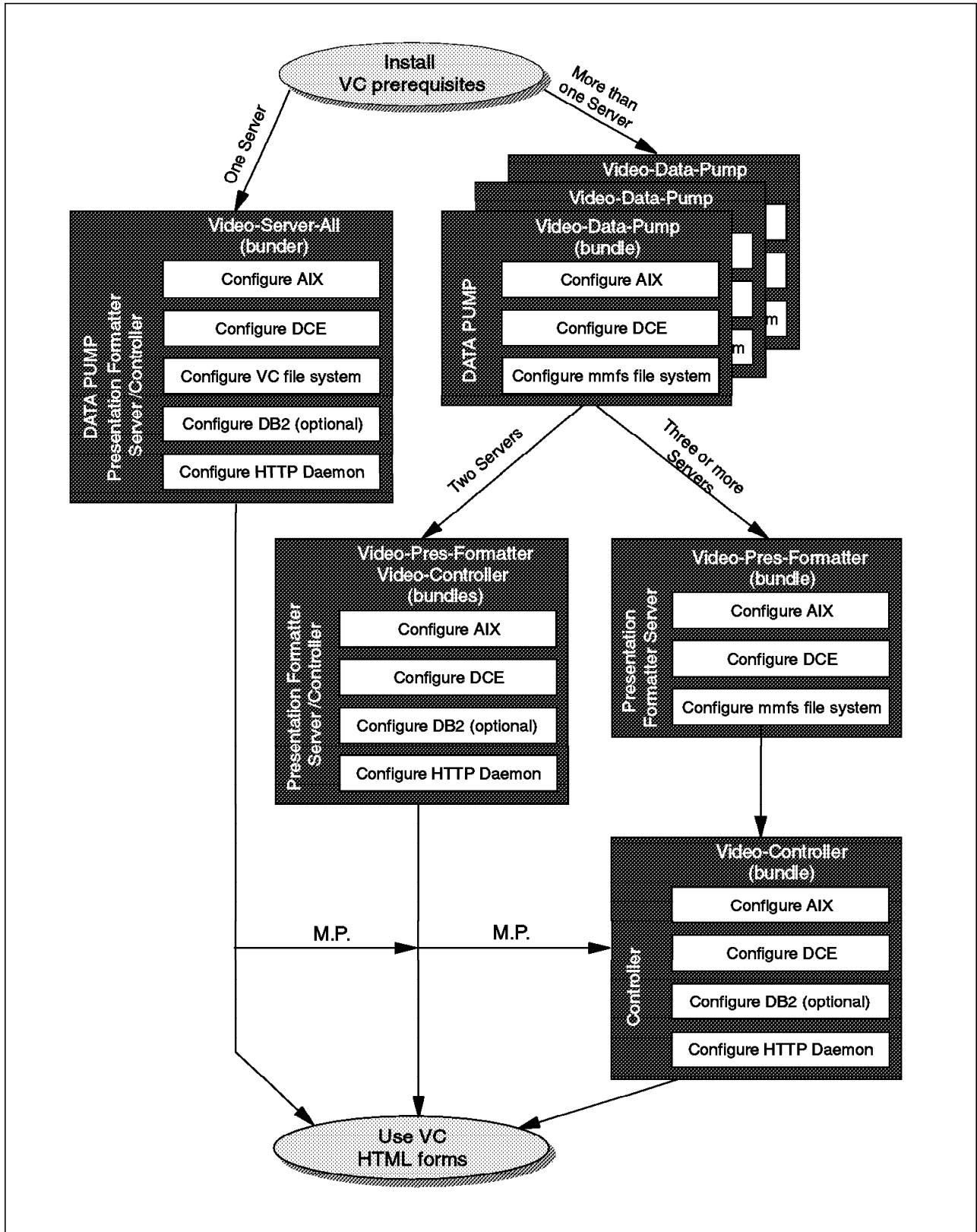


Figure 6. Configuration Diagram. This picture shows the configuration path for one or more servers.

3.2.1 Configuring AIX

Note: Root authority is required to perform AIX configuration tasks.

Your AIX configuration must include the following to support the VideoCharger software:

- Your amount of paging space must total twice the amount of real memory (RAM) on your system. To determine your current paging space, and change it if necessary, use the
`smit pgsp`
fast path to access the Page Space menu. Refer to *AIX Version 4 System Management Guide: Operating System and Devices*, GC23-2486 for more information on adding paging space.
- TCP/IP should be configured and running.

3.2.2 Creating and Editing the .rhosts File

In addition, you need to create and edit an `.rhosts` file that will enable your Data Pumps to communicate with the Controller. This file must exist on each Data Pump, even if the Data Pump is running on the same machine as the Controller.

1. Log in as vsadmin at the Data Pump.
2. Create the `.rhosts` file by using the vi editor:

```
vi $HOME/.rhosts
```

```
ControllerName: root
```

```
ControllerName: vsadmin
```

```
Save and exit vi editor by typing ESC:wq!
```

```
chmod 640 $HOME/.rhosts
```

where `ControllerName` is the fully qualified host name of the Controller. You can determine this fully qualified host name by issuing the host `host_name` command at the Controller.

3. Exit vsadmin.

3.2.3 Configuring DCE

The VideoCharger components rely on DCE Remote Procedure Call (RPC) functionality to enable client-to-server communication.

1. Invoke SMIT as root with the **smit mkdce** fast path, then select the following menus:

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

2. Enter information for the following fields:

- CELL Name

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

- CLIENTS to configure

```
Enter rpc.
```

- SECURITY Server

```
Specify your local host name.
```

- Client Machine DCE HOSTNAME

Specify your local host name.

3. Use the default values listed for all other fields and click **OK**.
4. Press Enter again at the prompt to execute the command.
5. Click **Cancel** to return to the main DCE menu.
6. Select **Choose DCE/DFS Start options**. A menu similar to the following will appear:

Select the DCE/DFS items to start	dce
START now, system restart or both	now
7. Change the value for the last option from now to both by clicking on the **up** arrow to the right of the **List** button.
8. Click **OK**.
9. Exit from SMIT.

3.2.4 Configuring DB2

If you are using DB2 to track additional information on assets, you need to run a script in order to create a DB2 instance. This instance will be used by the system later as you fully configure the database through HTML forms. Enter the following at the command line:

```
/usr/1pp/avs/db2/mkdb2i.sh
```

3.2.5 Configuring the Multimedia File System

Configure the file system through SMIT; for a standard configuration, follow the procedure in this section.

3.2.5.1 Prerequisite

When the file system is started, a page pool is created for it. The page pool is the area in the shared memory segment from which buffers are allocated for data that is read from, or written to disk. Data includes data blocks, inodes, indirect blocks, allocation maps, and temporary I/O buffers. The size can range from 4MB to 380MB.

The default page pool size is 20MB. If you need a larger page pool, you need to refer to the Changing the Configuration menu. After specifying the page pool size in the File System Manager, you can return here and complete the standard configuration.

3.2.5.2 Standard Configuration

After determining if the default page pool will meet your needs, you can begin standard configuration, during which your file system will be created and configured.

1. Log in as root, and enter `smit mmcs` at the command line.
2. Select **Create Content Storage**.
3. Select **Create New File System**. Complete the following fields:

- File System Name

Enter a file system name, for example `sg0`. The file system is subsequently created with the `/mmfs/` path prefix.

Note: You cannot easily change the name of a file system, so choose this name carefully.

- Number of Assets

Enter the maximum number of assets you plan on storing in the file system. This maximum should include assets you might add as a result of adding disk storage in the future. To estimate this maximum, refer to 2.4.1, “Estimation Table” on page 14. The file system uses the value you specify to set up the internal data structures for that number of files.

Note: Subsequently adding volumes to a file system will not increase the total possible number of files, although it does increase the total possible amount of data that can be contained in these files.

- Data Pump Dedicated to Low Bit Rate Media

A system dedicated to assets (streams under 1.0Mbps) will have a block size of 32K, whereas one dedicated to serving HBR assets will have a block size of 256K. A larger file system block size has significant performance advantage for HBR streams. A hybrid Data Pump serving both types should also have a 256K block size. The default is 256K.

- Ensure Volumes are Currently Unused

Accept the default, which is yes. If the configuration fails using yes, change the field to no and retry.

- Volumes

Select **List** to view a list of available disks that can be part of the multimedia file system.

4. Select **OK**.

3.2.6 Configuring an HTTP Daemon

Configuring an HTTP daemon involves five basic steps:

- Create administration and content-loading IDs for the HTTP daemon (vsadmin and vsloader, respectively).
- Add links to the CGI-bin programs that provide access to the VideoCharger Configuration and Administration forms, and to the Presentation Formatters.
- Add the CGI-bin program directories as valid CGI directories.
- Add protection for the directories containing the CGI-bin programs.
- Change the time-out value to 60 minutes to accommodate loading of large assets.

These steps are performed automatically during the install process for IBM Internet Connection Server for AIX. The following sections further discuss the steps for Netscape FastTrack Server.

3.2.6.1 Notes on Configuring IBM Internet Connection Server

The software is installed in the /usr/lpp/internet directory. The product provides a short README in the /usr/lpp/internet_server.base directory.

Note: The httpd daemon is run under the ID *nobody*. It needs to belong to the vsadmin and vsasset groups. You can ensure it does by issuing the following two commands:


```
/usr/bin/chgrpmem -m + nobody vsadmin  
/usr/bin/chgrpmem -m + nobody vsasset
```

Additional information on the Internet Connection configuration is available on the World Wide Web at the following URL:

<http://www.raleigh.ibm.com/ics/icsprod.html>

You can also download a PostScript version of the *Internet Connection Server for AIX Up and Running! Guide* from this URL.

3.2.6.2 Starting and Stopping the Server

The preferred way to start and stop the server is to send the System Resource Controller (SRC) a request. To determine if the server is running, type from any AIX command prompt:

```
lssrc -s httpd
```

To stop the server, log in as vsadmin and type from any AIX command prompt:

```
stopsrc -s httpd
```

To start the server, log in as vsadmin and type from any AIX command prompt:

```
startsrc -s httpd
```

3.2.6.3 Notes on Configuring Netscape FastTrack Server

Note: You need to have Netscape Navigator (or another browser) installed in order to complete the configuration of the Netscape server.

The product will be installed in the `/usr/lpp/netscapeServer/fasttrack-us` directory. You will find a short README file in this directory.

To configure the server, run the program `/usr/lpp/netscapeServer/fasttrack-us/ns-setup` as root user.

The `ns-setup` program gathers basic information from you, then brings up the Netscape Navigator browser so that you can complete the configuration of the FastTrack Server. Once the Netscape Navigator has been invoked, log in using the ID and password you specified during `ns-setup`'s initial setup. You will then see the Netscape Server Selector main menu.

1. Select **Install a New Netscape Fast Track Server**.
2. Click **OK** at the bottom of the Install a New Netscape FastTrack Server menu. You will see a message similar to the following:

```
Success!  
Created new server jacob.siren.com, listening to port 80,  
serving documents from the /usr/ns-home/docs directory.
```

Note: The `httpd` daemon is run under the ID `nobody`. It needs to belong to the `vsadmin` and the `vsasset` groups. You can ensure it does by issuing the following from the command line:

```
chuser groups= 'nobody, vsadmin, vsasset' nobody
```

3. Select **Configure More about Your New Server** from the subsequent menu.
4. From the main menu bar, click **Access Control**. The Create User menu will be displayed. Enter the following information:

Login Name: vsadmin
Full Name: Video Server Administrator
Password: vsibm
Again: vsibm
Group: (No groups have been created.)
Database: default

5. Click **OK**.
6. Create another user vsloader with the same information. The full name for vsloader should be Video Server Content Loader.
7. Click **OK**.
8. From the main menu bar, select **Programs**.
9. Select **CGI Directory**, then **Add another CGI Directory**.
10. Complete the subsequent menu with the following information:
URL prefix: vs_admin/cgi-bin
http://hostname/
CGI directory: /usr/lpp/avs/html/cgi-bin
11. Click **OK**, then click **Save and Apply**.
12. Repeat steps 10 and 11 to add vs_public as a CGI directory, with the following information:
URL prefix: vs_public/cgi-bin
http://hostname/
CGI directory: /usr/lpp/avs/public/cgi-bin
13. Click **OK**, then click **Save and Apply**.
14. From the command line, change directory to /usr/ns-home/docs, or to the directory you have designated as the Primary Document Directory.
15. Create the following two links:
ln -s /usr/lpp/avs/html vs_admin
ln -s /usr/lpp/avs/public vs_public
16. From the main menu bar, select **Access Control**.
17. Select **Restrict Access**.
18. Click **Turn on access control**.
19. On the subsequent Restrict Access menu, select **Deny** under **Read**, and then click **Edit Permissions**. On the Allow Access to a Resource menu, click **User Database**, and then click **Done**.
20. Click **Apply** in the top right corner of the form.
21. Click **Save and Apply**.

From the command line, stop the Netscape administration daemon by issuing:

```
cd /usr/ns-home  
stop-admin
```

For further information about installation and configuration, refer to *Netscape FastTrack Server Administrator's Guide: UNIX*.

3.2.6.4 Making the VideoCharger Home Page Your Default Home Page

If the VideoCharger is running on a dedicated machine, you may want to have the configuration and administration forms be the default home page. The home page is the document that your server returns when a client sends a request that does not point to a specific directory or file. When a client sends a URL in the format of:

`http://your.server.name/`

your server responds by sending back the default home page. When the server receives requests that do not point to a specific directory, it tries to serve the request from the document root directory. Therefore, you need to have your home page in this directory.

The default document root directory for Internet Connection is `/usr/lpp/internet/server_root/pub`, while the default for Netscape FastTrack is `/usr/ns-home/docs`. Once at the default directory, the server determines which file contains your home page by matching the list of welcome pages to the files in the directory. The first match it finds is the file it returns as your home page. The default configuration file defines a list of four welcome pages. The order of the welcome pages is important because the server goes down the list from top to bottom when looking for the file it should return.

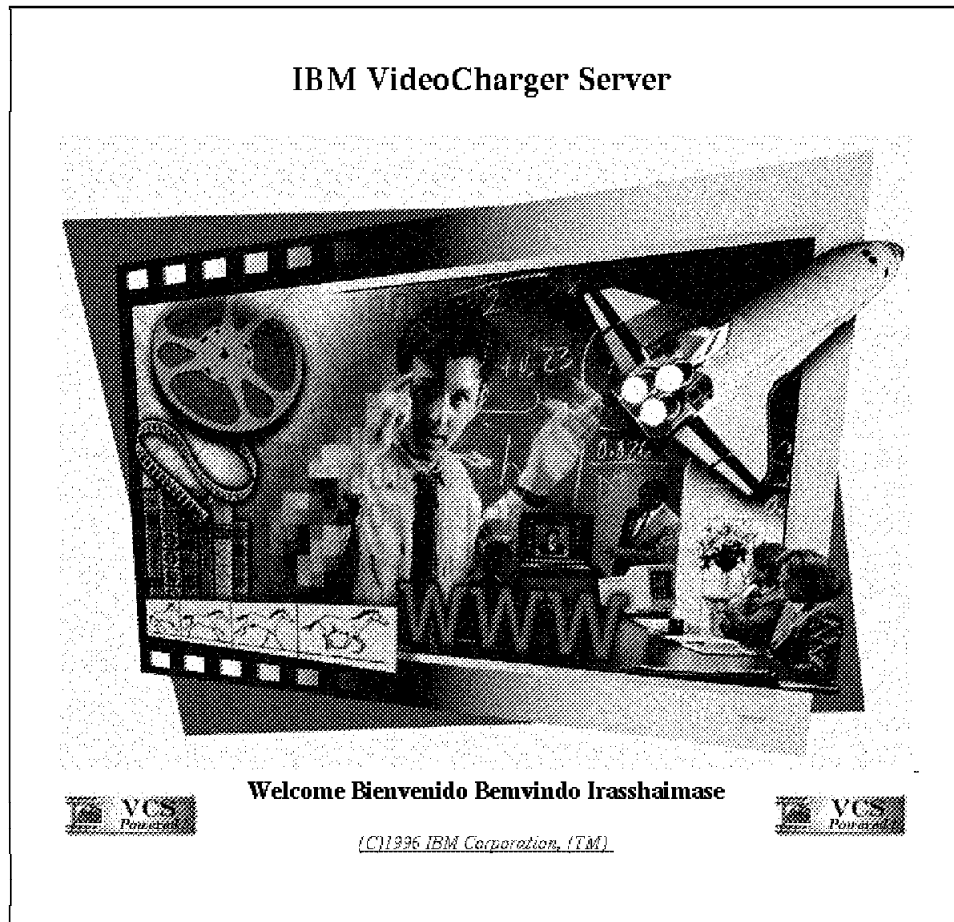


Figure 7. VC Home Page. This is the default VideoCharger Home Page.

For the Internet Connection Server, the default welcome page file names and their default order are:

1. Welcome.html
2. index.html
3. Frntpage.html

For the Netscape FastTrack Server, the default welcome page file names and their default order are:

1. index.html
2. home.html

For example, with Internet Connection Server, if you are using the default configuration and your document root directory does not contain a file named Welcome.html, or welcome.html, but does contain files named index.html and Frntpage.html, the index.html file is used as your home page.

Therefore, to change the default home page, you need to:

1. Open the /etc/httpd.conf file.

Note: If you are not using English as your language, you need to edit the file found in /etc/http/config/lang/httpd.conf, where *lang* is your language.

2. Add the following line to the top of the list of welcome page file names:

```
Welcome vs_admin/admin/vs.html
```

Note: This procedure assumes you are using Internet Connection as your HTTP daemon.

This ensures that the vs.html file will appear as the default home page.

3.2.7 Using the VideoCharger Configuration Forms for Initial Setup

Once you have completed the tasks outlined in the flowchart, you are ready to access the on-line configuration interface on the VideoCharger home page.

If you have not made the VideoCharger home page your default home page, use the following URL to view the forms:

```
http://hostname/vs_admin/admin/vs.html
```

where *hostname* is the IP hostname of the VideoCharger. Otherwise, use the following URL:

```
http://your.server.name
```

You will be prompted for your ID and password.

Note: The Web administration vsadmin ID created during installation provides the administrative authority needed to perform the configuration and administration tasks. The default password of the ID is vsibm. If you have not already done so, change the password for this ID. You also need to change the password for the content-loading ID (vsloader), the default for which is also vsibm. See 3.1.5, "Changing the Passwords for AIX: IDs" on page 28 for more information.

After logging in, you will see the VideoCharger Server graphic.

Click the graphic and you will see the main VideoCharger screen.

This section outlines the tasks you need to perform to get your VideoCharger software up and running. While only the forms are discussed, you can also configure the software using commands. See the administrator's guide for information on these commands and the order in which they need to be used in the configuration.

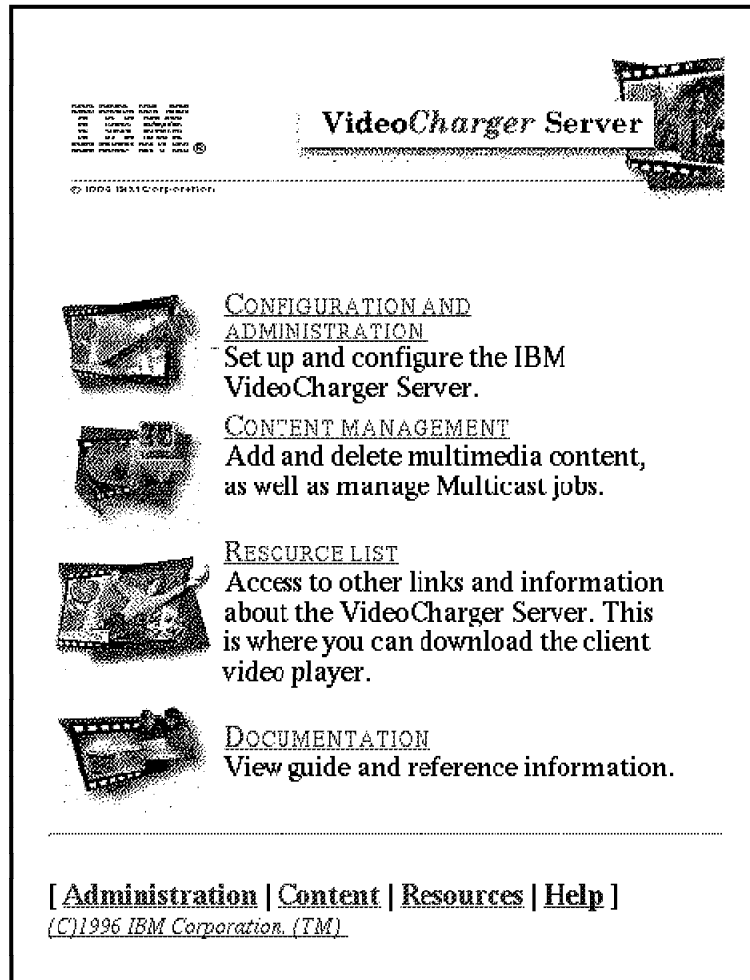


Figure 8. VC Configuration Form. This shows the configuration and administration HTML forms.

Click **Configuration and Administration**. You will see a list of tasks:

1. You now need to define what type of configuration you have.

If you have installed all components on one system, select **Single System** under **Initial Setup**. The host name of the Controller appears in the first field. Click **Continue**.

If you have multiple systems in the complex, select **Multisystem** under **Initial Setup**. You need to enter the appropriate host names for both the Controller and the Presentation Formatter Server (these are assumed to be the same).

2. If you have multiple systems in the complex, you need to add the host name for each Data Pump to the system definition list.

Note: If you have changed the user ID and/or password that was set during the installation process for content loading, or are using another content-loading ID, enter the correct information in the fields provided.

3. You also need to specify the type of database, if any, the Application Server will use to track complementary information about the asset (for example, director and actors' names). The default is none, which means that your system will track only basic attributes (encoding type, frame rate, play rate, and so on).
4. Click **OK**. This begins the configuration of all the components. In particular, for the Data Pumps, automatic configuration will result in the following:
 - Definition of the port group, which contains all the available ports.
 - Creation of ports that comprise the port groups.
 - Creation of an asset group, which contains the assets loaded on the Data Pumps. There can be one asset group per VideoCharger complex.
 - Creation of stripe groups, one per Data Pump. A stripe group is simply a container defining what Data Pump an asset is stored on.

Note: If the Controller and Presentation Formatter Server are on different machines, copy the ISC.INI file from /var/avs/config on the Controller to the same directory on the Presentation Formatter Server.

Perform a backup of the configuration, which is an option on the HTML configuration and administration forms.

Once the initial configuration is done, you can test the server by downloading the client code and watching a sample video.

3.2.7.1 Configuring for Optimal Bandwidth

Bandwidth is set as part of the configuration of the Data Pump. During initial setup, default values are assigned for bandwidth. In terms of initial setup, you should accept the defaults. You can change them later if you find that they do not fit the needs of your environment.

In determining the bandwidth that is right for your configuration, you should review the discussions of disk bandwidth and network requirements in 2.5.2, "Determining Disk Bandwidth Requirements" on page 16. System CPU and memory can also influence bandwidth.

Note: It is a good idea to back up your configuration settings before adjusting your bandwidth.

Admission Control: The Controller performs admission control for three types of resources: ports, Data Pumps, and stripe groups. Admission control is based on the rate of real-time stream movement. With admission control, the system manages the available resources to maximize efficiency of the system. Multiple interfaces (multihomed network connections) allow a single Data Pump to serve clients from multiple networks. If multiple Data Pumps are available, stream delivery is load-balanced across the configured Data Pumps.

For stripe groups, bandwidth is dynamically measured during configuration of the multimedia file system. The more disks and disk controllers you have, the

higher the bandwidth. The stripe group's bandwidth settings are kept in what is known as a *performance group*.

A common instance where you would choose to change the established limit is if you are doing extensive content loading and need not worry about the impact on simultaneous serving of assets.

You can set a bandwidth limit at both the Data Pump and port level.

For each Data Pump, bandwidth limit is the maximum amount of CPU resources you want dedicated to the delivery of assets. Requests that exceed a given port's maximum, or the Data Pump's maximum, will be rejected.

For each port, this represents the maximum amount of bandwidth that all streams over the network interface can use. Setting such a limit helps the system avoid overruns or 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 might also set this as a temporary limit for unusual circumstances.

If no Data Pump bandwidth limit is set, bandwidth limit is essentially turned off. However, other admission control factors (such as the stripe group or port bandwidth) take over for it at that point, so the system is never without some form of admission control. If no port bandwidth limit is set, it is set to the maximum bandwidth (for example, for 10BaseT Ethernet, this would be approximately 10Mbps).

There are two main scenarios for which you would modify your bandwidth limit. First, 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 60Mbps of video at maximum capacity, you might want to set the Data Pump bandwidth limit to 30Mbps. This would allow the system to serve 20 streams of 1.5Mbps MPEG-1, but still allow enough CPU cycles for other non-video related services (such as general purpose HTTP serving).

The second scenario involves determining the bandwidth for a VideoCharger in a complex environment. For example, while a Data Pump may be capable of streaming data at 10 Mbps, it may connect to a router that is capable of only 1.5Mbps. In this case, either take the lowest common denominator or experiment to determine the maximum throughput of your configuration. Figure 6 on page 31 depicts such a configuration.

In the configuration depicted, you might set the port bandwidth limit to 3Mbps (or less) to prevent the outgoing video from overwhelming the two T1 interfaces.

3.2.8 Changing Your Configuration

As your needs change, you will need to update your configuration. When you add an adapter, for example, you need to 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

You may also want to change from one type of configuration to another; the following sections outline the tasks involved doing this.

3.2.8.1 Changing from Option 1 to Option 2

As your needs change, the scalability of the VideoCharger allows you to add additional Data Pumps, either to mirror existing assets for improved availability, or to store new assets. The easiest way to add a Data Pump is to maintain the existing machine as your Controller, and configure the additional machine as a Data Pump.

Follow these steps to remove the Data Pump code from the initial server:

1. Back up your configuration.
2. Install the Video-Data-Pump bundle on the new system as described in Table 3 on page 25.
3. Set up passwords on the new system for vsadmin and vsloader as described in 3.1.5, "Changing the Passwords for AIX: IDs" on page 28.
4. Configure AIX, the multimedia file system, and DCE on the new system.
5. In the VideoCharger HTML forms, under Change Configuration, select **Add/Change/Remove Systems** to add the new Data Pump.

Note: A stripe group will automatically be created on the new Data Pump; this creation begins the cloning operation. The content on one of the existing Data Pumps is replicated to the new Data Pump. For this to work, the asset group must be active and at least one of the existing Data Pumps must be active. This cloning operation may take a significant amount of time, depending upon the number of assets that need to be copied and the current load on the systems and networks.

6. You may verify the completion of the cloning operation by comparing the files in the /mmfs/<stripe group name> directory on the new Data Pump with the /mmfs/<stripe group name> on an existing Data Pump. When the number of files match, the cloning is complete.
7. Use the VideoCharger HTML forms to deactivate the old Data Pump. Under Manage VideoCharger, select **Activate, Deactivate, or Quiesce VideoCharger Components**.
8. In the VideoCharger HTML forms, remove the old Data Pump by selecting **Add/Change/Remove Systems** under Change Configuration.
9. Delete the multimedia file system as follows:

- a. Log in as root, and enter `smit mmcs` at the command line.
- b. Select **Delete Content Storage**.
- c. Enter the file system name, for example `sg0`.

3.2.8.2 Changing from Option 2 to Option 3

As your needs change, the scalability of the VideoCharger allows you to off-load activity from the Presentation Formatter Server/Controller by establishing a separate Presentation Formatter Server (which acts as a Web interface). This Web interface will act as your primary HTTP server, while the HTTP daemon that continues to run on the Controller will act as the HTTP server for VideoCharger administration or content loading. Again, the easiest way to establish a Presentation Formatter Server is to maintain the existing machine as your Controller, and configure the additional machine as the Web interface.

1. Load the Presentation Formatter Server bundle on the machine that will act as Presentation Formatter Server.
2. Configure AIX, DCE, and the HTTP daemon.
3. In the VideoCharger HTML forms, under Change Configuration, select **Add/Change/Remove Systems** to change the hostname of the Presentation Formatter Server.
4. FTP the `isc.ini` file from the Controller to the `/var/avs/config` directory on the new Presentation Formatter Server.
5. Start the `vssy` daemon on the new Presentation Formatter Server by issuing the following command:

```
startsrc -g vs
```

At this point, the system should be operational and you can have your clients access the new server using the new URL.

3.2.8.3 Adding Additional Data Pumps to Option 2 or 3

1. Install the Video-Data-Pump bundle on the new system as described in Table 3 on page 25.
2. Set up passwords on the new system for `vsadmin` and `vsloader` as described in 3.1.5, "Changing the Passwords for AIX: IDs" on page 28.
3. Configure AIX, the multimedia file system, and DCE on the new system.
4. In the VideoCharger HTML forms, under Change Configuration, select **Add/Change/Remove Systems** to add the new Data Pump.

Note: A stripe group will automatically be created on the new Data Pump. This creation begins the cloning operation. The content on one of the existing Data Pumps is replicated to the new Data Pump. For this to work, the asset group and at least one of the existing Data Pumps must be active. This cloning operation may take a significant amount of time, depending upon the number of assets that need to be copied and the current load on the systems and networks.

3.2.9 Backing Up

Backing up allows you to take snapshots of all or part of your system to ensure that your work in configuring the system is not lost in case of a problem.

Specifically, you should periodically back up the following types of information:

- System configuration information regarding the VideoCharger complex (performed through the HTML forms on the VideoCharger home page).
- Multimedia file system configuration information (performed through SMIT).
- System image (operating system and licensed program products) through mksysb system backup, in case the system becomes corrupted, or you want to transfer the configured VideoCharger software to another system. This backs up the Control Server catalog that contains a list of assets, as well as backing up the metafiles that contain information on asset attributes.

Given the storage requirements of multimedia assets, it is often not practical to do a backup of them; however, you can at least keep records of your multimedia assets.

Note: It is best to perform the backup when no loading or deleting of assets is occurring, to ensure that the Control Server's catalog of assets is up-to-date. If using DB2, you should stop the database before backing up, if possible. To stop the database, log in as vsadmin and type:

```
db2stop
```

After backing up, you can restart the database as vsadmin by typing:

```
db2start
```

3.2.10 Downloading Client Code and Viewing a Sample Video

The client code can be downloaded from the VideoCharger home page (under the Resource List), or from the IBM RS/6000 Solutions home page (in the Video Server category). The URL for the latter is:

```
http://www.rs6000.ibm.com/solutions/  
videoservers/VideoCharger/player_download.html
```

The self-extracting compressed file runs on any PC, and includes the following:

- The networking subsystem, which manages the flow of compressed, digitized video into the client. It establishes the connection to the Application Server portion of the Controller. This subsystem represents extensions to a Windows 95 subsystem.
- The multimedia subsystem, which decompresses, decodes, and presents the asset being streamed from the Data Pump. This subsystem represents extensions to a Windows 95 subsystem; it includes support for Microsoft's ActiveMovie standard. If the ActiveMovie components are not already present on the client, they are automatically installed. In addition, it includes a Low Bit Rate codec that implements the H.263 standard for video and the G.723 standard for audio.
- The video Viewer, a browser helper application that displays the asset to the end user. It includes VCR-style functions such as play, stop, pause, rewind, and fast forward.

Note: LBR Transcoders, which allow you to convert Windows .AVI or .WAV files to the IBM Low Bit Rate streaming video format (.IBA) can also be downloaded

from the Solutions home page. See 5.4.1, “Creating Low Bit Rate Content” on page 76 for more information on the LBR transcoder.

After downloading and installing the code, do the following to view a sample video that is shipped with VideoCharger:

1. Invoke a browser from the VideoCharger complex and go to the VideoCharger Home Page. Log in as vsadmin.
2. Under Resource List, select **Download Sample Low Bit Rate and High Bit-rate Sample Assets**.
3. Select an asset and download it to the local host.
4. Load the asset onto the Data Pump through the HTML forms for Content Management (see 5.5.2, “Adding Video Contents” on page 84 for more details on loading an asset).
5. From the client machine, invoke a browser and go to the following URL:
`http://sample.pf.server/vs_public/cgi-bin/iscpfse1?video=assetname`
The *assetname* cited is the name you gave the asset when loading it. If the name includes spaces or special characters, you should put it in quotes.

The Video Viewer appears in its own window, and the asset begins playing.

For more information on the client code and how to install and use it, refer to *VideoCharger Player Version 1 for Windows 95: User's Guide*, available through the Documentation path on the VideoCharger Home Page.

Chapter 4. VideoCharger Player

This chapter provides a guide to installing, setting up, and using the VideoCharger Player for Windows 95 (VPW), Version 1.1. The VideoCharger Player is the client side of the VideoCharger server/client system. VPW is a set of programs that resides on a personal computer and uses Internet technology to select, receive, and interactively play video and audio streamed from the VideoCharger Server for AIX. The player also includes a transcoder to translate captured video and/or audio files to the .IBA format necessary to load into the VideoCharger Server.

The VideoCharger Player uses an HTML browser (Netscape Navigator or Microsoft Internet Explorer are recommended) to obtain information on videos and to select the videos themselves, or applications containing videos. VPW uses a video viewer for displaying the video. The viewer provides buttons for play, pause, stop, rewind, fast forward, and video-segment selection control. VPW requires Microsoft's Windows 95 operating system.

4.1.1 Overview

The IBM Server/Client is a set of programs that provides an end-to-end solution for delivering multimedia, including full-motion video, using Internet-based technology. Included in the Server/Client are the IBM VideoCharger Client (VCC), Release 1.0, and the IBM VideoCharger Server (VCS) for AIX, Release 1.0.

Customers can use existing Internet Protocol networks to deploy VideoCharger solutions. The VideoCharger Client supports Microsoft's Windows 95 operating system, and two standard Internet browsers: Netscape Navigator and Microsoft Internet Explorer. In the VideoCharger Client system, these browsers, in addition to their normal Internet functions, display information on available videos. End-users can select videos to be played, or applications that contain videos. VCC includes a Video Viewer, complete with play, pause, stop, rewind, fast forward, and video-segment selection buttons, for displaying and positioning the video.

4.1.1.1 VideoCharger Server

The VideoCharger Server consists of:

- A HyperText Transfer Protocol (HTTP) World Wide Web server, which provides support for video title presentation, navigation, and selection. The IBM Internet Connection Server or the Netscape Server can provide these functions. The VCS Presentation Formatters, a set of CGI programs, generate HyperText Markup Language (HTML) screens for presenting information on and selecting videos. The CGI programs run on the same system as the HTTP Server.
- A VCS Application Server, which controls access to the video description databases and files, and the VCS Control Server, which manages the data pumps and the delivery of the video streams to the clients. The Application Server also processes Video Cassette Recorder (VCR)-type commands from the clients, such as play, pause, stop, rewind, fast forward and video positioning commands. The Control Server also manages a database of functional information on the videos, including items such as size of the video file, frame rate, and format.

- VCS Data Pumps, storing the video assets, and “pumping” out video streams to the clients.

For more information on the VideoCharger Server, see the following publications:

- *AIX VideoCharger Server Guide and Reference*, SC23-1982
- *AIX VideoCharger Server Programming Reference*, SC23-1983

4.1.1.2 VideoCharger Client

Essentially, you use a World Wide Web browser to obtain information on videos, or on applications containing videos. The Presentation Formatter, which runs on the HTTP Server component of the VideoCharger Server, generates HTML pages through which you can obtain information and select videos. VCS customers can modify the Presentation Formatters provided with the system, or write their own. Once you have selected a video, the server sends a file, called the Stream/Session Data Metafile, to the client workstation, and also prepares to stream the video. The Stream/Session Data Metafile contains key characteristics of the video. This file activates the client Video Viewer, through which you view the video.

Figure 9 shows a portion of a sample Video-on-Demand home page.



Figure 9. Portion of IBM Video-on-Demand Home Page

If you click the **Entertainment** icon in Figure 9, you receive a results screen similar to the look shown in Figure 10 on page 49. The number of movie titles are shown in the screen.

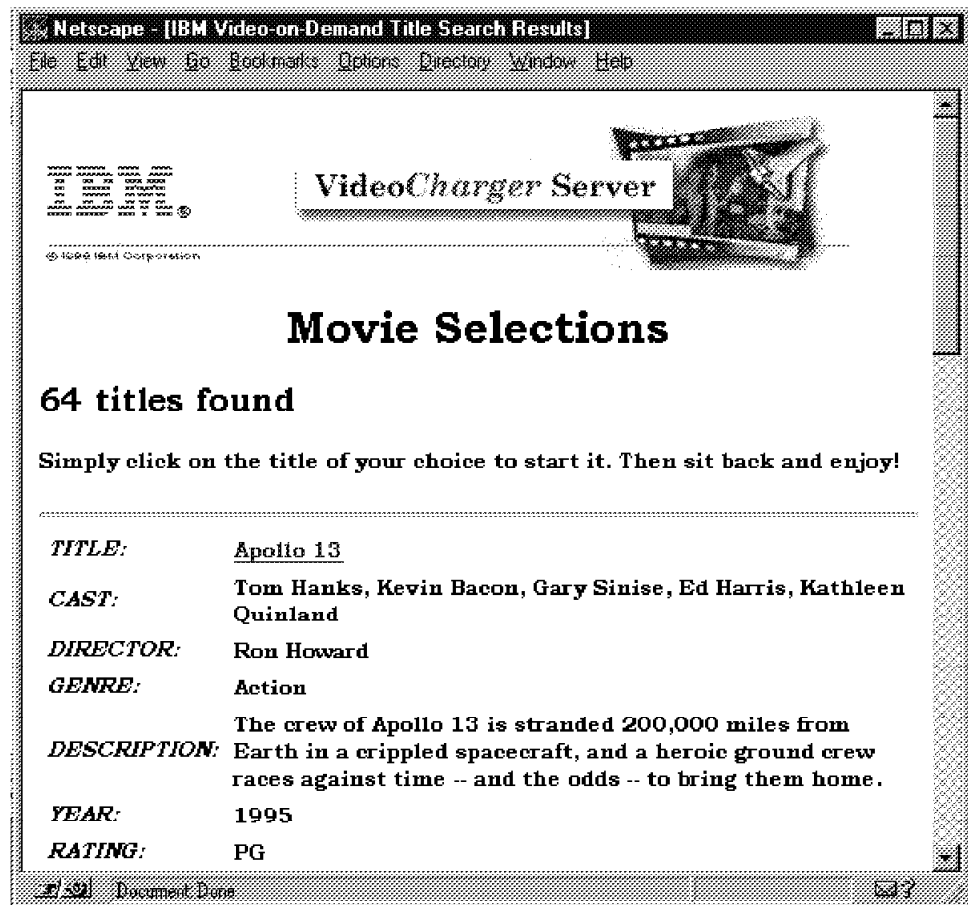


Figure 10. First Part of Sample Search Results Screen

Clicking any of the available titles results in the VideoCharger Server initiating the desired video, and starting the client VideoCharger Viewer to display the video.

4.1.1.3 Components of the VideoCharger Client

The VideoCharger Client contains on-line the software necessary for interactive video except:

- A World Wide Web browser (Netscape Navigator V2.0 or higher, or Microsoft Internet Explorer V3.0 or higher are recommended)
- A Microsoft Windows 95 operating system
- An Internet connection via an Internet service provider

The client workstation receives streamed data from the network in one of two formats:

- Moving Pictures Experts Group - 1 (MPEG-1)
- Low Bit Rate - (LBR)

LBR is an IBM-customized version of interleaved H.263 format for video and G.721 format for audio.

The VideoCharger Client itself consists of the Video Viewer, for displaying the video, and additions to two major Microsoft Windows 95 subsystems:

- Networking Subsystem

The Networking Subsystem manages the flow of compressed, digitized video into the client. It establishes the connection to the Application Server component of the VideoCharger Server, and, through the Application Server, instructs the Data Pumps to stream video data to the client.

- Multimedia Subsystem

The Multimedia Subsystem decompresses, decodes, and presents the media data coming from the VCS Data Pumps through VCC's Networking Subsystem. Many of these components are part of Microsoft's ActiveMovie product. If the ActiveMovie components are not already present on the client system, the VideoCharger Client Setup program automatically installs them.

4.1.2 Requirements for the VideoCharger Player

This section contains the hardware, software, and networking requirements for the VideoCharger Player.

4.1.2.1 Hardware Requirements

- IBM (or 100% compatible) Personal Computer
 - For Moving Pictures Experts Group - 1 (MPEG-1) encoded video/audio stream, you need at least a Pentium 100 Mhz computer. MPEG-1 data streams sent at 1.5Mbps allow viewing of full-motion video at 30 frames per second.
 - For Low Bit Rate (LBR) encoded video/audio streams, you need at least a 66 Mhz 486 DX2-66 computer. LBR data streams can be received by 28.8Kbps modems and allow the viewing of 160 by 120 resolution smooth-motion video at the rate of 7.5 frames per second.
- 16MB of system memory (or 2MB over other system requirements)
- 5MB of disk space over other system requirements
- Audio adapter supported by Microsoft's ActiveMovie (for example, Creative Technology's SoundBlaster audio adapter)
- Network Adapter with Microsoft Winsock support (handles both MPEG-1 and LBR video/audio streams)
- A modem at least 28.8Kbps (handles LBR video/audio streams only)

4.1.3 Software Requirements

- Microsoft Windows 95 Operating System
- Internet World Wide Web browser:
 - Netscape Navigator Version 2.02 or higher
 - Microsoft Internet Explorer Version 3.0 or higher

4.1.3.1 Networking Requirements

Connection to the VideoCharger Server via Local Area Network (LAN), Asynchronous Transfer Mode (ATM), or modem.

For more information on networking requirements, see *IBM VideoCharger Server Version 1 for AIX, Administrator's Guide and Reference*, SC23-1982.

4.1.4 Installing and Setting Up the VideoCharger Player

IBM provides the VideoCharger Player software in two ways:

- As a file you can download from your VideoCharger Server main page.
- As a file you can download from the IBM RS/6000 Solutions home page (in the Video Server category). The URL for this page is:

http://www.rs6000.ibm.com/solutions/videoservers/VideoCharger/player_download.html

4.1.4.1 Downloading the VideoCharger Player Program

The name of the file that you download is `iscinst.exe`. You can load this file in directory `iscsetup`, or in a temporary directory of your own choice.

The file `iscinst.exe` is a self-extracting compressed file that:

- Creates the necessary routines for setting up and configuring the VideoCharger Player
- Automatically executes the extracted `setup.exe` file to perform the installation and configuration

To execute `iscinst.exe`, select the Windows **Run** facility and either enter the path for the `iscinst.exe` file in the Open field, or use the **Browse** capability to have Windows 95 place the file name in the field. For example, if you elected to load `iscinst.exe` in the `iscsetup` directory on the D: disk, the Open field of the Run window should contain the path `d:\iscsetup\iscinst.exe`.

If the path is correct, click **OK**. `iscinst.exe` now unpacks the install files and launches the install process.

4.1.4.2 Installing the VideoCharger Player Program

The unpacked VPW setup program automatically calls the InstallShield Wizard for assistance with the installation process (see Figure 11).

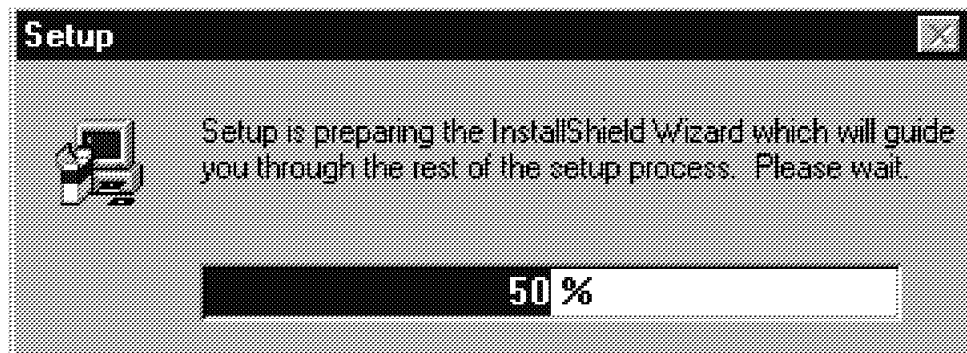


Figure 11. Automatic Invocation of the InstallShield Wizard Program

Figure 12 on page 52 shows the Welcome screen for the Setup program. Clicking **Next** moves forward to the next screen; clicking **Cancel** causes an exit from the Setup program.



Figure 12. Setup Program Welcome Screen

The VideoCharger Player License Agreement screen follows. Clicking **Yes** indicates acceptance of the agreement.

The Setup Type screen (see Figure 13 on page 53) enables you to specify one of two different types of installations:

- **Typical** - Installation of the VideoCharger Player program with the most common options. The transcoders *will not* be installed.
- **Custom** - Allows you to select specific options to install. The transcoders *will* be installed.



Figure 13. Choosing the Type of Setup

Selecting **Typical** and clicking **Next** causes you to go directly to the Choose Destination Location screen. However, selecting **Custom** and clicking on **Next** causes the Select Components screen to display (see Figure 14). By checking individual components and clicking **Next**, you can select the components to be installed.



Figure 14. Selective Install of VideoCharger Player Components

Clicking to the left of a component creates a check or removes an existing check. Clicking **Select All** places a check next to each component; **Clear All** removes all checks. To confirm the choices made and proceed to the next screen, click **Next**.

Checking **Application Program Files** and clicking **Next** causes display of a menu with four choices, as shown in Figure 15:

- README File
- On-line Documentation
- Low Bit Rate Audio Transcoder
- Low Bit Rate Audio/Video Transcoder



Figure 15. Selection of Items for VideoCharger Player Installation

The README file and On-line Documentation are normally installed with the product, and the choices are initially checked. The Transcoder choices are for installing the encoders to convert files to the Low Bit Rate format (for example, *.AVI to *.IBA). For more information on these transcoders, see the publication *IBM VideoCharger Server Version 1 for AIX, Administrator's Guide and Reference*, SC23-1982.

The Choose Destination Location screen enables you to specify the directory for the VideoCharger Player code. The default is a directory named IBMIVSC on the drive on which the Microsoft Windows 95 system is installed (see Figure 16 on page 55).



Figure 16. Choose Destination Location Screen

In this example, Windows 95 is on the C: drive, so the default destination directory is C:\IBMIVSC\. Use the **Browse** button to specify a different drive and directory.

If you have an existing version of VideoCharger Player for Windows 95 on your system, the Setup program displays a window indicating the version number currently on the system, and the version number to be installed. Click **Yes** to continue with the installation. A Confirm File Deletion window follows. Clicking **Yes** activates the UninstallShield program to remove the existing version.

The Setup program then copies program files into the designated directory. Your only option is to cancel this process, if desired. Figure 17 on page 56 shows the screen displayed during this process.

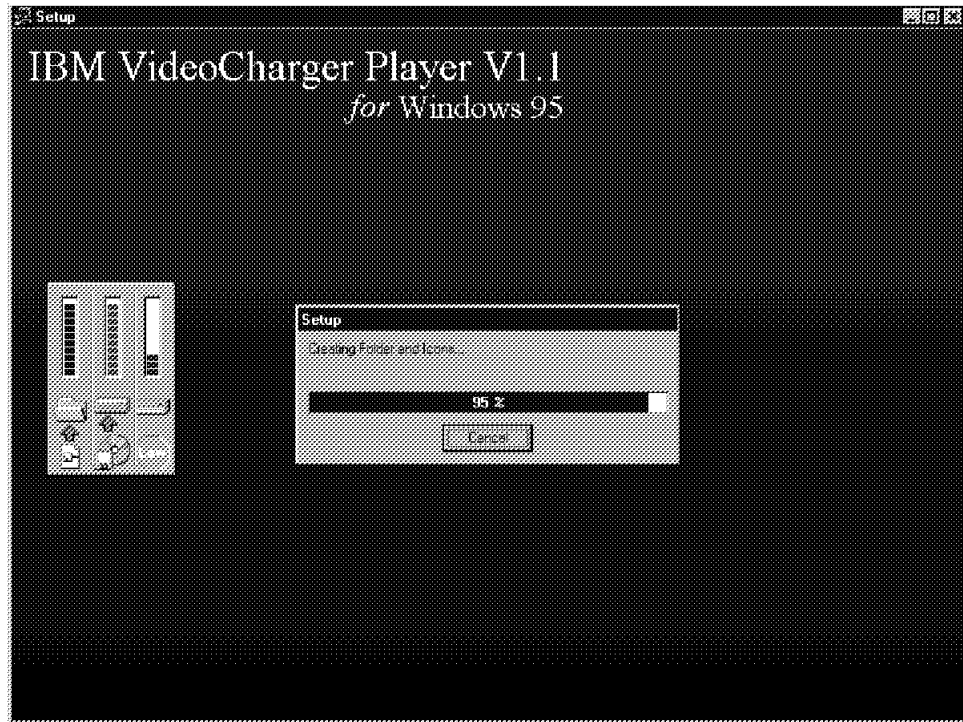


Figure 17. Copying Program Files into the Designated VideoCharger Player Directory

During a typical installation, the Setup program automatically installs Microsoft Corporation's redistributable ActiveMovie runtime libraries. Prior to this installation, Setup displays a copy of the Microsoft ActiveMovie End-User License Agreement. Clicking **Yes** signifies acceptance of the agreement.

Figure 18 on page 57 shows the screen you get during the automatic installation of Microsoft's ActiveMovie program.

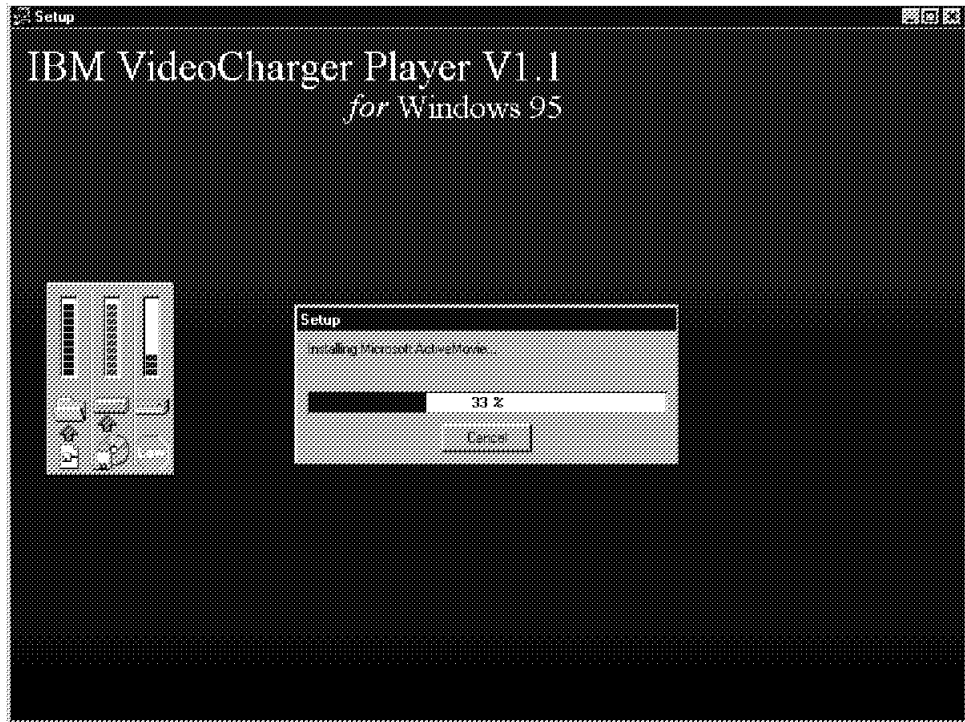


Figure 18. Installation of Microsoft Corporation's ActiveMovie Program

Depending on the level of Netscape Navigator or Microsoft Internet Explorer browser installed, you may receive additional panel messages at this point concerning the VideoCharger Player. These messages inform you that the player will be registered with the respective browser as an external viewer.

Figure 19 shows the message you should receive when Setup is complete.



Figure 19. Setup Complete Message

Figure 20 on page 58 shows the created VideoCharger Player startup window with icons.



Figure 20. VideoCharger Player Startup Window Created by Setup Program

In this example, Setup created four icons:

- Pcstrace, for accessing the log file
- VideoCharger Player, for starting the player
- README file, for introductory information on the VideoCharger Player
- User's Guide, for accessing the on-line VideoCharger Player User's Guide

Note that clicking the **VideoCharger Player** icon starts the player for viewing local files only. For streamed video/audio files, the player is started automatically through selecting a hypertext link, entering a URL in the Web Browser, or selecting a title in the resulting HTML page generated by the VOD Presentation Formatter.

4.1.5 Using the VideoCharger Player

The VideoCharger Player is a helper application that displays video within its own window. Operationally, the player emulates a video cassette recorder. Unlike a "plug-in" type viewer, which enables an application such as a World Wide Web browser to show video as another medium (in addition, for example, to text, graphics, and animation) within its display, the player operates externally to the browser application.

You can invoke the VideoCharger Player through an icon (see Figure 20), through the Windows 95 Run window, or from another application. In the VPW environment, the most common form of invocation is from a World Wide Web browser.

Within a World Wide Web browser environment, you can invoke the VideoCharger Player by clicking a HyperText link. The HTML code for the link contains a call to the VideoCharger Server Presentation Formatter `iscpfse1` routine in the CGI-BIN subdirectory of the HTTP Server.

When the VideoCharger Server successfully processes the selected data, its Application Server component sends a file called the Stream/Session Data Metafile back to the client workstation. This file, containing key data on the video requested, initiates execution of the VideoCharger Player. The player window area initially contains no viewing area. Figure 21 shows the VideoCharger Player window before the video is streamed.

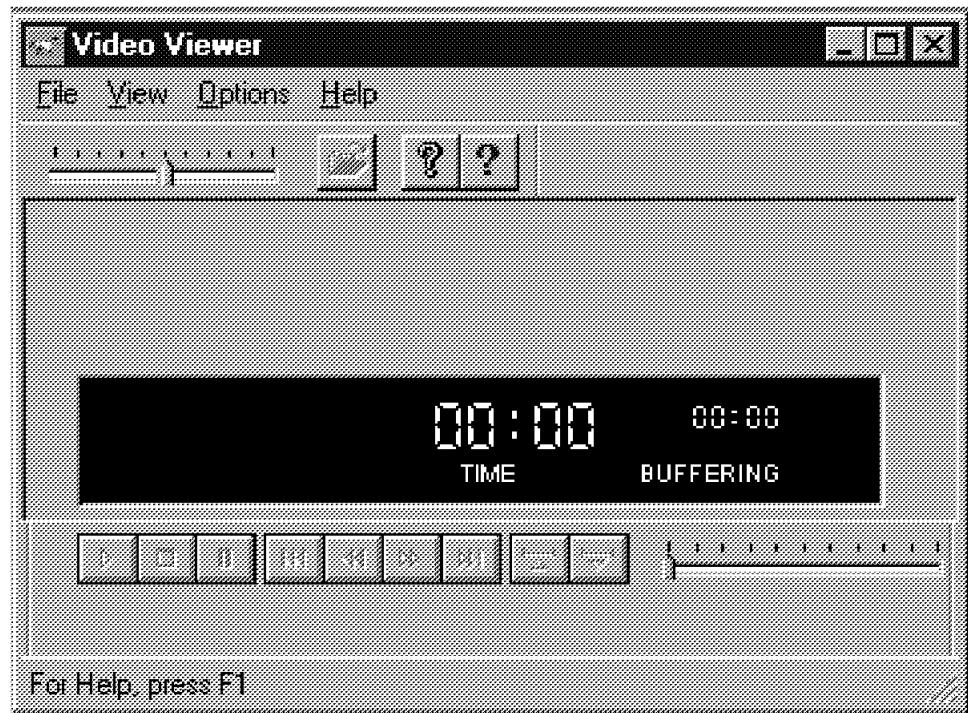


Figure 21. VideoCharger Player Window before Playing the Video

The body of the player window contains a video-status display area and a control-button/video-play trackbar area. The video status area initially displays a time of 00:00 and a state of *buffering*; this means that the client system is receiving data into its cache area in preparation to begin playing. Other possible states while VPW is active include playing, stopped, paused, and seeking.

The control-button/video-play trackbar area contains grayed VCR-type buttons and the trackbar. The elapsed-time indicator is initially positioned at the far left of the trackbar.

The top of the window contains the VideoCharger Player title line, a menu selection line, and a toolbar. The bottom portion of the window provides a status-message bar.

The menu selection line can initiate four pull-down menus:

- File
- View
- Options
- Help

When the client begins receiving the streamed video, the player window expands to accommodate the area for showing the video. Figure 22 shows the player at the start of a sample video.



Figure 22. VideoCharger Player Window at Start of Video

In this example, the network status data is inhibited. The video status area shows the total time of the video (7 minutes and 12 seconds) and the state of the video (paused). At the left is the repeat count/play count in the form $(n:m)$. The repeat count (n) is the total number of times the video should be repeated. The play count (m) is the current iteration. In Figure 22, $(2: 1)$ indicates that the

video should be played twice, and is currently on the first iteration. See 4.1.6.3, “Options” on page 66 for information on how to set the repeat count.

4.1.5.1 Using the Video Control Buttons

The player window contains control buttons for performing video cassette recorder-type functions such as play, stop, pause, fast forward, and rewind. Figure 23 shows the functions these buttons perform, along with alternative keyboard entries that can be used in lieu of clicking the buttons.

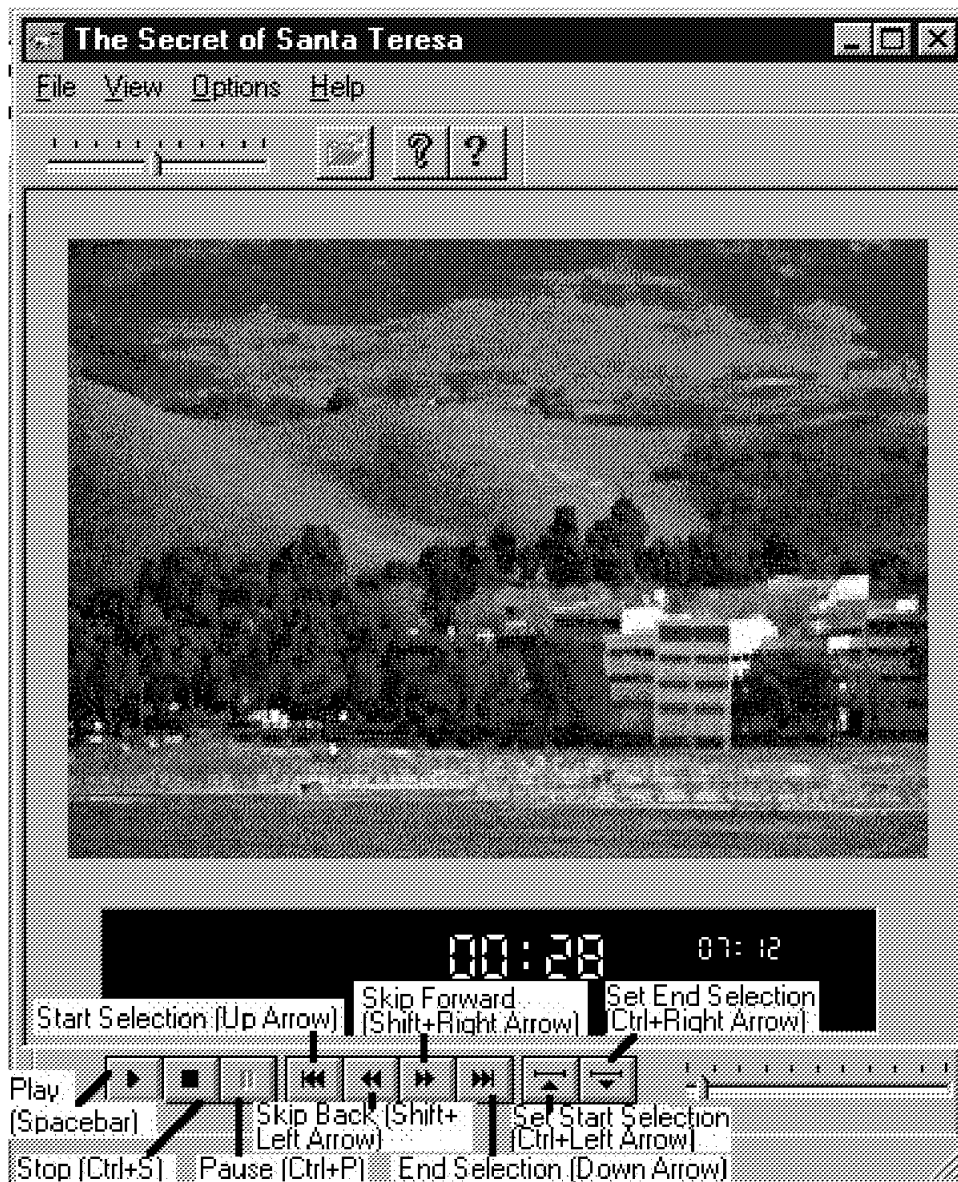


Figure 23. Functions Performed by the VideoCharger Player VCR-Type Buttons

The set video-segment selection buttons, named Set Start Selection and Set End Selection, enable you to set the equivalent of video tabs, or markers. These are time positions (minutes and seconds) on the video stream that interact with VCR-type functions to allow you to view a desired portion of the video.

In the following descriptions, the term “previous state” normally means play, stop, or pause.

The buttons and their functions are:

Button	Function
Play	Plays the video.
Stop	Stops the video.
Pause	Similar to stop, but connotes an intention to resume playing the video. For example, if Auto Rewind is in effect, Pause maintains the current video position; Stop causes the video to be positioned at beginning, or at the Set Start Selection point, if specified.
Start Selection	Causes the video to go back to the Set Start Selection point, and resume its previous state. If no Set Start Selection point has been specified, the video goes back to the beginning.
Skip Back	Causes the video to go back a predetermined time period (one second, or one percent of the total video length), and resume its previous state.
Skip Forward	Causes the video to go forward a predetermined time period (one second, or one percent of the total video length), and resume its previous state.
End Selection	Causes the video to go forward to the Set End Selection point, and stop. If no End Selection point has been specified, the video goes forward to the end.
Set Start Selection	Sets the video “start” tab, or marker. If Set Start Selection is specified, clicking Start Selection causes the player to position the video at the Set Start Selection point, and resume its previous state.
Set End Selection	Sets the video “end” tab, or marker. When the video reaches the specified End Selection point, it stops. If Set End Selection is specified, clicking End Selection causes the player to position the video at the Set End Selection point, and STOP.

Figure 24 on page 63 shows the use of the Set Start Selection and Set End Selection buttons. 00:11 is the Set Start Selection point, and 00:21 is the Set End Selection point. Assume the video is at 00:15 and playing when you click the **Start Selection** button. The video returns to the 00:11 point, and resumes playing from that point.



Figure 24. Sample Use of Set Start and Set End Selection Buttons

4.1.6 Customizing the VideoCharger Player

The VideoCharger Player provides a set of menus for customizing its operation. You can access these menus from a menu selection line at the top of the player window. The menus provide the following services:

- File** Allows you to play a local video file (instead of receiving a streamed video file from the VideoCharger Server), to view the Stream/Session Data Metafile, or to save the Metafile. The Stream/Session Data Metafile is the file sent from the Application Server that initiates the player for handling streamed data, and contains key data on the video to be streamed.
- View** Provides toggle-type options for showing or removing the toolbar and the status bar from the window.

- Options** Provides a pull-down menu for defaults and trace options. The Defaults menu provides tabs for Playback Options, Startup Defaults, Movie Controls, and Filters. The Trace menus show trace options, components being traced, and the name of the trace output file. You can modify all the default values in these menus.
- Help** Provides a help index and release-level information on the VideoCharger Player.

4.1.6.1 Files

There are three file options available from the pull-down menu:

- Open local file
- Display metadata
- Save metadata file

Open Local File: This option provides a dialog box for selecting a local file to be played. You indicate the drive, directory, and file name. Files must have a suffix of MPG, IBA, AVI, AU, AIFF, MOV, or WAV (IBA is a Low Bit Rate format). If the VideoCharger Player was initiated by selecting a streamed video (for example, from a server-provided Video-on-Demand menu), the Open Local File option is not available.

Display Metadata: This option enables you to view the contents of the Stream/Session Data Metafile sent from the Application Server. If the VideoCharger Player was not initiated by selection of a streamed video, the Display Metadata option is not available.

Figure 25 on page 65 shows a sample display of the Stream/Session Data Metafile.

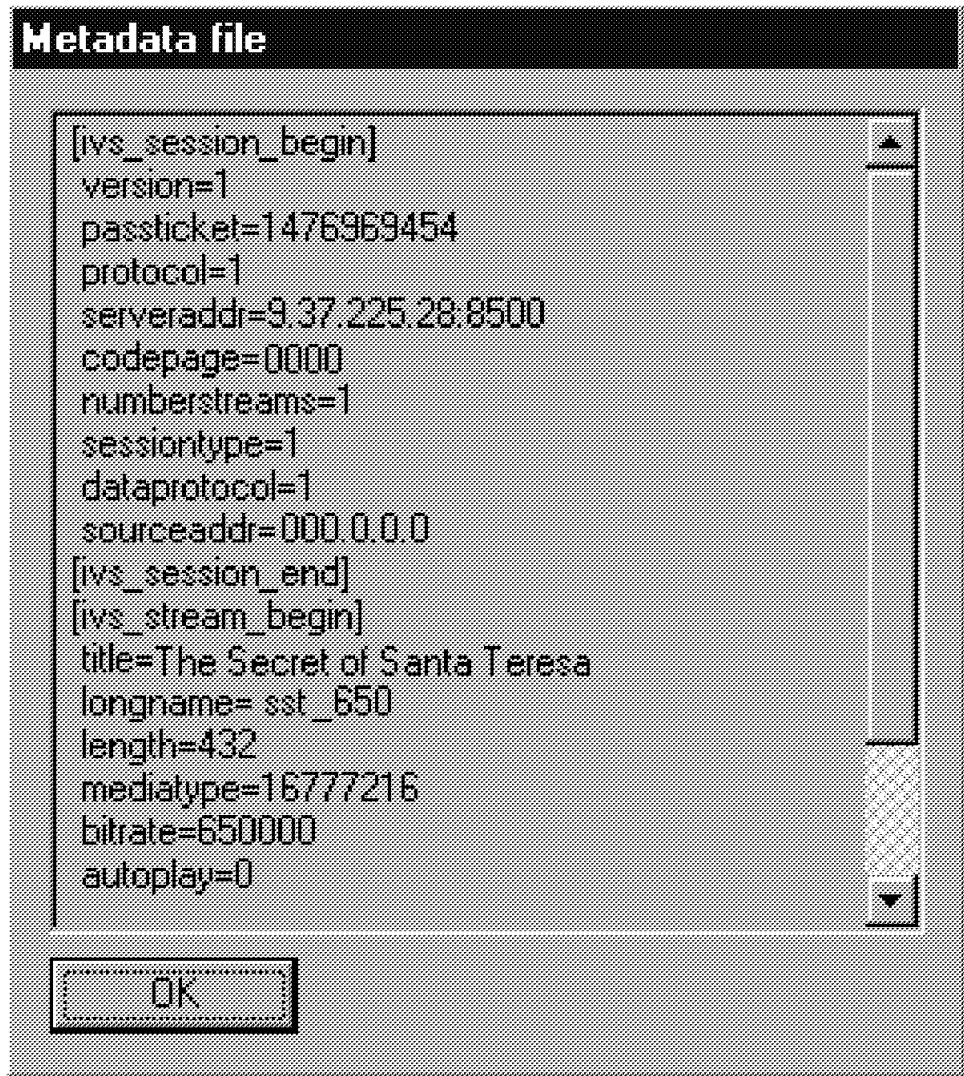


Figure 25. Sample Display of the Stream/Session Data Metafile

For detailed information on the contents of the metafile, see *VideoCharger Server Version 1 for AIX, Administrator's Guide and Reference*, SC23-1982.

Save Metadata: This option enables you to save the contents of the Stream/Session Data Metafile to a file name of your own choice. This data can be useful for debugging purposes. If the VideoCharger Player was not initiated by selecting a streamed video, the Save Metadata option will not be available.

4.1.6.2 View

View provides toggle-type choices, enabling you to show or hide the Toolbar or the Status Bar.

The toolbar appears immediately below the menu selection line and consists of an audio volume control, the Open Local File icon, and two question-mark icons (yellow and blue). You can change the audio volume by placing the mouse pointer on the indicator, holding the left mouse button down, and dragging the indicator to the left (lower volume) or right (higher volume). The actual volume does not change until you release the mouse button.

The Open Local File icon provides a dialog box for selecting a local file to be played. The yellow question mark provides access to version level information on the VideoCharger Player. The blue question mark provides access to on-line help. The default setting is to show the toolbar.

The status bar appears at the bottom of the player window and contains descriptive information on options that you point to with the mouse pointer. For example, if you point to the volume gauge on the toolbar, the status bar displays a Set volume of video message. The default setting is to show the status bar.

4.1.6.3 Options

Two categories of options provided are Default and Trace options. Default options provide settings for the playing of the videos. Trace options provide choices for performing traces when problems arise.

Default Options: Within the default options category, there are five menu-selection tabs:

- Playback options
- Startup defaults
- Movie controls
- Screen size
- Filters

Playback Options: The Playback Options menu allows the following options:

- Audio balance
- Audio volume
- Start and stop times
- Repeat options

The audio balance and volume settings are on the left side of the screen. You can change these settings by placing the mouse pointer on the indicator, holding the left mouse button down, and “dragging” the indicator to the right or left. For audio balance, the left side of the bar is for the left speaker, and the right side is for the right speaker. For audio volume, the left side indicates low volume, and the right side indicates high volume.

The Start and Stop times in the Play Range section are in hours, minutes, and seconds. These will be zeros for start and the length of the video for stop if no Set Start Selection and Set End Selection values were specified. If Set Start Selection and Set End Selection were specified, Play Range reflects these values.

In the Repeat section, a check in the Auto Rewind checkbox indicates that a rewind should occur whenever the video is in the stopped state. If Auto Repeat is checked, and the Repeat count is greater than 0, the video automatically repeats for the number of plays specified.

Startup Defaults: Figure 26 on page 67 shows the startup defaults for the VideoCharger Player. Clicking any of the checkboxes shown causes placement of a check in the box and activates the parameter.

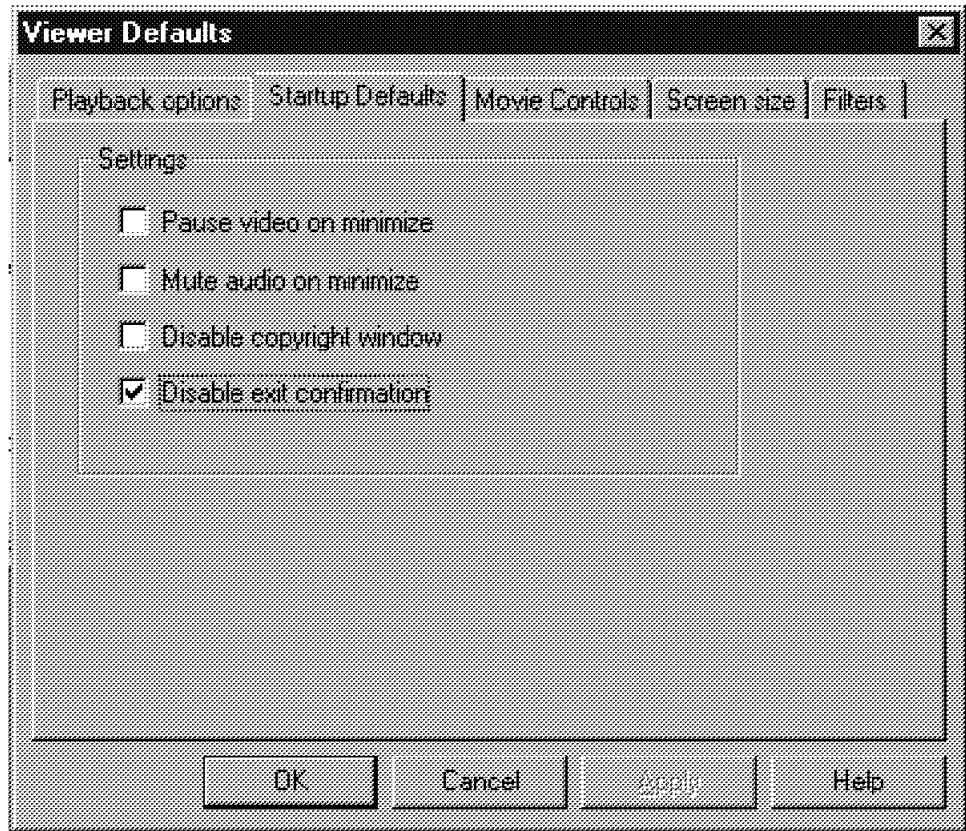


Figure 26. VideoCharger Player Startup Defaults

The options available and their meanings are as follows:

Option	Meaning
Pause video on minimize	A check indicates that the video pauses (instead of continuing) when the player window is minimized.
Mute audio on minimize	A check indicates that the audio is muted when the player window is minimized.
Disable copyright window	A check inhibits the display of the About VideoCharger Player opening window at the startup of the player.
Disable exit confirmation	A check inhibits the display of the exit confirmation window when you close the VideoCharger Player.

Movie Controls: Figure 27 on page 68 shows sample movie controls for the VideoCharger Player. Clicking any of the checkboxes shown causes placement of a check in the box and activates the parameter.

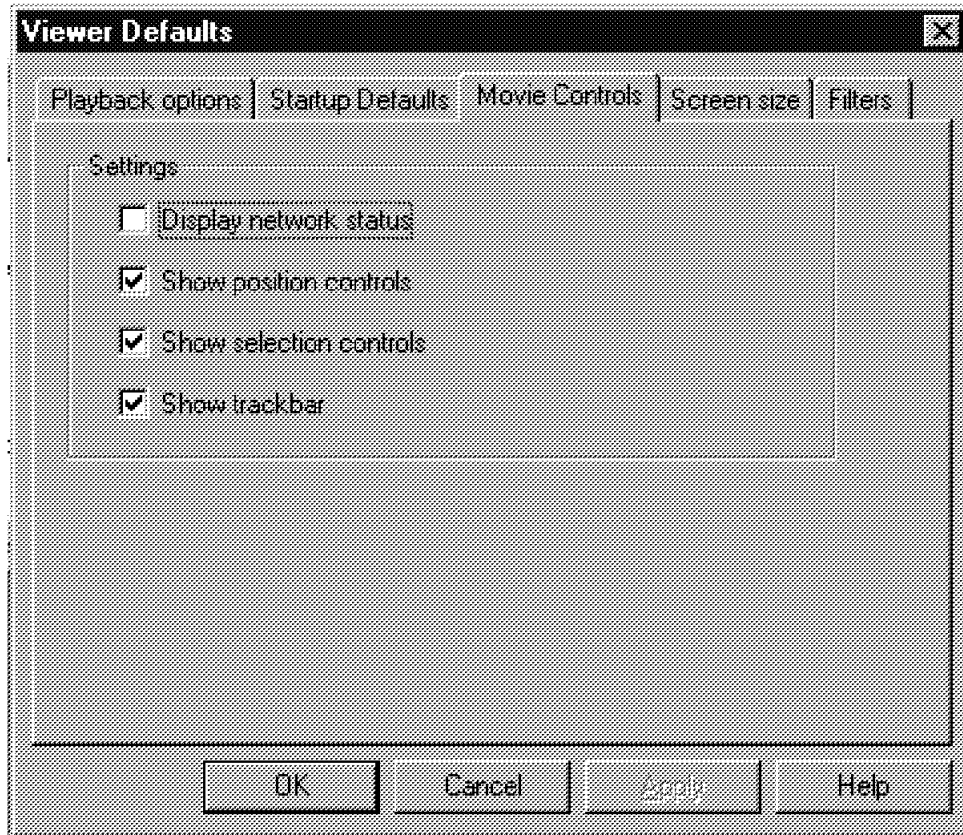


Figure 27. VideoCharger Player Movie Controls

The options available and their meanings are:

Option	Meaning
Display network status	A check indicates that the player will display information on the network transmission of the streamed video. Figure 28 shows sample network data added to the video status display. Below the network data are the video control buttons and the video-play trackbar.

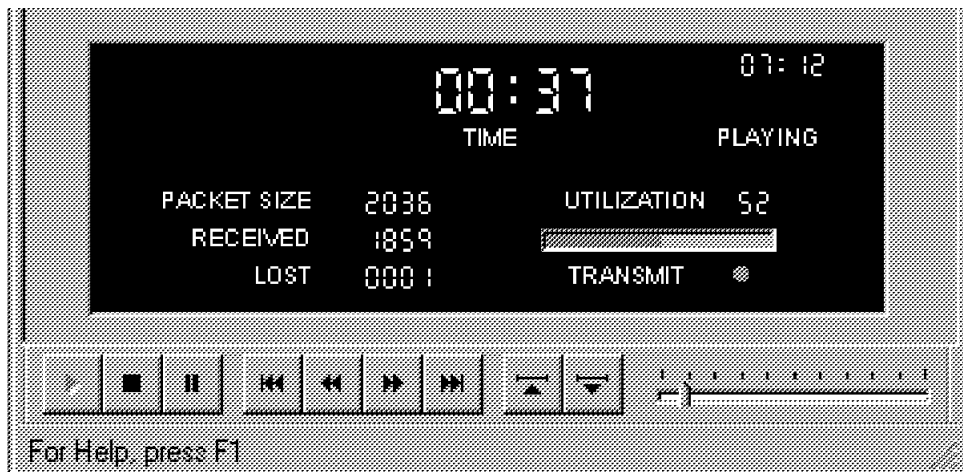


Figure 28. Network Status Data Added to Video Status Display

This data includes the size of the packets being transmitted, the number of packets received, the number of packets lost, the percent utilization of client cache storage, and a transmit on/off indicator (green for on, red for off).

Show position controls

A check indicates that the player will show the Start Selection, Skip Back, Skip Forward, and End Selection position control buttons. If this box is not checked, the player does not display these position controls.

Show selection controls

A check indicates that the player will show the Set Start Selection and Set End Selection control buttons. If this box is not checked, the player does not display these selection controls.

Show trackbar

A check indicates that the player should show the video-play trackbar. If this box is not checked, the player does not display the trackbar.

Screen Size: Figure 29 on page 70 shows a sample screen size menu. The three choices are:

- Default screen size - the smallest of the three options
- Double size - twice the default size
- Full screen - occupying the entire display

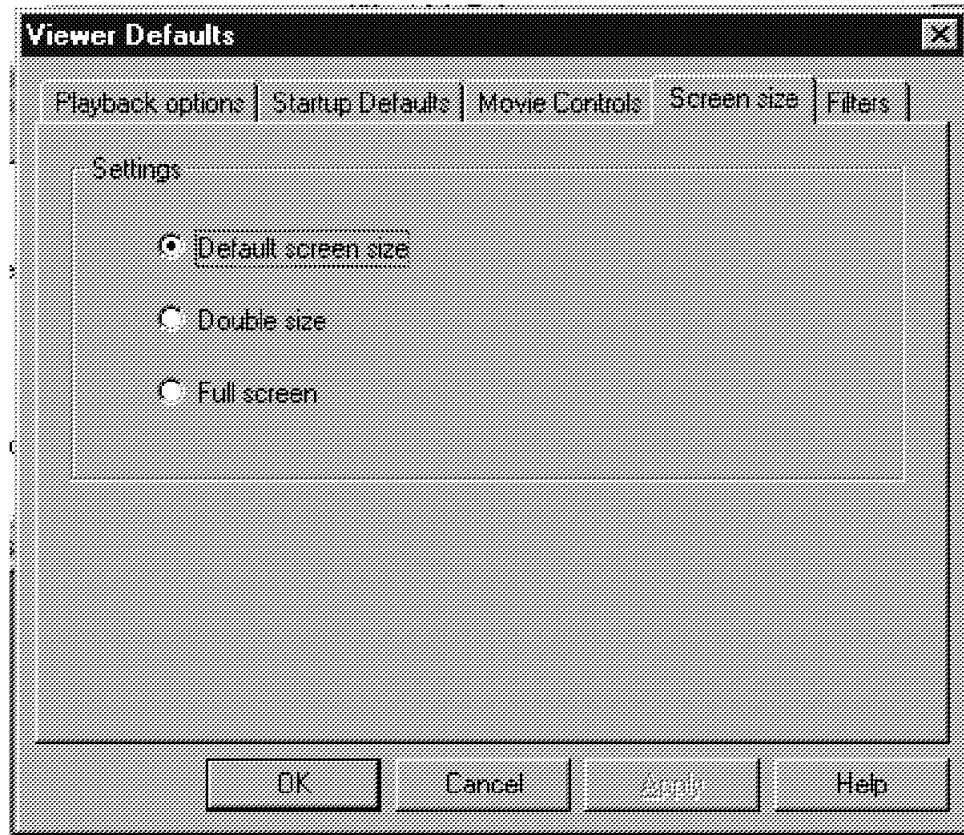


Figure 29. Sample Screen Size Menu

With the full screen option, the player (not the video display area) occupies the entire screen. All toolbar, control button, and status display options remain in effect.

Filters: Figure 30 on page 71 shows a sample filters menu. A filter is a component within Microsoft ActiveMovie that determines how the video data will be processed. The VideoCharger Player provides stream support for two types of digitized video/audio streams: Moving Pictures Experts Group - 1 (MPEG-1) and Low Bit Rate (LBR) decoders.

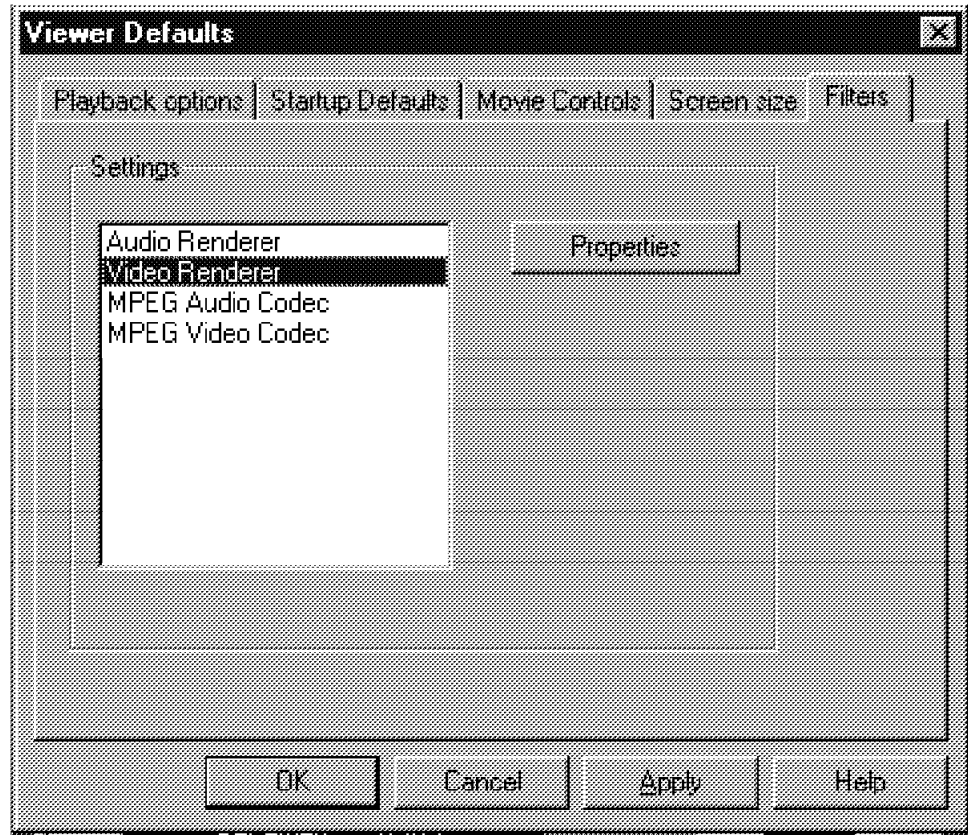


Figure 30. Sample Filters Menu

The Properties button on the Filters menu enables you to obtain information for each type of filter and to set defaults. Figure 31 on page 72 shows the default properties information displayed for the MPEG-1 video decoder filter.

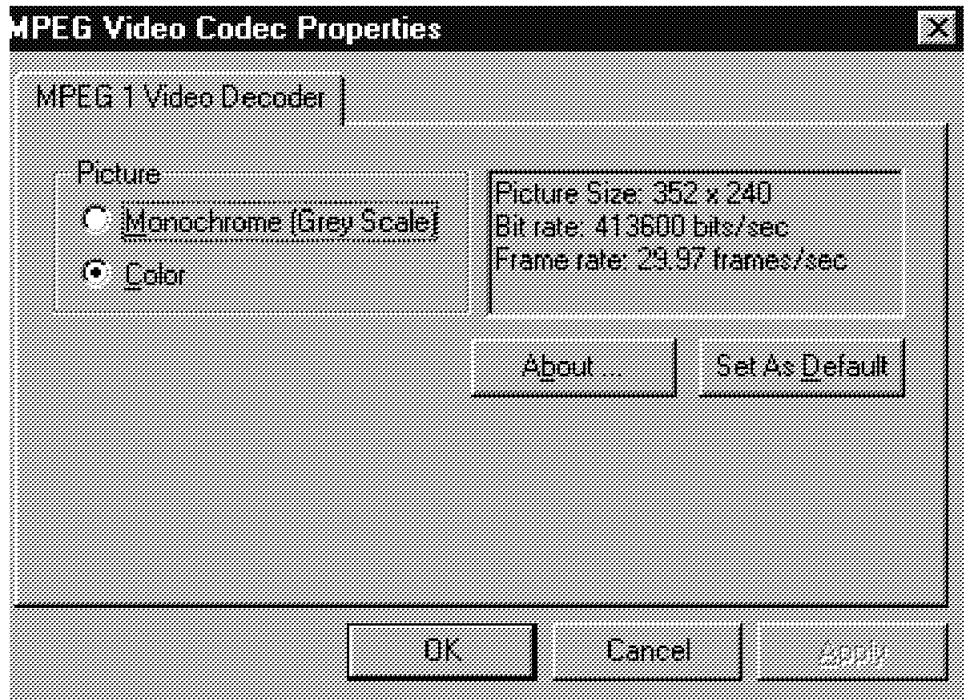


Figure 31. Default Properties Information for the MPEG-1 Filter

4.1.6.4 Specifying Traces

Clicking the **Trace** entry on the pull-down Options menu causes the Trace Options menu to display (see Figure 32 on page 73).

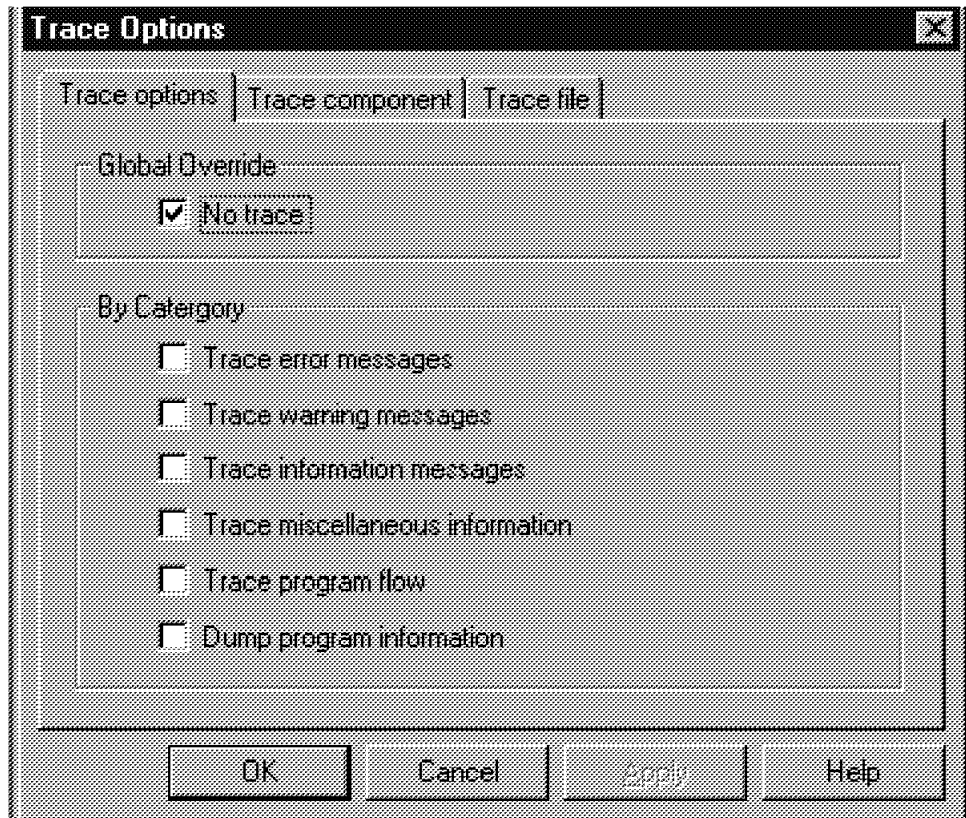


Figure 32. VideoCharger Player Trace Options

Clicking any combination of the six trace and dump options in the By Category section activates those options and deletes the check for the No trace choice in the Global Override section. Similarly, entering a check in the **No trace** checkbox erases any checks in the By Category section. The trace and dump options remain in effect until the checkbox for the particular option is blanked.

You also have the capability to trace all components, or some combination of components. Clicking the **Trace component** tab brings up the display of the component selection menu (see Figure 33 on page 74).

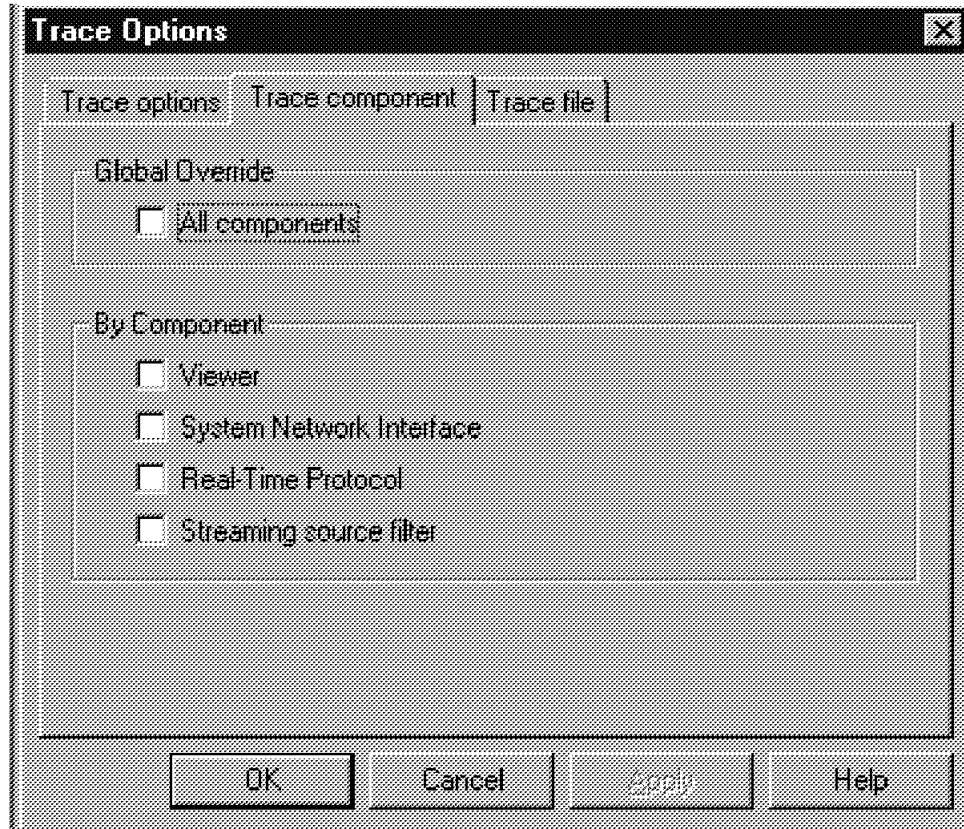


Figure 33. Selecting Components for Tracing

Placing a check in the **All components** checkbox automatically creates checks for the individual components shown in the By component section. Deleting a check for any of the individual components causes the All components check to be blanked.

The Trace file option enables you to specify a name of the file to contain the trace. The default is PCSTRACE.LOG.

The default is to erase the named trace file each time the player is started. If you do not wish to have the file erased (that is, you want to have the current trace material appended to the previously-traced data), remove the check next to **Erase trace file on startup** by clicking the checkbox. However, failure to erase the trace file at startup could result in a massive file that impacts performance and limits available storage.

4.1.7 Help

Clicking **Help** produces a pull-down list with two choices: Help Topics and About VideoCharger Player.

Clicking **Help** provides access to the VideoCharger Player on-line help. Clicking **About VideoCharger Player** shows which version of the player you are running.

Chapter 5. Using VideoCharger

This chapter shows you how to use VideoCharger Server with an end-to-end scenario.

5.1 Scenario

You have two digital video files and want to store them on the VideoCharger. Then you will play the video files on a Windows 95 client through LAN environments. One of the video files is in AVI file format and will be transcoded to a Low Bit Rate format called IBA file format.

5.2 Assumptions

For this scenario, the following assumptions are made:

- You have already installed the VideoCharger and configured it properly. All three components (Controller, Presentation Formatter Server, and Data Pump) of the VideoCharger software are installed on one machine.
- You do not have DB2, so an ASCII database will be used.
- You have downloaded the client modules from the VideoCharger for your Windows 95 client and have set up the client properly.
- You have two digital video files; one is an MPEG1 file and the other one is a Windows AVI file. If you do not have any digital video files, you can easily find them on the Internet.

5.3 Planning

You should know the following information:

- TCP/IP addresses and hostnames of the VideoCharger and the client.
- Password of the vsloader user on the VideoCharger.
- Names of MPEG1 file and AVI file. Give them names such as m.mpg and a.avi. Place these files on the C:\ directory of the client.
- The VideoCharger should have enough space for video files.
- The key field name of the asset database. It will be VIDEOID in this scenario.
- You should decide what kind of additional information will be stored in the database.

In this scenario, three more fields will be used in addition to the mandatory fields. The names of these fields will be Director, Genre, and Actors. The length of each field will be 30 characters.

5.4 Transcoding an AVI File to an IBA File

Before transcoding directly, you need to know some general information about the Low Bit Rate content. This information is found in *VideoCharger Server for AIX Administrator's Guide and Reference*.

5.4.1 Creating Low Bit Rate Content

The VideoCharger software includes transcoders that can convert either Windows .AVI or .WAV files into Low Bit Rate format. The compressed data is stored in a unique file format (.IBA) that is optimized for UDP protocol.

5.4.1.1 Advantages of .IBA Format

The Low Bit Rate audio and video compression methods combined with the .IBA file format produce a highly compressed file that varies in quality based on the target bit rate selected in the transcoder. For example, raw video (YUV9) compression for a 320 x 240 resolution requires a data rate of 17Mbps (megabits per second) for 30 fps (frames per second) content. Depending on the amount of action and color, the video can typically be transcoded to approximately 400Kbps or less to achieve 30 fps and good quality. This is a ratio of 42.5 to 1, which has two benefits:

- Smaller asset size to manage, requiring less disk space
- Faster file transfer when loading the asset into the VideoCharger server

The same raw video input can be transcoded for lower bit rates to optimize for the specific client connectivity choices. Transcoding for 28.8Kbps (default to 22.3Kbps) results in an average of 4 fps to 12 fps. The compression ratio is 765 to 1 for the reduced frame rate and quality.

5.4.1.2 Converting .AVI Files

A transcoder that is part of the Player download, the VideoCharger LBR Transcoder, is available to convert Windows .AVI files to the VideoCharger Low Bit Rate streaming video format (.IBA). The transcoder converts .AVI video into the industry-standard H.263 Low Bit Rate compressed video, and also converts .AVI audio compressions into standard G.723 mode 1 (6.3Kbps) compressed audio. The compressed audio and video data is combined into a unique file format (.IBA) optimized for UDP protocol.

This transcoder, which is available from the IBM RS/6000 Solutions Home Page, can be used on PC-compatible machines running Windows 95. See *Downloading the Client Code and Viewing a Sample Video* for information on the IBM RS/6000 Solutions Home Page.

The transcoder expects images in one of two general sizes and will convert the images to a size that fits in one of the two categories. The maximum image size that can be handled is 352 x 288 (CIF) and the smaller image size is 176 x 144 (QCIF). Images that are less than the maximum will be framed in a black border.

A 24-bit RGB, 8-bit palette, and YUV9 uncompressed video (Indeo Raw Video codec) is the optimal format used for the assets to achieve the fastest conversion to .IBA format. However, if the asset is already compressed, you can still recompress it to the .IBA format, since the transcoder can internally translate the asset from one of the .AVI compressions installed in the multimedia support for Windows 95.

5.4.1.3 Converting .WAV Files

The VideoCharger Audio Transcoder is a command-line tool that creates VideoCharger audio from .WAV files. The audio transcoder produces only .IBA files.

The audio transcoder has been provided as a command-line tool because it is easier for Web developers to use it this way. Although the transcoder looks like a DOS program, it is actually a 32-bit program, and you will need to be in Windows 95 to convert audio clips.

The audio in the .WAV file must be sampled at between 8000 and 8012 samples/second, at 16 bits mono. If your clips are not in this format, the Windows Sound Recorder can convert them to it. However, if at all possible, record at 8000 samples/second, as converting the sample rate can introduce distortion.

The audio in the .WAV file must be in PCM format. This is the default format. Some audio tools refer to PCM format as "linear" format.

The transcoder will not accept wildcards, which means you must compress each audio file in a directory separately. The audio transcoder will create the .IBA files in the same directory as the .WAV files. For example:

```
c:\temp>Transaud xyz.wav ---> xyz.iba
```

5.4.2 Transcoding an a.avi File to an a.iba File

If you run the transcoder on the Windows 95 client, the main menu screen in Figure 34 on page 78 will be shown. Enter the name of source file and path, choose 28.8Kbps, and click **Go!**, and then a.avi is converted to an a.iba file.

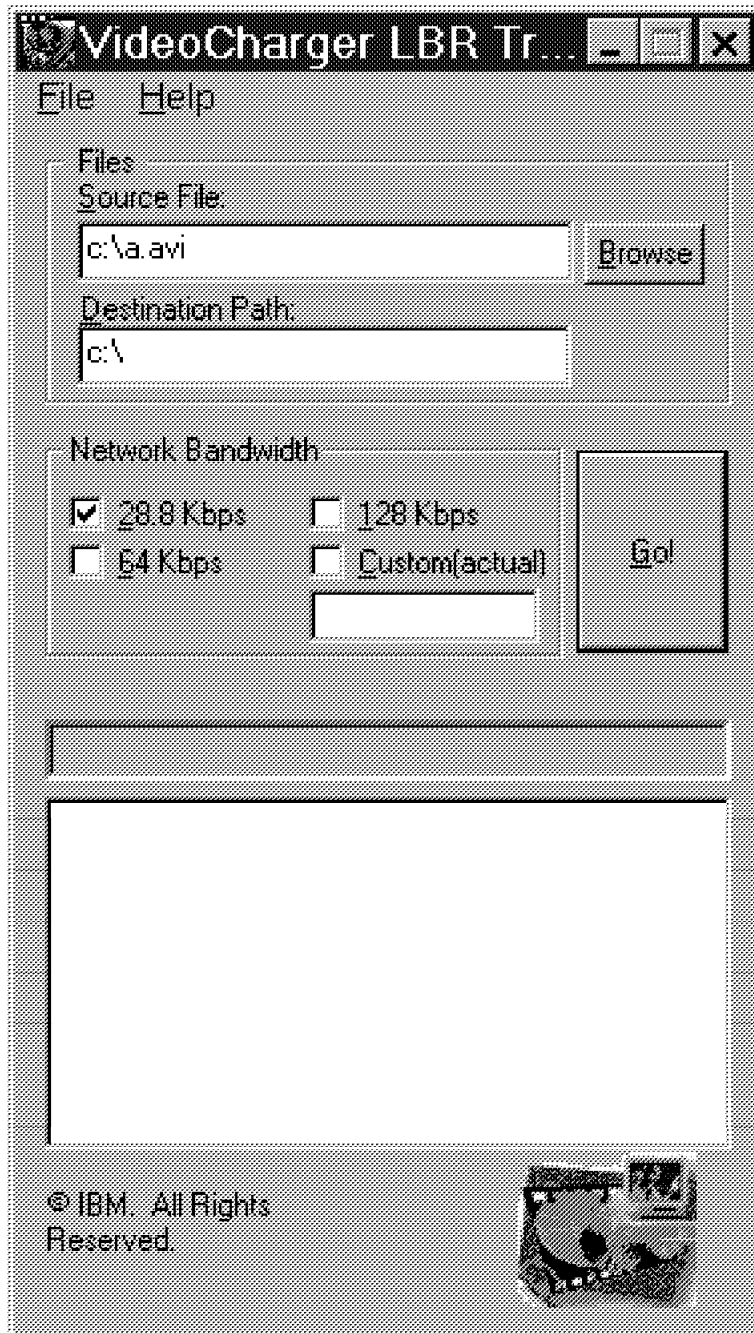


Figure 34. Transcoder

5.5 Loading Contents

When you are loading contents, you should specify a hostname of a machine that has contents files. You also need a user name and password of this machine. Let's call this machine a "contents file server." If you start loading the contents, the VideoCharger transfers the contents file using ftp protocol from the contents file server that you specified. The client, the VideoCharger itself, or any other machines can be used as a contents file server.

You can specify the client machine as a contents file server if it is properly configured as an FTP server.

In this scenario, the VideoCharger will have the contents, that is, VideoCharger will be a contents file server. You have to transfer the video files from the client to the VideoCharger using ftp or diskettes because the video files are originally located on the client machine.

1. Transfer video files from the client PC to the VideoCharger by issuing the following commands on the Window 95 client's MS-DOS Window:

```
cd C:\
C:\ftp myserver.ibm.com
user name: vsloader
password : vsloader
ftp>bin
ftp>put a.iba
ftp>put m.mpg
ftp>quit
```

where myserver.ibm.com is an IP address of the VideoCharger and vsloader is a user name and a password. If you have a different password for the vsloader user, use it. Now two video files are located in the /home/vsloader directory of the VideoCharger.

2. On the client side, run a Web browser (for example, Netscape Navigator).
3. Go to the home page of your VideoCharger by entering the URL address or hostname of your VideoCharger. The default home page is:

```
http://myserver.ibm.com/vs_admin/admin/vs.html
```

where myserver.ibm.com is an IP address of VideoCharger. Then you will see a home page of the VideoCharger, as shown in Figure 35 on page 80. If you changed the home page directory while implementing the VideoCharger, go to that directory.

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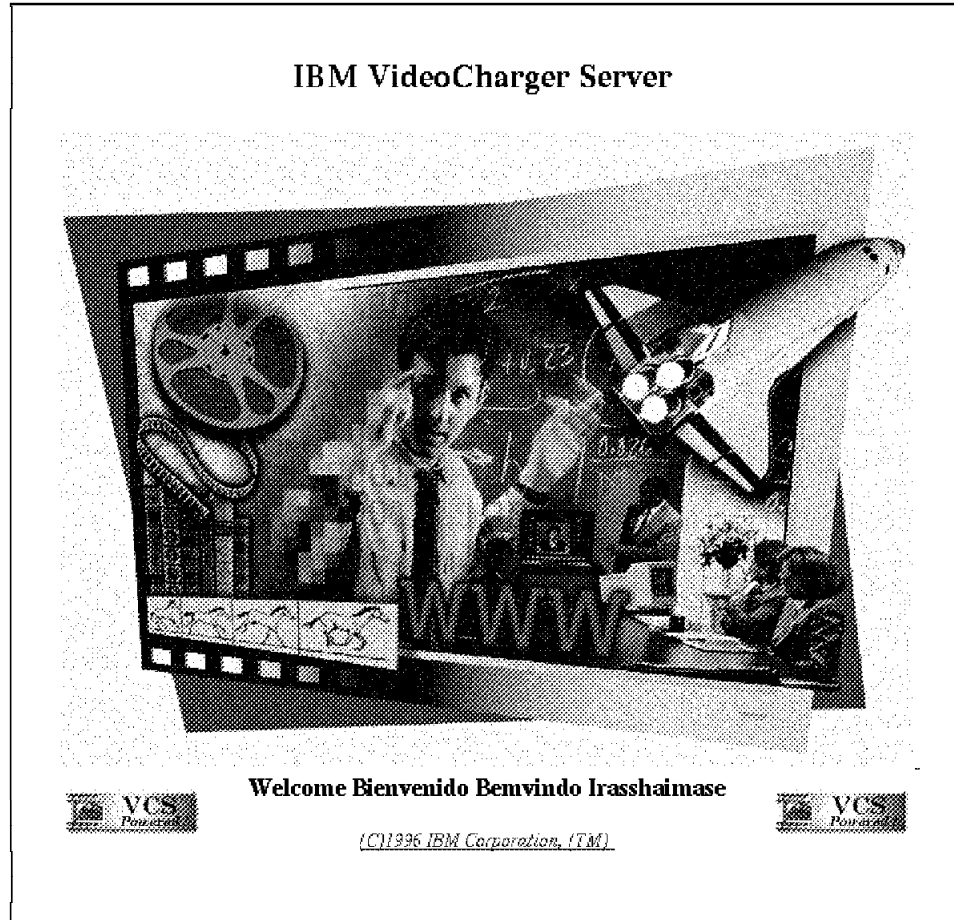


Figure 35. VideoCharger Home Page

4. Put your mouse pointer on the picture and click the left button. Enter vsloader as a user name and enter its password. Then you will see four menus, as shown in Figure 36 on page 81:
 - Configuration and Administration
 - Content Management
 - Resource List
 - Documentation

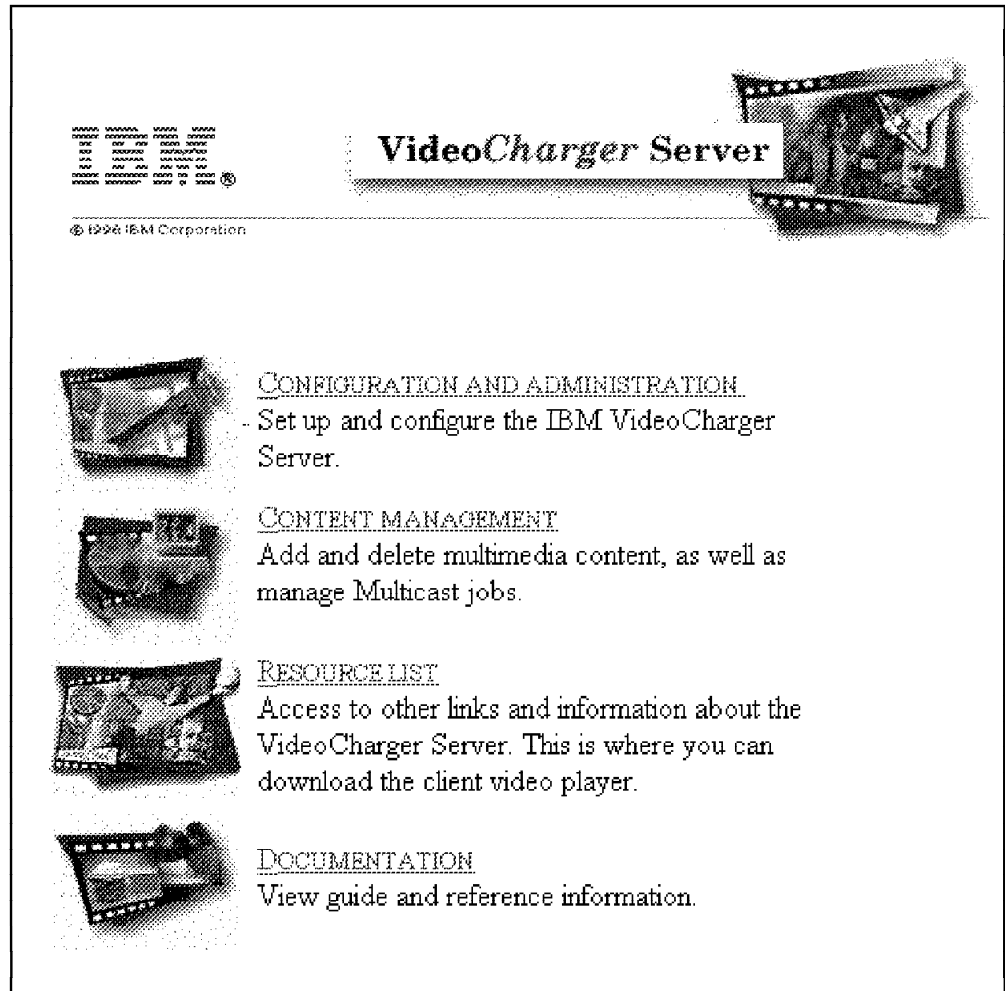


Figure 36. Submenus of VideoCharger Home Page

5. Click **Content Management**. This brings you to a new menu as shown in Figure 37 on page 82.



Figure 37. Content Management

5.5.1 Creating an ASCII Database

You need a database that contains the information of video contents. VideoCharger supports the DB2 database and the ASCII database. In this scenario, you will use the ASCII database.

1. Clicking **ASCII** brings you to an ASCII database management menu, as shown in Figure 38 on page 83.

Create ASCII Database

Indicate if you are creating a new database, adding tables to a database, or deleting tables from a database, then click on the **Continue** button to proceed.

Create a new database
 Delete an existing database

Enter this field information for database creation. Only the Key field is required.

Name of Key Field:


Name of Title Field:

Length of Title Field:

Additional fields:

Figure 38. ASCII Database Creation

2. Select the menu **Create a new database** and fill in the fields:
Name of Key Field : VIDEOID
Name of Title Field : TITLE
Length of Title Field : 30
Additional Fields : 3
3. Clicking **Continue** brings you a new menu, as shown in Figure 39 on page 84, in which you can define the attributes of additional fields.



Create ASCII Database

Define Table Fields

Enter the name, length, and descriptor for each field. The descriptor values are Short (include this field as part of the short description) or Long (include this field only as part of the long description).




Field Name	Length	Descriptor
Director	30	Long 
Genre	30	Long 
Actors	30	Long 

Figure 39. ASCII Database Creation

4. Fill in the field name blanks with Director, Genre, and Actors. The length of every field is 30 and descriptors are Long or Short.

Conditions for display are controlled by Short and Long indicators. The data in fields designated as Short appears when the end user requests the *short* description. When end users request a Long description, they see data marked as either Short or Long.

5. Click the **Create Table** button.
6. Go back to the Content Management menu.

5.5.2 Adding Video Contents

This section gives an example of how to load an asset onto the Data Pump:

1. Click **Manage Content** from the main Content Management menu.
2. Add a New Video is the default action; enter the name of the asset you are going to load, for example MYMOVIE, and click **Continue** (see Figure 40 on page 85).



Content Management

Select the function to perform, enter the required information, then click on the Continue button to proceed.

Help

- Add a new video
- Modify information for an existing video
- Delete a video
- List existing videos

- Ignore errors and continue processing. (USE WITH EXTREME CAUTION)

Asset Name:

Figure 40. Adding a New Asset

3. As shown in Figure 41 on page 86, you will see the Content Management - Add Video menu, with an asterisk noting the fields that require you to enter information. In this example, only the required fields (those marked with an asterisk) are completed. When you use the HTML forms to load an asset, the command `vsparse` is used to automatically determine its bit rate, duration, and type. This menu also has additional fields for more information about assets. You can enter any value you want for these descriptive information fields.

Use care when working with required fields marked with an asterisk. These fields relate to the machine that has the video files. In this scenario, the video files are located on the VideoCharger itself, so the values of these fields relate to the VideoCharger. In this scenario, the VideoCharger will log in to itself using `ftp` in order to get the video file it will load to Data Pump, which is a part of the VideoCharger. The file `/home/vsloader/m.mpg` will be transferred to the multimedia filesystem used by the Data Pump.

Note: Although the video file is on the VideoCharger, you cannot use the `cp` command because during the loading procedure, the VideoCharger performs many other jobs in addition to simple file copy.

Content Management – Add Video

This command provides the capability of adding content to the video server. Fields marked with '*' are mandatory.

Help

Asset Name:

Asset group name:

Video file name():*

Bit rate: *Type:*

Duration: *Max users:*

Host name():*

FTP user id():* *FTP password(*):*

Descriptive information for video:

Title:

Director:

Genre:

Actors:

Figure 41. Adding an Asset with Information

4. Click **Add Video** to add the asset to the Data Pump. The Controller's catalog and the ASCII database will be updated with the information associated with the asset.

Repeat these steps for the a.iba file.

5.5.3 Alternative Methods of Content Loading

While this chapter focuses on how to perform tasks through the HTML forms, there are three other ways to manage content:

- Using the content management commands directly, or calling them through shell scripts used for batch loading. See *VideoCharger Server for AIX Administrator's Guide and Reference*, Appendix B, "Content Management Commands," for more information on how to use each command.
- Using ftp directly.
- Writing to the VideoCharger API. Use this method if you want to write your own custom content loader, or if you want to record assets directly from a stream. The API is documented in the *VideoCharger Server Version 1 for*

AIX: Programmer's Reference, which is available in PostScript format from the VideoCharger home page.

Note: Using either the content management commands or ftp directly does not support passing additional information (for example, actor, director, and so on) to the content management database. Therefore, you should not use these methods for assets you plan to retrieve using the Video-on-Demand Presentation Formatter, which searches only those assets listed in the database.

5.6 Title Search and Play

To play a video on the client, you should search the video that you want to see first. On the client side, run the Web browser and go to the following URL address:

`http://myserver.ibm.com/ps_public/cgi-bin/iscpffrm`

You will see a Title Search screen on the Web browser. After clicking **Display titles and long descriptions**, type MYMOVIE on the Title field, then click **Search** (see Figure 42 on page 88).

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VideoCharger Server

Title Search

Select the type of search and the maximum number of titles to find, then enter the information you're searching for. The case (upper/lower) of the text is not important. Click on the Search button to start the search. Click on the Reset button if you want to clear all the search information and start again.

Display titles only

Display titles and short descriptions

Display titles and long descriptions

Display asset names with search results

Display all titles in database (instead of using search parameters)

Maximum number of titles to display:

Help

VIDEOID:

Title:

Director:

Genre:

Actors:

Figure 42. Title Search

When the title list has come up, click **MYMOVIE** (see Figure 43 on page 89).

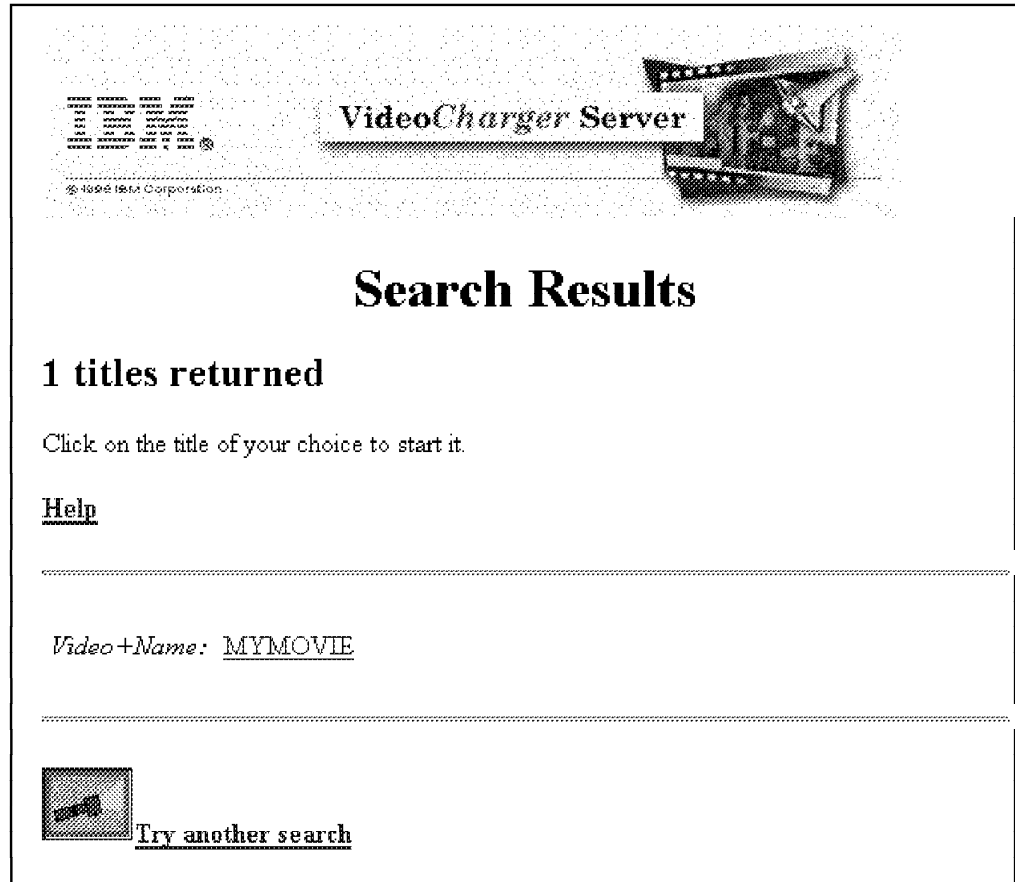


Figure 43. Search Result

The player module on the client is invoked automatically to play the video. No more action is required; you only need to wait and watch.

If you know the asset name of the movie, you can play the movie directly without the menu screen. You can use the `iscpfse1` command in the URL to play the movie directly:

```
http://myserver.ibm.com/ps_public/cgi-bin/iscpfse1?videoid=
MYMOVIE-V1
```

When you create a link to a specific asset in an HTML document, you can use `iscpfse1`, as in the following sample:

```
<br><A
href="http://myserver.ibm.com/vs_public/cgi-bin/iscpfse1?videoid=
MYMOVIE-V1"><b>MYMOVIE</b></A>
```

5.7 Multicasting

The IP Multicast feature allows the VideoCharger Server to be used as a “broadcast” server. This feature allows multiple users to receive an audio or video stream, while only using the bandwidth of a single stream rather than one for each recipient.

You can use IP multicasting to diffuse new information to a group of people inside or outside your company, for example, for a presentation on new product releases, health benefit changes, or new corporate strategies. Users can view a list of scheduled broadcasts and can join or leave the multicast session whenever they choose.

The administrator can schedule broadcasts by selecting **Manage Multicasting** from the Content Management menu of the VideoCharger home page. Once scheduled, a multicast job can be listed, changed, or removed; all of these actions can be performed from the Manage Multicasting main menu.

At the time of writing, the IP multicast feature was not fully implemented on the VideoCharger client. Therefore, a full treatment of IP multicast was deferred.

Chapter 6. Application Programming Interface

This chapter gives application programmers an overview of how to write their own interfaces to the VideoCharger Server. Refer to the *AIX VideoCharger Programmer's Reference* for additional information and example programs.

The application program interface (API) of the VideoCharger allows you to deliver real-time (streamed) video and audio to Internet or intranet-connected clients through an API. You can also use API calls of the Presentation Formatter, the component of the VideoCharger that controls how clients view information on available assets and select specific assets for viewing.

6.1 AIX Version 4 VideoCharger Application Development Environment

The VideoCharger Server for AIX application development environment requires an RS/6000 system with AIX Version 4.2, the IBM C Set++ Compiler licensed program product, and the VideoCharger application development environment. To add the VideoCharger application development environment to this system, use the VideoCharger installation media to install the following file sets:

avs.applsrv.client.adt	Video Server Application Server Development Toolkit
avs.cs.client.adt	Video Server Client Development Toolkit

These file sets include the header files and shared libraries that your application requires for using the VideoCharger API.

6.2 Presentation Formatter

The Presentation Formatter is a set of programs that reside in the Common Gateway Interface-Binary (CGI-BIN) subdirectory of the HyperText Transfer Protocol (HTTP) Server. C-language source code for the Presentation Formatter programs is provided. You also have the option of placing your own presentation formatter programs in the CGI-BIN subdirectory.

The Presentation Formatter performs the following functions:

- Provides a main HTML page
- Provides a query HTML page
- Analyzes search data
- Prepares the search parameters for the Application Server
- Prepares an HTML output page to present the Application Server search results
- Analyzes selection input and prepares play parameters for the Application Server

6.2.1 How the Presentation Formatter Operates

The VideoCharger Server's Presentation Formatter interacts with the client through the HTTP Server's standard input/output and environmental variable functions, and with the Application Server through the Application Server Interface Layer. Figure 44 on page 92 presents an overview of the flow of these interactions.

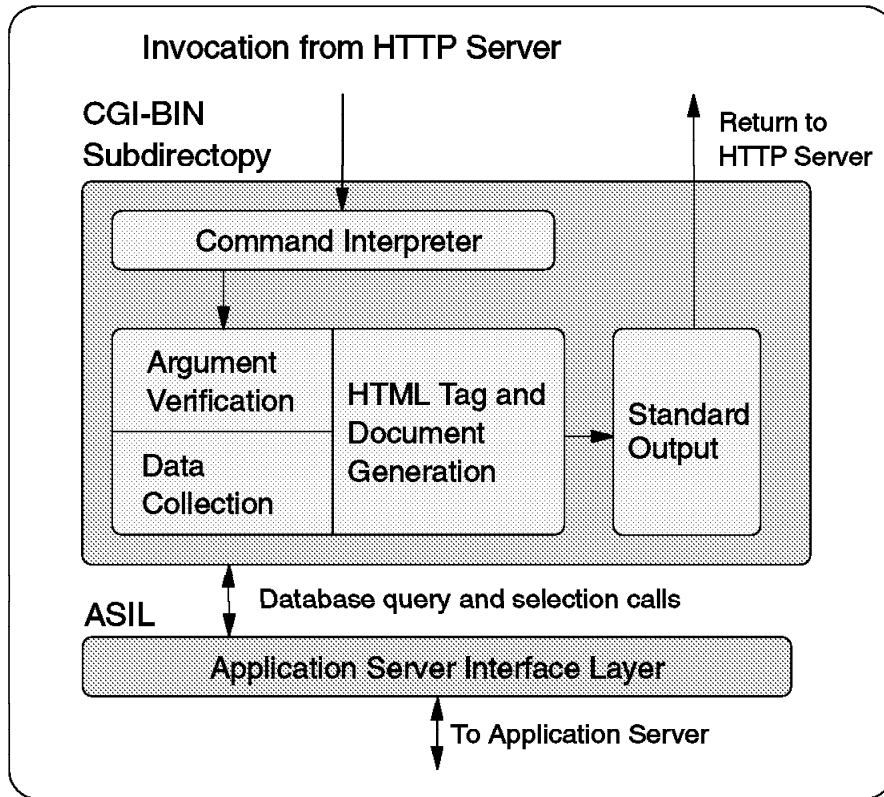


Figure 44. Presentation Formatter Interaction

In Figure 44, the client initiates the processing flow by sending the HTTP Server a request, using either the HTML GET or POST method. The general steps are:

1. The HTTP Server invokes the requested Presentation Formatter program in the Common Gateway Interface (CGI-BIN) directory.
2. The Presentation Formatter interprets the commands sent based on the method used. Generally, GET commands append material to the Universal Resource Locator (URL) address, and POST commands transmit the data via the standard input file.
3. The Presentation Formatter validates the arguments for syntax and logic.
4. If the command requests video title data, the Application Server Interface Layer prepares the required calling sequences, and transmits them to the Application Server.
5. The Presentation Formatter prepares the HTML document (including description data retrieved from the Application Server, if requested), and sends the document to the standard output function.
6. If a video was selected, the Application Server sends the Stream/Session Data Metafile, which contains required information for playing the video, to the standard output function.
7. The CGI program exits, returning the standard output data to the HTTP Server.

6.2.2 Modifying the Presentation Formatter

The Presentation Formatter is a flexible set of programs that you can use as is or modify in varying degrees. The degree to which you modify these programs depends on the needs of your organization.

There are two main ways you can modify the Presentation Formatter:

- Change the C-language source code for the Presentation Formatter routines, and recompile the routines.
- Develop new HTML pages that link to the existing Presentation Formatter routines as required.

In general, changing and recompiling the C-language source code is the more difficult of the two options. One routine, the Video Selection routine `iscpfsel`, should be modified only to include an additional function such as a security verification. The routine `iscpfsel` executes an exact sequence of events to initiate the playing of the video, and, unlike the other routines, does not generate any HTML pages.

Table 4 shows the general degree of difficulty in changing the C-language code for each of the Presentation Formatter routines.

Name of Routine	Function	Degree of Modification Difficulty
<code>iscpfhom</code>	Creates the home page	Relatively easy
<code>iscpffrm</code>	Generates search form	Relatively easy
<code>iscfpfst</code>	Processes POST data	More difficult
<code>iscpfget</code>	Processes GET data	More difficult
<code>iscpfsel</code>	Selects video	Should not be modified, except to add an additional function such as a security verification routine

This section contains some basic examples of both types of modifications. If you are changing the C-language source code for any of the routines (`iscpfhom`, `iscpffrm`, `iscfpfst`, or `iscpfget`, for example), you should copy and rename the provided source and executable code before attempting the modifications.

6.2.3 Example 1: Changing the Provided Logo

If you use the Video-on-Demand home page provided, you can change the logo either by renaming another image file to the name of the file specified in by the Presentation Formatter code, or by changing the Presentation Formatter code to call in a logo with a different file name. Note that if the Presentation Formatter code is changed to call in a different logo, the Presentation Formatter must be recompiled. To change the name of the logo image file on the `iscpffrm` page, the `iscpffrm.c` must be modified. The relevant section of the `iscpffrm.c` file is represented here:

```
/* HTML header */
printf("Content-type: text/html\n");
printf("\n");
printf("<HTML>\n");
printf("<HEAD>\n");
printf("<TITLE>%s</TITLE>\n", pfmsg40);
printf("</HEAD>\n");
```

```

printf("<BODY BGCOLOR=\"FFFFFF\">\n");
printf("img src=\"/icons/iscpfivs.gif\" alt=\"%s\"><p>\n", pfmsg65);
printf("<CENTER><H1>%</H1></CENTER>\n", pfmsg41);
printf("\n");
printf("<P>%\n", pfmsg42);
printf("%\n", pfmsg43);
printf("%\n", pfmsg44);
printf("%s<br>\n<P>\n", pfmsg45);

```

To replace the logo, change the provided logo file name, `iscpfivs.gif`, to the name of a GIF file that contains your own logo. Recompile the Presentation Formatter `iscpfrm.c` routine and place the new logo in the `icons` subdirectory on the HTTP server.

6.2.4 Example 2: Using `iscpfsel` with Customized Screens

You can use the `iscpfsel` routine on Presentation Formatter in conjunction with a standard HTML document to provide video as one of several media types available for display. For example, the following section of HTML code provides a link to the Emma asset from a home page concerning Jane Austen.

```

<HTML>
<HEAD>
<TITLE>Jane Austen</TITLE>
</HEAD>
<body>
<IMG SRC="iscpflg1.gif" alt="Video On Demand"></IMG>
<h2>Recent Jane Austen Adaptations</h2>
<A href="http://cbox60.obexample.com/cgi-bin/iscpfsel?videoid=emma">
<IMG src="emma.gif" alt="Emma"><b>Emma</b><DT></A>
<blockquote>Play the video</DD></blockquote>

```

Note the third line from the bottom, which uses `iscpfsel` as part of the link.

6.3 ASIL Application Programming Interface

The Application Server Interface Layer (ASIL) is a set of programming library functions that simplifies the providing and retrieving of information between the Presentation Formatter and the Application Server. For example, `GetTitleInfo` is a function that enables the Presentation Formatter, and ultimately the end-user, to retrieve descriptive information on video assets from the Application Server's Content Management database. Similarly, `SetServer` is a function that enables the Presentation Formatter to specify a VideoCharger Server complex to deliver a video.

ASIL functions are written in the C-language and support invocation in C-language routines and PERL scripts, as well as shell script command line input. ASIL establishes a Distributed Communications Environment (DCE) link to the Application Server using Remote Procedure Calls (RPCs).

6.3.1 ASIL API Overview

The following list gives an overview of the ASIL API functions:

- ASIL API calls required for all C-language calling sequences:
 - asVideoInit** Initializes the video request handle
 - asVideoExit** Releases resources used for video request
- ASIL API calls for video data retrieval:

- | | |
|----------------------------|--|
| asVideoGetTitleInfo | Processes a query for title information |
| asVideoFreeTitleLst | Frees allocated memory after content query |
| asVideoGetResponse | Gets a copy of the metadata file |
- ASIL API calls for video selection:

asVideoSetServer	Specifies the server to receive the video request
asVideoSetUserData	Saves individual utilization data
asVideoSetVideoName	Specifies the name of the video requested
asVideoSetRestriction	Specifies use restrictions for a particular video
asVideoBuildResponse	Builds the session/stream data metafile
 - Processing user data:

asVideoProcessUserData	Interfaces to a user-supplied routine for processing user data
-------------------------------	--
 - Content loader interface:

asVideoUpdateTitleInfo	Updates title information in the database
-------------------------------	---

6.4 MS Application Programming Interface

The external application programming interface (API) provided by the Controller (Control and Application Server) of the VideoCharger Server product is designed to provide:

- Digital media streaming with VCR control functions, including:
 - VCR control of streams (play, pause, jump, and so on)
- Real-time and best-effort content loading to the server from remote systems including:
 - Another VideoCharger product (stage)
 - Remote file via FTP protocol (load)
 - An application such as an analog-to-digital video encoding application
- Static and dynamic connections to support multiple concurrent media streams access on multiple network types. The networks and devices supported include:
 - Internet using TCP or RTP over UDP protocols
 - The API is designed to be extendable to support new networks and devices in the future. In addition, network-specific options can be accessed in a network-transparent manner.
- Support to multiple concurrent stream connections for play operations over a single session with the server
- Client library to enable remote access to one or more server products concurrently from AIX 4.2-based multithreaded applications

6.4.1 MS API Overview

The MS API provides the following functions:

- Session Management
 - msInit** Initializes a client library
 - msOpenSession** Opens a VideoCharger session
 - msCloseSession** Closes a session
 - msSetSessionAttr** Sets session attributes
 - msGetSessionAttr** Gets session attributes
 - msRegisterCallBack** Registers a user callback
 - msUnregisterCallBack** Unregisters a user callback
- Stream Connection Management
 - msListPortGroups** Gets a list of configured port groups
 - msListPorts** Gets a list of configured port names
 - msOpenPort** Initializes a network connection
 - msClosePort** Terminates a network connection
 - msSetPortAttr** Sets network attributes
 - msGetPortAttr** Gets network attributes
- Stream Operations
 - msOpenPlayStream** Opens a play stream
 - msCloseStream** Closes a stream
 - msPlay** Starts or resumes playing a stream
 - msPause** Pauses or stops a stream
 - msJump** Jumps to a new stream position
 - msUpdatePlayStream** Reserved
 - msRemovePlayStream** Reserved
 - msGetPlayStreamAttr** Reserved
 - msGetPlayStatus** Gets play status
- Asset Management
 - msListAssetGroups** Gets list of asset group names
 - msListAssets** Gets list of asset names
 - msOpenAsset** Opens an asset
 - msCloseAsset** Closes an asset
 - msDeleteAsset** Deletes an asset
 - msSetAssetAttr** Sets asset attributes
 - msGetAssetAttr** Gets asset attributes
 - msSetAssetInfo** Sets the asset meta-data
 - msGetAssetInfo** Gets the asset meta-data
 - msGetAssetStatus** Gets asset status

msGetAssetGrpStatus	Gets asset group status
msStage	Stages an asset from archive to server
msLoad	Loads one or more files as a single asset
msRead	Reads a block of data from an asset
msWrite	Writes a block of data to an asset
msSeek	Sets the byte position within an asset
msRawAdd	Tells server about files that are assets

6.4.2 API Calling Sequences

Figure 45 on page 98 describes the calling sequences of the API.

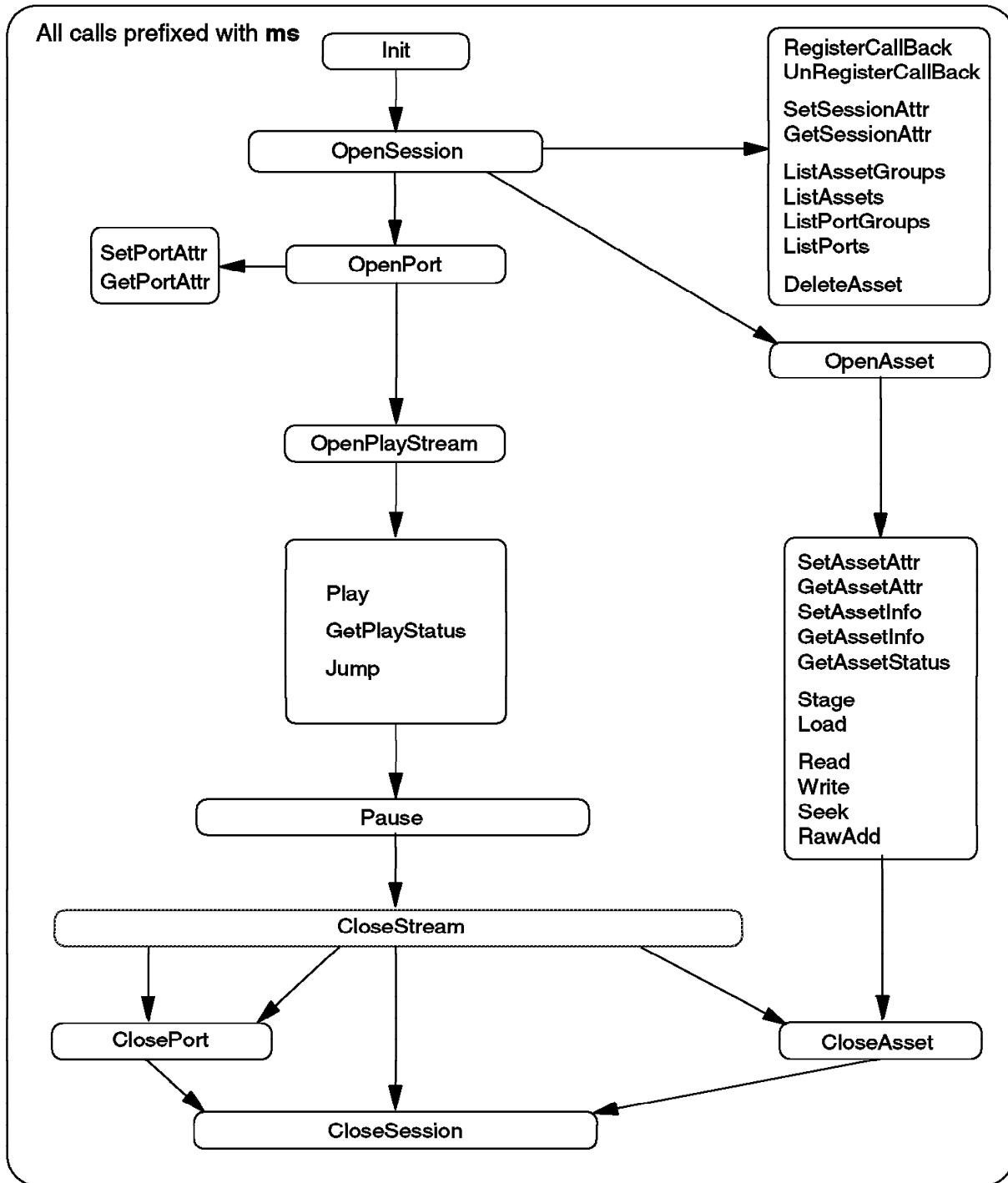


Figure 45. API Calling Sequences

6.4.2.1 Session Management

The application uses session management calls to establish a communication session with the VideoCharger in order to access its services. The first call to the MS client library is the `msInit` call to initialize the local data area of the application process. After initialization, the application process can issue the `msOpenSession` call to establish a session.

An application can optionally register a call-back routine when it wants to be notified of asynchronous events using the `msRegisterCallBack` call. The `msUnregisterCallBack` call is used to remove the registration. The application process issues the `msCloseSession` call to terminate the session. The `msGetSessionAttr` and `msSetSessionAttr` calls are used to get and set session-related parameters.

6.4.2.2 Stream Connection Management

This set of API functions is used by the application to reserve, modify, and release Control Server network connection resources for stream operations. Port connections are used to support the three kinds of stream operations. Under a single session, you can use multiple ports to support multiple concurrent stream accesses.

The Control Server selects a Data Pump and its controlled networks and device adapters. The Control Server supports pre-reserved (static reservation) resources to ensure a specified quality of service for network access. If a requested bandwidth is specified with the `msOpenPort` call, it is also reserved on the selected devices in such a way that subsequent I/O access is guaranteed.

Alternatively, dynamic reservation is also supported. If a requested bandwidth is not specified with the `msOpenPort` call, no resources are reserved. Instead, when a stream operation (`msOpenPlayStream`) is initiated, the Control Server dynamically reserves the bandwidth and establishes the network connection based on the bandwidth required by the stream.

The `msClosePort` call is used to end a network connection.

The calls `msGetPortAttr` and `msSetPortAttr` are used to get and set attributes of the port resource after it has been opened.

6.4.2.3 Stream Operations

The stream interface provides methods to access a media stream. The functions include playing, passing, and seeking a stream.

The following describes the typical API sequence for playing a stream:

1. `msOpenSession` establishes a session with the Control Server.
2. `msOpenPort` opens network connection to the user.
3. `msOpenPlayStream` binds a port to an asset to play a stream.
4. `msUpdatePlayStream` is reserved.
5. `msPlay` plays the stream.
6. `msCloseStream` breaks resource binding to the stream.
7. `msClosePort` closes the network connection to the user.
8. `msCloseSession` closes a session with the Control Server.

6.4.2.4 Asset Management

These functions are used to determine the physical placement of assets and to perform the transfer of asset data, based upon the characteristics of those assets.

The following describes the typical API sequence for writing an asset to a VideoCharger:

1. msOpenSession establishes the session with the VideoCharger.
2. msOpenAsset uses the open mode to create a new asset, within the Control Server. At this point, the asset name is put into the catalog, but other resources have yet to be allocated.
3. msSetAssetAttr specifies physical properties of the asset, including name, size, duration, rate, and usage. The VideoCharger uses this information to allocate resources.
4. msWrite writes asset data to the server. The client library handles this call and actually writes the data to one or more Data Pumps.
5. msCloseAsset shows the asset is closed and is now available to be played.
6. msCloseSession closes the session with Control Server.

Appendix A. Special Notices

This publication is intended to help system engineers to implement the VideoCharger product on the network environment. The information in this publication is not intended as the specification of any programming interfaces that are provided by VideoCharger. See the PUBLICATIONS section of the IBM Programming Announcement for VideoCharger for more information about what publications are considered to be product documentation.

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Appendix B. Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

B.1 International Technical Support Organization Publications

For information on ordering these ITSO publications, see "How to Get ITSO Redbooks" on page 105.

- *Implementing IBM MediaStreamer Solution*, SG24-4934

B.2 Redbooks on CD-ROMs

Redbooks are also available on CD-ROMs. **Order a subscription** and receive updates 2-4 times a year at significant savings.

CD-ROM Title	Subscription Number	Collection Kit Number
System/390 Redbooks Collection	SBOF-7201	SK2T-2177
Networking and Systems Management Redbooks Collection	SBOF-7370	SK2T-6022
Transaction Processing and Data Management Redbook	SBOF-7240	SK2T-8038
AS/400 Redbooks Collection	SBOF-7270	SK2T-2849
RS/6000 Redbooks Collection (HTML, BkMgr)	SBOF-7230	SK2T-8040
RS/6000 Redbooks Collection (PostScript)	SBOF-7205	SK2T-8041
Application Development Redbooks Collection	SBOF-7290	SK2T-8037
Personal Systems Redbooks Collection	SBOF-7250	SK2T-8042

B.3 Other Publications

These publications are also relevant as further information sources:

- *AIX VideoCharger Server Guide and Reference*, SC23-1982
- *AIX VideoCharger Server Programming Reference*, SC23-1983
- *AIX System Management Guide: Operating Systems and Devices*, GC23-2486
- *Netscape FastTrack Server V2.0*, available on CD-ROM, SK2T-7449

How to Get ITSO Redbooks

This section explains how both customers and IBM employees can find out about ITSO redbooks, CD-ROMs, workshops, and residencies. A form for ordering books and CD-ROMs is also provided.

This information was current at the time of publication, but is continually subject to change. The latest information may be found at URL <http://www.redbooks.ibm.com>.

How IBM Employees Can Get ITSO Redbooks

Employees may request ITSO deliverables (redbooks, BookManager BOOKs, and CD-ROMs) and information about redbooks, workshops, and residencies in the following ways:

- **PUBORDER** — to order hardcopies in United States
- **GOPHER link to the Internet** - type GOPHER.WTSCPOK.ITSO.IBM.COM
- **Tools disks**

To get LIST3820s of redbooks, type one of the following commands:

```
TOOLS SENDTO EHONE4 TOOLS2 REDPRINT GET SG24xxxx PACKAGE
TOOLS SENDTO CANVM2 TOOLS REDPRINT GET SG24xxxx PACKAGE (Canadian users only)
```

To get BookManager BOOKs of redbooks, type the following command:

```
TOOLCAT REDBOOKS
```

To get lists of redbooks, type one of the following commands:

```
TOOLS SENDTO USDIST MKTTOOLS MKTTOOLS GET ITSOCAT TXT
TOOLS SENDTO USDIST MKTTOOLS MKTTOOLS GET LISTSERV PACKAGE
```

To register for information on workshops, residencies, and redbooks, type the following command:

```
TOOLS SENDTO WTSCPOK TOOLS ZDISK GET ITSOREGI 1996
```

For a list of product area specialists in the ITSO: type the following command:

```
TOOLS SENDTO WTSCPOK TOOLS ZDISK GET ORGCARD PACKAGE
```

- **Redbooks Home Page on the World Wide Web**
<http://w3.itso.ibm.com/redbooks>
- **IBM Direct Publications Catalog on the World Wide Web**
<http://www.elink.ibm.link.ibm.com/pb1/pb1>

IBM employees may obtain LIST3820s of redbooks from this page.

- **REDBOOKS category on INEWS**
- **Online** — send orders to: USIB6FPL at IBMMAIL or DKIBMBSH at IBMMAIL
- **Internet Listserver**

With an Internet e-mail address, anyone can subscribe to an IBM Announcement Listserver. To initiate the service, send an e-mail note to announce@webster.ibm.link.ibm.com with the keyword subscribe in the body of the note (leave the subject line blank). A category form and detailed instructions will be sent to you.

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In United States:	IBMAIL usib6fpl at ibmmail	Internet usib6fpl@ibmmail.com
In Canada:	caibmbkz at ibmmail	lmannix@vnet.ibm.com
Outside North America:	dkibmbsh at ibmmail	bookshop@dk.ibm.com

- **Telephone orders**

United States (toll free)	1-800-879-2755
Canada (toll free)	1-800-IBM-4YOU
Outside North America	(long distance charges apply)
(+45) 4810-1320 - Danish	(+45) 4810-1020 - German
(+45) 4810-1420 - Dutch	(+45) 4810-1620 - Italian
(+45) 4810-1540 - English	(+45) 4810-1270 - Norwegian
(+45) 4810-1670 - Finnish	(+45) 4810-1120 - Spanish
(+45) 4810-1220 - French	(+45) 4810-1170 - Swedish

- **Mail Orders** — send orders to:

IBM Publications Publications Customer Support P.O. Box 29570 Raleigh, NC 27626-0570 USA	IBM Publications 144-4th Avenue, S.W. Calgary, Alberta T2P 3N5 Canada	IBM Direct Services Sortemosevej 21 DK-3450 Allerød Denmark
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- **Fax** — send orders to:

United States (toll free)	1-800-445-9269
Canada	1-403-267-4455
Outside North America	(+45) 48 14 2207 (long distance charge)

- **1-800-IBM-4FAX (United States) or (+1)001-408-256-5422 (Outside USA)** — ask for:

Index # 4421 Abstracts of new redbooks
Index # 4422 IBM redbooks
Index # 4420 Redbooks for last six months

- **Direct Services** - send note to softwareshop@vnet.ibm.com

- **On the World Wide Web**

Redbooks Home Page <http://www.redbooks.ibm.com>
"Redpieces" - online-readable excerpts from redbooks in progress <http://www.redbooks.ibm.com/redpieces>
IBM Direct Publications Catalog <http://www.elink.ibm.link.ibm.com/pbl/pbl>

- **Internet Listserver**

With an Internet e-mail address, anyone can subscribe to an IBM Announcement Listserver. To initiate the service, send an e-mail note to announce@webster.ibm.link.ibm.com with the keyword subscribe in the body of the note (leave the subject line blank).

IBM Redbook Order Form

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Telephone number Telefax number VAT number

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Credit card expiration date Card issued to Signature

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

A/B roll. An analog-video editing method that uses two source decks to incorporate optical effects between video segments on the master. The outgoing scene is played on the A roll, the incoming scene on the B roll. Effects such as dissolves and wipes are provided at the point at which the two scenes overlap. In the digital domain, A/B roll combines two video track inputs, with effects and transitions, writing to a third digital track.

access time. The time from issuing a command to read or write to a file on disk until the physical read or write is actually carried out.

acknowledgement. The audio or visual acknowledgement to a user upon the successful selection of an active element or icon on the screen.

ACPA. Audio Capture and Playback Adapter.

ActionMedia II. Adapters and software that uses DVI technology. It allows capture and playback of interactive applications with full-motion video, digital audio, stills, and graphics.

active. Any circuit containing amplifying devices, such as tubes or transistors.

Adaptive differential pulse code modulation (ADPCM). Coding scheme standardized by CCITT (See also CCITT) that allows an analog voice to be carried on a 32Kbps digital channel instead of the standard 64Kbps PCM channel. Sampling is 8000 times per second, but each sample represents the difference between two adjacent samples. Hence only three or four bits are required to describe each sample. Hardware compression of audio data that gets between 2:1 and 4:1 compression. Many audio file formats support a form of ADPCM.

ADC. Analog to digital converter.

addressable converter. A set-top converter that has a unique serial number and can be told (individually) by the headend to act in a certain manner (such as enabling channel x, but not channel y).

adjacent channel. Any of two TV channels are considered adjacent when their video carriers, either off-air or on a cable system, are 6 MHz apart. FM signals on a cable system, two channels apart are adjacent when their carriers are 400 to 600 KHz apart.

ADPCM. Adaptive differential pulse code modulation.

ADSI. Analog display services interface.

ADSL. See Asymmetrical Digital Subscriber Line.

Advanced Mobile Phone Service (AMPS). The name applied to the original analog cellular system. Still the predominant cellular transmission scheme.

AGC. Automatic gain control.

aLaw. An audio data format. Not many audio file formats support it. A variation of uLaw for European Telephony (E1).

allocations. The assignment of frequencies by the FCC for various communications uses (for example: television, radio, land-mobile, defense, microwave, and so forth) to achieve a fair division of the available spectrum and to minimize interference among users.

Alternative Operator Services (AOS). Name applied to those non-telephone company businesses that provide operator services (for example, to private payphone operators).

American National Standards Institute (ANSI). A U.S. standards-setting organization, not a government agency. Accredits various other standards setting committees.

American Standard Code for Information Interchange (ASCII). A binary coding scheme used to represent 128 letters, numbers, symbols and punctuation. Seven bits plus a parity bit are used.

amplifier. A device used to boost the strength of an electronic signal. Amplifiers are spaced at intervals throughout a cable system to rebuild the strength of television signals which weaken as they pass through the cable network.

AMPS. Advanced Mobile Phone Service.

Analog display services interface (ADSI). A protocol that allows text messages generated by a remote computer or central office switch to be shown on a display on a user's telephone or television set.

Analog to digital converter (ADC). A device that converts an analog signal into its equivalent digital signal.

analog video. Video in which all the information representing images is in a continuous-scale electrical signal for both amplitude and time.

ANSI. See American National Standards Institute.

antenna. A device used to transmit or receive broadcast signals.

anti-aliasing. Removal by dithering of jagged edges and stair-step patterns that appear in angled lines in a video. Important for titling, as anti-aliasing provides a visually smooth line.

AOS. See Alternative Operator Services.

API. See Application Programming Interface.

Application Programming Interface (API). The formally defined program language which is between an IBM system control program, or licensed program, and the user of the program.

APS. See Automatic Protection Switching.

artifact. A distortion that can occur in graphic or moving images. Aliasing and loss of color data are two examples of artifacts in video. Artifacts cannot be removed.

ASCII. See American Standard Code for Information Interchange.

asymmetric compression. An approach to the encoding and decoding of digital information in which the decompression process is not a step-by-step reversal of the compression process. The compression process typically takes much longer than the decompression process and needs a much more powerful computer. It is often used to prepare content for fast and easy decoding so that decoders can be less costly. These algorithms take into account that stored video will be only encoded once, but played back many times.

asymmetric video services. Services where the traffic going to the user is far greater than the traffic coming from the user (such as video-on-demand).

Asymmetrical Digital Subscriber Line (ADSL). Transmits high-speed data downstream and low-speed data upstream, where transmission direction is separated by using frequency division multiplexing. The payload signals include:

- A one way 6Mbps channel (downstream)
- Two-way 384Kbps and 144Kbps channels for data or video conferencing
- A two-way signaling/control channel
- Conventional telephone service

See also *HDSL* and *CDSL*.

Asynchronous Transfer Mode (ATM). A transmission technique in which data is divided into fixed-length cells of 53 bytes (5 bytes for the header and 48 for the content) and are flexibly routed through the network at very high speeds. Current ATM protocols support speeds of 155Mbps and 622Mbps but it is capable of speeds up to 2.8Gbps. It is built on telephone switch technology and is useful because it gives large bandwidth plus time-of-delivery

guarantees (bandwidth on demand and isochronous communications).

ATM will be the technology of choice for multimedia transmission. It is a cell transmission scheme, operating over a packet network. There are 48 bytes in the payload and five bytes in the header, for a total of 53 bytes per cell.

ATIS. See Alliance for Telecommunications Industry Solutions.

ATM. See Asynchronous Transfer Mode.

attribute descriptor. In DVI run-time software, the data structure that contains the parameters for how graphics operations are to be performed.

ATU-C. ADSL Terminating Unit at the **Central** office.

ATU-R. ADSL Terminating Unit at the subscriber **Remote** location.

ATV. Advanced TV, previously called HDTV.

audio. Sound portion of a video signal. (See also *Audio Track*).

Audio Capture and Playback Adapter (ACPA). An adapter card that allows the capture and playback of audio. Incoming audio, through a jack, is converted to digital information and stored on disk. Digital audio stored on disk is converted by the card to analog audio, and will output to a line out or headphone socket. The card is available in an PC AT Bus or microchannel format.

The microchannel (also ISA bus) card sold by IBM supports PCM, ADPCM, uLaw and aLaw data recording and playback. See also *Sound Blaster*.

audio track. (1) The audio (sound) portion of the program. (2) The physical location where the audio is placed beside the image. (3) The section of the videodisc frame that contains the sound signal. A system with two audio tracks can have either stereo sound or two independent sound tracks.

Audio Video Interleaved (AVI). A file format that arranges audio and video data chunks in a file.

Audio Video Interleaved Files (AVI). A standard file format being used by Microsoft and IBM to store motion video. Interleaved data is important in allowing software only to decode and playback.

Audio Video Support System (AVSS). In DVI run-time software, the software package that plays motion video and audio.

Audio Visual Authoring Language (AVA). A scripting language (based on REXX) used by AVC and Ultimedia Builder/2.

Audio Visual Connection (AVC). A DOS authoring tool.

Audio Visual Kernel (AVK). Intel's software for driving DVI decompression hardware.

Audio Visual Support System Files (AVSS). The standard file format for storing RTV and PLV DVI data. This format strings all the video and audio data at the front of the file (without frame headers) and places a complete frame index at the end of the file.

authoring system. Software tools to integrate computers and multimedia peripherals (CD-ROM, laser disks, sound systems, and so on).

authoring tools. Computer software designed to create interactive TV, or playback from disk, programming.

Automatic gain control (AGC). An electronic circuit using negative feedback techniques that equalize the volume of signals, whether an input is large or small. For example, AM or FM radio stations with nearby transmitters do not sound significantly louder than distant stations.

Automatic Protection Switching (APS). A method of allowing transmission equipment to automatically recover from failures such as a cable cut.

automatic slope control. Automatic correction of changes in slope by compensating circuitry.

AVA Language. See Audio Visual Authoring Language.

AVC. See Audio Visual Connection.

AVI file format. The audio/video interleaved (AVI) file format is the standard file format used to support software motion video. AVI files can contain multiple streams (tracks) of data (for example, a video and an audio stream). The streams are interleaved to improve access times during playback. The present implementation is limited to a single video stream and a single, optional, audio stream.

AVI Files. See Audio Video Interleaved Files.

AVK. See Audio Visual Kernel.

AVSS. See Audio Video Support System.

AVSS Files. See Audio Visual Support System Files.

B

backlight. The light that is presented behind the image to be photographed.

bandwidth. A measure of spectrum (frequency) use or capacity. For instance, a voice transmission by telephone requires a bandwidth of about 3,000 cycles per second (3KHz). A TV channel occupies a bandwidth of 6 million cycles per second (6MHz). Cable system bandwidth occupies 50 to 300 MHz on the electromagnetic spectrum.

Basic Exchange Telecommunications Radio Service (BETRS). In its simplest form, it is "fixed cellular." A form of wireless local exchange service. In such an application, handoff is not required.

Basic Inout/Output system (BIOS). The area of the computer that controls incoming and outgoing signals.

Basic Rate Interface (BRI). This ISDN scheme is identified as 2B+D, and permits two "bearer" channels, each operating at 64Kbps, and one "data" channel, operating at 16Kbps, to be carried over a single twisted pair. See also *ISDN*.

BER. Bit Error Rate.

BETRS. Basic Exchange Telecommunications Radio Service.

BIOS. Basic Inout/Output system.

Bit Error Rate (BER). A measure of transmission accuracy. It is the ratio of bits received in error to bits sent. A BER of 10⁻⁹ (or one error in a billion bits) is common in voice and data transmission systems.

bitmap. (1) An area of memory or storage that contains the pixels representing an image, arranged in the sequence in which they are normally scanned, to display the image. (2) A representation of an image by an array of bits.

blanking (picture). The portion of the composite video signal whose instantaneous amplitude makes the vertical and horizontal retrace invisible.

blitting. To alter areas of a bitmap display quickly with a graphics image or pattern.

BRI. Basic Rate Interface.

brightness. Refers to the level of luminosity of the video signal. A brightness level of 0 produces a dark image and a brightness level of 100 produces a bright image.

broadband network. Networks that mix data, voice, image and video information by chopping the information up into packets or cells and switching them using cell relay technologies. They transport

different types over a single link bandwidth, rather than dedicating a bandwidth channel for each type of traffic.

broadcaster's service area. Geographical area encompassed by a station's signal.

broadcasting. Transmitting electromagnetic signals in a multidirectional pattern over the air.

browser. A program that displays a multimedia file. Browsers allow a representative sample of a multimedia data file, or the entire file, to be viewed or played. Browsers are accessible from Light Table folders. This variety of browser is not a read-only browser.

bursty. Switched packet networks that assign bandwidth dynamically as needed

C

Cable Digital Subscriber Loop (CDSL). A patented cable network technology owned by ICTV which allows an uplink digital connection from set-top boxes to the CDSL gateway located in the cable TV headend.

cablecasting. Originating programming over a cable system. It includes public access programming.

cable powering. A method of supplying power to solid-state CATV equipment by using the coaxial cable to carry both signal and power simultaneously.

cable TV. Previously called Community Antenna Television (CATV). A communications system which distributes broadcast programs and original programs and services by means of coaxial cable.

Canadian Standards Association (CSA). One of several bodies that develops telecommunications standards. This one is based in Canada.

CAP. Competitive Access Provider.

capture. To take a snapshot of motion video and retain it in memory. The video image may then be saved to a file or restored to the display.

carriage. A cable system's procedure of carrying the signals of television stations on its various channels. FCC rules determine which signals cable systems must or may carry.

Carrier Sense Multiple Access with Collision Detection (CSMA/CD). A local area network access control technique where network devices "listen" for other transmissions in progress before attempting a transmission.

CARS. Community Antenna Relay Service.

cartridge. The container for recorded programming designed to be shown on a television receiver. The cartridge contains a reel of motion picture film, videotape, or electronically embossed vinyl tape, blank or recorded, and uses an external take-up reel.

cassette. A self-contained package of reel-to-reel blank or recorded film, videotape or electronically embossed vinyl tape which is continuous and self-rewinding. Similar to a cartridge, but of slightly different design.

CBT. Computer-based training.

CCIR 601. A recommendation of the former International Radio Consultative Committee (CCIR) for digital video (720 lines with 486 pixels for NTSC or 704 lines with 576 pixels for PAL).

CCITT. Consultive Committee for International Telephone and Telegraph.

CD-DA. Compact Disc Digital Audio.

CD-I. Compact Disc Interactive.

CDMA. Code Division Multiple Access.

CD-ROM. Compact Disc Read Only Memory.

CD-ROM XA. Compact Disc Read Only Memory Extended Architecture.

CDSL. Cable Digital Subscriber Loop.

Central Office (CO). The building in which telephone companies and so forth locate their switching equipment and terminate their circuits. Sometimes used interchangeably with "exchange."

Central Office-based Local Area Network (CO-LAN). Instead of stringing a separate set of cables around a particular locale, it is possible to extend individual transmission channels to a nearby central office, and place control there. Thus the system acts like a LAN, but in fact uses a central office.

Central Office Equipment (COE). The equipment located in a central office.

Certificate of Compliance. The approval of the FCC that must be obtained before a cable system can carry television broadcast signals.

channel. In television, a single path or section of the spectrum 6MHz wide, which carries a television signal.

channel capacity. The maximum number of 6MHz channels which can be simultaneously carried on a CATV system.

chrominance. The signals that represent the color components of an image, such as hue and saturation.

chunk. (1) The basic building block of a RIFF file. (2) A RIFF term for a formalized data area. There are different types of chunks, depending on the chunk ID.

CIF. Common Intermediate Format.

CISC. Complex Instruction Set Computer.

clause. In SQL, a distinct part of a statement, for example, a WHERE clause.

clip. A section of recorded or edited video.

clip art. Digitally stored objects that are in the public domain and that can be used in multimedia stories. Vendors have made clip art collections available on diskette or CD-ROM.

clip board. A temporary storage area used to pass information within a program or from a program to another.

clipping. The shearing off of the peaks of a signal. For a picture signal, this may affect either the positive (white) or negative (black) peaks. For a composite video signal, the sync signal may be affected.

closed captioning. The ability for an application to provide a visual representation of audio sounds. Most commonly, this is in the form of text that accompanies the sound of spoken words. Television programs use closed captioning to enable hearing-impaired individuals to view what is being said. If a computer application, such as a spreadsheet or electronic-mail program, provides the closed captioning feature, it can take advantage of this feature and display the text.

closed circuit. A system of transmitting TV signals in which the receiving and originating equipment are directly linked by cable, microwave or telephone lines, without broadcasting through the air.

CO. Central Office.

CO-LAN. Central Office-based Local Area Network.

co-channel. Any two or more TV signals are considered co-channel when their video carriers, either off-air or after conversion by CATV equipment, occupy the same TV channel.

coaxial cable. Copper or copper-sheathed aluminum wire surrounded by an insulating layer of polyethylene foam, used by CATV systems. The insulating layer is covered with tubular shielding composed of tiny strands of braided copper wire, or a seamless aluminum sheath, and protective outer skin. The wire and the shielding react with each other to set up an electromagnetic field between them. This system reduces frequency loss and gives cable its great signal-carrying capacity.

Coaxial cable carries an electrical signal in the RF range on which information is carried. It has a potential bandwidth of 1GHz (750MHz with today designs). Cable operators typically divide this frequency into downstream and upstream bandwidth. The downstream capability is further divided into digital and analog channels. In order for a TV to view a digital signal, it requires a digital to analog set-top converter.

- Upstream digital - 5 to 40MHz for telephone, remote control and data communications
- Downstream analog - 54 to 550MHz for conventional broadcast TV
- Downstream digital - 550-750MHz for video-on-demand, near video-on-demand, information retrieval
- Upstream digital - 750MHz to 1GHz for personal communications systems, telephone, data and others

codec. A codec (coder/decoder) is a processor that can code analog audio or video information in digital form for transmission and decode digital data back to analog form.

Code Division Multiple Access (CDMA). A transmission scheme used by some cellular carriers. Derived from spread spectrum techniques of the military. Claimed to be more efficient than other systems and to offer up to 20 times more call handling capacity than analog cellular systems.

COE. Central Office Equipment.

color. (1) Refers to the depth of color intensity. A color level of 0 is no color (gray scale). A color level of 100 is maximum color intensity. (2) Also referred to as *saturation*.

color map. The color characteristics of a color palette.

combining network. A passive network which permits the addition of several signals into one combined output with a high degree of isolation between individual inputs. It may be a power or frequency combiner.

Common Intermediate Format (CIF). An ITU-T recommendation for digital video with a resolution of 352 pixels per line, 288 lines per frame.

Community Antenna Relay Service (CARS). The 12.75 GHz to 12.95 GHz microwave frequency band which the FCC has assigned to the CATV industry for use in transporting television signals.

compact disc. An optical read-only disc for use with digital audio, data, or video.

Compact Disc Digital Audio (CD-DA). CD format for high quality audio.

Compact Disc Interactive (CD-I). A CD-ROM format promoted by Phillips corporation for home video players. Also called the "Green Book" format. Proprietary format that keeps its operating system and binaries on the disc with the data.

Compact Disc Read Only Memory (CD-ROM). A Compact disc specifically for storing data.

Compact Disc Read Only Memory Extended Architecture (CD-ROM XA). A partial implementation of CDI and DVI standards.

Competitive Access Provider (CAP). Alternate carrier (for example, Teleport and Metropolitan Fiber Systems) that competes with telephone companies in carrying traffic. Usually these companies construct a SONET ring in an urban area to attract businesses to use their services in addition to or in place of the services of the local telephone company.

Complex Instruction Set Computer (CICS). A name given to a CPU that uses complex instructions that take many cycles to complete. The main way to gain speed with CICS was with caching, and upping the processor speed because it is difficult to optimize complex instructions. Examples include the Intel 80x86 and Motorola 680x0 processors. See also *RISC*.

component signal. A color signal in which luminance (light intensity, grey scale, sharpness of the image) and chrominance (red, green, blue colors, hue and saturation) information are transmitted separately.

component video. The color video signals that describe a color image. Typical component systems are RGB, YIQ, or YUV. The video color signal that contains all of the color information in one signal. Typical composite video signal standards are NTSC, PAL, and SECAM.

composite signal. A color signal in which luminance and chrominance information are combined in a single signal and transmitted across a single wire.

compositing. The process of layering video with titling, graphics, animation, background mattes, and sound, blending a mixture of elements into a single track. In the analog domain, this typically requires several dedicated pieces of special-purpose equipment. In the digital domain, compositing can be accomplished through software alone.

compression. The process of reducing the amount of data needed to represent information. There are several considerations when considering digital video compression.

- Real-time: Capture, compress to disk, decompress and play back with no delay.
- Symmetrical: Capture and compress to disk are done at the same speed as decompress and play back.

- Asymmetrical: Capture and compress to disk are done at different rates than decompress and play back.
- Compression ratio: Describes how much the original information has been reduced.
- Lossless: No information is lost in the compression process.
- Lossy: Some information is lost.
- Interframe: Although there is action happening, the background in most video scenes remains stable and thus a great deal of information between frames is redundant. MPEG used this technique.
- Intraframe: Each individual video frame is digitized and compressed in its entirety. Motion-JPEG uses this technique.

compressor/decompressor (CODEC). Algorithm by which an image is compressed and decompressed in hardware and/or software.

compulsory license. Legislation requiring copyright holders to license users of copyrighted material (CATV operators) on a uniform basis and for a stipulated fee.

conditional access. A system for scrambling and encoding signals in order to limit access to programs to certain groups of viewers who have paid subscriptions, and sometimes to certain countries (for copyright reasons).

Consultive Committee for International Telephone and Telegraph. An international standards committee in the communications arena.

continuous tone. An image that has shades of grey or color.

contrast. The range of light and dark values in a picture, or the ratio between the maximum and minimum brightness values. A high-contrast picture would contain intense blacks and whites; a lower-contrast picture would contain only shades of gray.

contrast ratio. The degree of difference, or ratio, between the light and dark areas of the scene.

converter. A device used to convert non-VHF television signals into standard VHF channels. Cable systems often install converters where more than 12 channels are relayed on a single cable. Converters also protect signals from the interference of strong local signals.

CPE. Customer Premises Equipment.

crop. Producing a new image by cutting off part of an existing image.

cropping. The cutting off of picture elements by the camera framing.

cross-ownership. Ownership of two or more kinds of communications outlets by the same individual or business. The FCC prohibits television stations and telephone companies from owning cable systems in their service areas. Television networks are prohibited from owning cable systems anywhere in the U.S.

crosstalk. An undesired signal interfering with the desired signal.

CSA. Canadian Standards Association.

CSMA/CD. Carrier Sense Multiple Access with Collision Detection.

Customer Premises Equipment (CPE). The telecommunications equipment located on a customer's premises. Usually refers to key systems, private branch exchanges (PBXs), telephones, and so on.

cutoff frequency. That frequency beyond which no appreciable energy is transmitted. It may refer to either an upper or lower limit of a frequency band.

cuts only. A video editing method that uses a single video source deck and supports only direct, immediate edits. The only transition available from scene to scene (beyond abrupt jumps from one to the other) is fading out at the end of one edit segment and fading in at the beginning of the next.

D

D1 (Sony). Component digital; a separate signal for each color (red, green, blue) being sent at 221Mbps. Top performing component technique.

D2 (Sony). Composite digital; a separate signal for color and separate signal for light intensity being sent at 140Mbps.

D2-MAC. A variant of the European MAC standard that can be used for satellite transmission or cable.

D3 (Matsushita). Composite digital; separate signal for color and intensity; 17MBps.

DAC. Digital-to-Analog Converter.

DAT. Digital Audio Tape.

Data Circuit-terminating Equipment (DCE). The equipment that provides the signal conversion and coding between the data terminal equipment and the data circuit.

Data Packet Network (DPN). A packet network is one in which "bundles" of information are transmitted, one after another. This differs from a circuit network, in which an entire circuit is dedicated to a particular user.

Also the prefix for Northern Telecom's DPN data networking switches.

data rates. Information on data rates can be found at the end of the glossary.

data stream. Data being transferred from a device as a continuous stream of data

DAVIC. Digital Audio Visual Council.

DBS. Direct broadcast Satellite.

DCE. Data Circuit-terminating Equipment.

DCF. Digital Compression Facility.

DCS. Digital Cross Connect.

DCT. Discrete Cosine Transform.

DDS. Digital Data Service.

Decoder Time Clock (DTC). Used in decoding a compressed video signal. A clock distinct from the distant-end encoding clock, but kept in time and phase with the incoming signal by bits inserted in this incoming bit stream.

decompression. The process of decoding a compressed signal and expanding the data to the original length.

delay distortion. Distortion resulting from nonuniform speed of transmission of the various frequency components of a signal, that is, the various frequency components of the signal have different times of travel (delay) between the input and the output of a circuit.

delete. Recorder editing command for deleting a selected video clip from the file.

Desktop Video (DTV). Video production and editing using low-cost equipment and desktop computers.

device driver. A software program that controls a device attached to a computer, such as an input device.

DH. Digital Hierarchy.

digital audio. A technique of storing audio as a series of numbers.

Digital Audio Visual Council (DAVIC). A consortium of over 200 companies belonging to the leading edge of the interactive community. This includes consumer electronics, computer, network provider, service provider and content provider companies. DAVIC is aimed at the standardization of interoperable systems (set-top boxes, distribution networks, back-channel

networks, application servers, video servers, management nodes and content production systems).

Digital Compression Facility (DCF). MPEG-1 digital compression capability offered by IBM's POWER Visualization System.

Digital Cross Connect (DCS). A cross connect system, totally electronic, that routes DS1 and DS3 and DS0 lines among multiple paths. The DCS makes de-multiplexing unnecessary. Although it operates very rapidly, it in no way replaces a central office switch. It can, however, reroute traffic should a major system fault occur.

Digital Data Service (DDS). A 56Kbps or 64Kbps digital private line channel.

Digital Loop Carrier (DLC). A digital transmission system designed for subscriber loop plant. Multiplexes a plurality of circuits onto very few wires or onto a single fiber pair.

Digital Multiplex Systems (DMS). A system that combines, on a digital basis, a number of circuits.

Also the prefix for the Northern Telecom family of digital central office switches (DMS-10, DMS-100, DMS-250 and DMS-300).

Digital Signal Level 1 (DS1). A 1.544Mbps stream that is one of several transmission rates in the time-division multiplex hierarchy.

Digital Signal Processor (DSP). (1) A microprocessor that acts upon digital signals, in any of thousands of ways. An extremely powerful device, in effect a step above a conventional microprocessor. (2) A specialized chip designed to perform speedy and complex operations on digital waveforms.

Digital-to-Analog Converter (DAC). (1) A device that converts digital signals used by the computer into analog signals, such as those required to control the intensity of light produced along a raster scan on a video screen. (2) A chip which converts digital information to analog information. Usually associated with audio adapters.

digital video. A medium in which colors and sound are stored and manipulated as discrete bits of data. This allows video to be treated like any other digital data.

Digital Video Formats (DVF). The formats are:

- Digital Betacam
- D1 - component
- D2 - composite

Digital Video Interactive (DVI). (1) This technology compresses video images, and in its latest version it can produce animated scenes at 30 frames per

second. Present compression ratio is 160:1. (2) This is the name Intel gave to its video technology around which it built the i750 chip. DVI came in two varieties, RTV and PLV. The Audio Visual Kernel (AVK) was developed by Intel to manipulate these two video streams. Data was typically stored in AVSS file format. The ActionMedia-II adapter is the only commonly available hardware for DVI support.

digitizing. The process of converting an analog signal to a digital signal. When referring to images, usually it means the process of scanning an image.

digitize driver. A software program that controls a digitizer card.

digitized image. An image derived from a scanning device or a digitizing card with a camera.

Direct broadcast Satellite (DBS). Satellite broadcasting directly to homes.

directional coupler. A high-quality tapping device providing isolation between tap and output terminals.

Discrete Cosine Transform (DCT). A technique for mapping visual data into its frequency components (usually using fast Fourier transforms). Used by JPEG and MPEG to get exceptional compression (loss).

Discrete Multitone (DMT). A frequency-agile modulation scheme in which an available bandwidth is divided into many sub-channels. Each sub-channel is then analyzed for its ability to carry digital data. Noisy subchannels carry few or zero bits, while clear channels carry a maximum number of bits. Advanced DSP techniques allow these bits-to-sub-channel assignments to occur in real time.

dissolve. A transition between two consecutive images in the Play window.

distant signal. TV signals which originate at a point too far away to be picked up by ordinary home reception equipment; also signals defined by the FCC as outside a broadcaster's license area. Cable systems are limited by FCC rules in the number of distant signals they can offer subscribers.

distortion. The departure, during transmission or amplification, of the received signal wave form from that of the original transmitted wave form.

distribution plant. The hardware of a cable system (amplifiers, trunk cable and feeder lines), attached to utility poles or fed through underground conduits like telephone and electric wires.

DLC. Digital Loop Carrier.

DMS. Digital Multiplex Systems.

DMT. Discrete Multitone.

Dots Per Inch (DPI). A unit of measurement for print or screen resolution. Higher DPI values produce better images.

downstream. Signals traveling from the cable headend to subscriber homes.

DPI. Dots Per Inch.

DPN. Data Packet Network.

DS1. Digital Signal Level 1.

DSP. Digital Signal Processor.

DTC. Decoder Time Clock.

DTMF. Dual Tone Multi-Frequency.

DTV. Desktop Video.

dual cable. A method of doubling channel capacity by using two cables installed side by side to carry different signals.

Dual Tone Multi Frequency (DTMF). The tones sent out by a touch tone dialing unit. Each horizontal grouping of numbers (for example: 1, 2, 3 or 4, 5, 6, and so forth) keys one frequency. Each vertical group of numbers (for example: 1, 4, 7, * or 2, 5, 8, 0) keys a separate frequency. Hence, depressing "1" triggers two frequencies.

DVF. Digital Video Formats.

DVI. Digital Video Interactive.

E

Enhanced Time Division Multiple Access (E-TDMA). One of many transmission schemes proposed as "standard" for cellular radio. Primary proponent is Hughes Network Systems. Fundamentally it is a time division multiple access system.

EAS. Extended Area Service.

easement. The right to use land for a specific purpose, such as laying cable.

echo. A wave which has been reflected at one or more points in the transmission medium, with sufficient magnitude and time difference to be perceived in some manner as a wave distinct from that of the main or primary transmission. Echoes may be either leading or lagging the primary wave and appear in the picture monitor as reflections or "ghosts."

ECSA. Exchange Carrier Standard Association.

Edit-Level Video (ELV). In DVI technology, the video compression/decompression technique which

operates in real-time mode using the DVI system itself. This gives a picture quality suitable for development, but will normally be replaced by Presentation Level Video for the final application.

education channel. FCC rules require cable systems in the top 100 markets to set aside one channel for educational uses, to be available without cost for the "developmental period." The developmental period of a CATV system runs for five years from the time that subscriber service began, or five years after the completion of the basic trunk line.

Educational Television Station (ETV). A noncommercial television station primarily devoted to educational broadcasting.

EIA. Electronic Industry Association.

Electromagnetic interference (EMI). Electromagnetic waves emitted by some electrical device. Distorts or overwhelms communications signals being transmitted over the air.

electromagnetic spectrum. A continuous range of frequencies of electromagnetic radiation (that is, oscillating electrical and magnetic energy which can travel through space). Within the spectrum, waves have some specified common characteristics; the TV broadcast spectrum, for instance, ranges from 54 to 890 MHz. See also *frequency*.

Electronic Industry Association (EIA). A standards organization for the electronics industry

element. A media, graphic, or logic component of an event.

EMI. Electromagnetic interference.

equalization. A means of modifying the frequency response of an amplifier or network, thereby resulting in a flat overall response.

equalized loss. Any loss in CATV systems caused by coaxial cable; also, insertion loss of components designed to match cable loss characteristics.

E-TDMA. Enhanced Time Division Multiple Access.

Ethernet. A 10 Mbps baseband local area network specification operating under the IEEE 802.3 standard. The protocol is called CSMA/CD (Carrier Sense Multiple Access with Collision Detection). It operates in several modes:

- **ThinNet** - Uses coaxial cable (like cable-TV) to carry messages. Maximum bandwidth of 10 Mbps, with a range of about 100 meters. Uses a bus configuration.
- **ThickNet** - The original Ethernet media. Uses expensive shielded cables and taps. Maximum bandwidth of 10 Mbps, with a range of about 1000 meters. Uses a bus configuration.

- **Twisted Pair** - Uses phone wire (shielded or unshielded) to carry information. Maximum bandwidth of 10 Mbps. Uses a star configuration.
- **Fast** - A proposed standard for getting 10 Mbps by using the twisted pair star configuration.
- **10-Base-VG** - A proposed standard for dropping the collision detection aspects of Ethernet when in a star configuration so that 100 Mbps can be done on voice-grade phone lines.

ETSI. European Telecommunications Standards Institute.

ETV. Educational Television Station.

European Telecommunications Standards Institute (ETSI). Consists of equipment manufacturers, service providers and large users. It was established to create Europe-wide standards and to strengthen Europe's role in international standards.

event flags. In DVI technology, the data elements used by RTX to indicate that something has happened.

Exchange Carrier Standard Association (ECSA). A standards body sponsored by the exchange carriers, and accredited by American National Standards Institute (ANSI). Recently the name of this organization has been changed to Alliance for Telecommunications Industry Solutions (ATIS).

exclusivity. The provision in a commercial television film contract that grants exclusive playback rights for the film or episode to a broadcast station in the market it serves. Under the FCC's rules, cable operators cannot carry distant signals which violate local television stations' exclusivity agreements.

Extended Area Service (EAS). A service provided by many telephone companies in which towns with a common community of interest are considered "local." Hence subscribers calling these towns do not incur a long distance charge.

extended attributes. An OS/2-provided location for maintaining additional information about files or objects, adjacent to standard file-system data. It uses extended attributes as one of two locations for storing extended data; the other is a database. OS/2 provides APIs to define, store, and retrieve this information.

extended data. User-defined information, including multimedia information, about Light Table folder objects. Such information goes beyond what is available in OS/2 standard data. Extended data includes user-defined columns, and may come either from a supported database or from extended attributes.

F

FCC. Federal Communications Commission.

FCS. Fiber Channel Standard. See *fiber channel*.

FDDI. Fiber Distributed Data Interface.

fiber channel. A proposed standard for networking in which circuit-switched rather than packet-switched networking is used. Capable of supporting bandwidths up to 1 Gbps. Uses a star configuration when used as a network. Also proposed as a replacement for SCSI to get higher bandwidth when talking to computer peripherals.

Fiber Distributed Data Interface (FDDI). A standard designed to allow traffic of up to 100 Mbps to be transmitted in a local area network.

Fiber Optic Transmission System (FOTS). A generic term applied to any fiber optic transmission system.

fiber optics. Sending telecommunications signals using light down a thin glass tube.

Fiber-To-The-Curb (FTTC). Fiber has been placed first in the long distance network, then in the feeder plant, then the distribution plant. In this case, the fiber then proceeds to the curb, with copper going from the curb to the home itself. A fiber optic cable running out of a remote terminal to an optical network node situated curbside, from which copper runs the final 100 feet or so to the home. The FTTC nodes serve a maximum of 25 homes.

Fiber-To-The-Home (FTTH). Extending fiber past the curb, all the way to the wall of the subscriber's home.

Fiber In The Loop (FITL). Used generally to refer to the deployment of fiber between the central office and the subscriber.

field. One half of a full video frame. The first field contains the odd numbered lines, the second field contains the even numbered lines.

field frequency. The rate at which a complete field is scanned, nominally 60 times a second.

film. 24 frames/sec, 16:9 aspect ratio, resolution 1000 to 3000 lines per inch in negative with projected resolution, 1000 lines or less. Film formats and aspect ratios:

- Academy - 1.33:1
- Cinemascope - 2.35:1
- VistaVision - 1.50:1

filter. A circuit that selects the frequency of desired channels. Used in trunk and feeder lines for special cable services such as two-way operation.

FITL. Fiber In The Loop.

flicker. A phenomenon that occurs in a videodisc freeze when both video fields are not identically matched, thus creating two different pictures alternating every 1/60 of a second.

FLX. Fiber Loop Access.

FM. Frequency Modulation.

Foreign Exchange (FX). Provided local exchange telephone service from a central office that serves a different exchange area. Thus a subscriber in one city will receive dial tone from, and have a telephone number of, a distant city.

FOTS. Fiber Optic Transmission System.

fps. Frames per second.

fractal image compression. A proprietary image-compression technology developed by Iterated Systems. Fractal transform codes derived from the image are stored instead of the image itself.

frame.

1. Motion video is an accumulation of still images played back at a rate fast enough to fool the eye into seeing the objects of the images in motion. These still images are referred to as *frames* of the video. In the NTSC system, a frame is scanned every 1/30th of a second (for a frame rate of 30 frames per second). In the PAL system, a frame is scanned in every 1/25th of a second (or 25 fps). Each line of each video (525 in NTSC) is defined by a period of continuous voltage levels. Oppositely, a digital frame is defined by a number of lines of discrete 1s and 0s which a computer translates to colors. The frame rate of digital frames is user selectable, typically 15 fps or 39 fps.
2. The basic unit of video information. One complete picture consisting of two fields on interlaced scanning lines. In the United States and other countries that use the NTSC broadcast standard, one frame lasts one-thirtieth of a second.

frame relay. An interface standard describing the boundary between user equipment and a fast-packet network. In frame relay systems, flawed frames are discarded, and recovery is done end-to-end rather than hop-by-hop. It is a streamlined packet switching technology offering low overhead and high speed. Frame relay raw data speeds range from 56Kbps to 44.736Mbps.

frame-step recording. Refers to the capturing of video and audio data frame by frame, from a computer-controlled, video source device that can access individual frames, or a previously recorded AVI file.

franchise. Contractual agreement between a CATV operator and the governing municipal authority. Under federal regulation, a franchise, certificate, contract, or any other agreement amounts to a license to operate.

frequency. The number of times an electromagnetic signal repeats an identical cycle in a unit of time, usually one second. One Hertz (Hz) is one cycle per second. A KHz (Kilohertz) is one thousand cycles per second; a MHz (Megahertz) is one million cycles per second; a GHz (Gigahertz) is one billion cycles per second.

Frequency Modulation (FM). One of many modulation schemes. The message signal modulates a carrier signal in such a way that the frequency (as opposed to the amplitude or phase) of the carrier is varied.

frequency response. The change of gain with frequency.

frequency spectrum. The range of frequencies that signals on which be sent. A high level view of the spectrum on interest to interactive broadband services looks like:

- Return path - 0 to 50MHz
- Analog broadcast - 50 to 450MHz
- Digital broadcast - 450 to 750MHz

FSFM. Full-screen, full-motion.

FTTC. Fiber-To-The-Curb.

FTTH. Fiber-to-the-Home.

full motion. Video that moves at 24 to 30 frames per second is described as full motion.

Full-screen, full-motion (FSFM). This video can be played back at the same speed as broadcast TV or video (25 or 30 frames per second).

full-motion video. Video reproduction at 30 frames per second for NTSC signals or 25 frames per second for PAL.

FX. Foreign Exchange.

G

gain. A measure of amplification expressed in dB. The gain of an amplifier is usually specified at the highest frequency of operation, for example, at Channel 13 for allband equipment.

generation/generation loss. The number of times an analog video signal is copied. The original, unedited video source is known as first-generation. Edited video-tape is typically second generation. Analog

video and audio degrade each time they lose a generation by being copied.

genlock. (1) A synchronization generator lock (genlock) is a way of combining video signals from different sources (for example, an external video source with computer-generated graphics). (2) The process of handling the mixing of video signals so that the start of each frame, in a sequence of frames, occurs at the same point in time for all inputs.

GHz. Giga Hertz.

Giga Hertz (GHz). 1 billion cycles per second.

GIF. Graphic Interchange Format.

Graphic Interchange Format (GIF). A standard derived from CompuServe and now widely used for compressing still images without loss. Only supports 2-, 4-, or 8-bit images in color or gray scale. GIF89 supports 24-bit color, but few 24-bit GIFs exist.

government channel. FCC rules require cable systems in the top 100 markets to set aside one channel for local government use, to be available without cost for the "developmental period." That period runs for five years from the time subscriber service begins, or until five years after the completion of the basic trunk line.

GPS. Global Positioning System.

Global Positioning System (GPS). Atomic clocks with almost perfect accuracy control radio signals from orbiting satellites. A signal sent by three (in actual practice four) synchronous satellites can be received by a vehicle-mounted global positioning system, and through triangulation techniques, the vehicle can determine its position to within a few meters.

graphics (video). Text or pictorial artwork created by a variety of means, such as electronic generated graphics software, and then pressed onto the videodiscs.

graphics overlay device. Refers to a video capture device that can superimpose graphics or text on motion video or still video.

graphics view. Story view where a story is represented as rows of images, audio, video and other frames in the main application window.

gray scale. The various shades of gray in a TV picture that correspond to color, varying from 0 (pure black) to 10 (maximum white).

group delay. Delay of color components to the picture components of a signal caused by movement through a device which has non-linear frequency response components, that is, inductors and capacitors.

GSM. Global System for Mobile Communications.

Global System for Mobile Communications (GSM). A transmission scheme proposed as "standard" for cellular radio. This system is the standard in Europe and many countries in Asia. It is a time division-type system.

guide. Software that will help viewers to find their way around interactive TV program. Guides will be provided by the system operators and will interact with the intelligent agent used by the viewer.

H

hardware. The equipment involved in the production, storage, distribution or reception of electronic signals. In CATV it means the headend, the coaxial cable network, amplifiers, the television receiver and production equipment like cameras and videotape recorders.

HBI. Horizontal Blanking Interval.

Horizontal Blanking Interval (HBI). Consists of the first part of a line of video. Scrambling systems mutate this part of the signal in some way to prevent unauthorized viewing.

HDTV. High Definition TV.

High Definition TV (HDTV). Television with very high resolution and a wide aspect ratio. Requires significantly greater bandwidth than conventional television (1080 lines by 1920 pixels).

headend. The central distribution point for a cable TV system where the TV programs originate or are received by satellite. They are then transmitted down the cable system from the headend to the customer.

HFC. Hybrid Fiber Coax.

Hybrid Fiber Coax (HFC). A hybrid fiber coax network consists of fiber optic cable from the cable head end down to a neighborhood node serving from approximately 200-500 homes. From the node, coax cable is used to connect to individual homes. At the home, the telephone signal is split off the coax cable and placed on the telephone wire and the video signal is left on the coax. Coax cable is excellent for carrying analog signals. This approach provides high bandwidth downstream and moderate bandwidth upstream for interactivity.

high VHF band. Part of the frequency band which the FCC allocates to VHF broadcasting, including channels 7 through 13, or 174 through 216 MHz.

HMSF. Hours-minutes-seconds-frames.

Hours-minutes-seconds-frames (HMSF). A time format for videodisc players.

horizontal resolution. The specification of resolution in the horizontal direction. The ability of the system to reproduce closely spaced vertical lines.

horizontal (hum) bars. Relatively broad horizontal bars, alternately black and white, which extend over the entire picture. They may be stationary, or may move up or down. Sometimes referred to as “venetian blind” effect. Caused by approximate 60-cycle interfacing frequency, or one of its harmonic frequencies.

house drop. The coaxial cable that connects each building or home to the nearest feeder line of the cable network.

HSSI. High Speed Serial Interface.

High Speed Serial Interface (HSSI). Up to 51.84Mbps.

hub. A wiring configurator that provides bridging and routing functions for LANs with different cables and protocols.

hypertext. A concept of linking related, nonsequential information. Hypertext is used in the online help facility for OS/2 and the Ultimedia products.

I

IDLC. Integrated Digital Loop Carrier

Integrated Digital Loop Carrier (IDLC). A digital loop carrier system that connects directly to a digital central office switch.

IEC. Interexchange Carrier

Interexchange Carrier (IEC). See IXC.

IEEE. Institute of Electrical and Electronic Engineers

Institute of Electrical and Electronic Engineers (IEEE). An information exchange, publishing and standards organization.

IMA. Interactive Multimedia Association

Interactive Multimedia Association (IMA). The standards committee for multimedia.

image. A still picture or one frame.

image plane. In digital video display hardware that has more than one video memory array, each memory array is called an image plane. A number of planes may be displayed at one time.

impulse pay-per-view. A method in which a viewer can order a pay-per-view event on impulse by pushing a button on a remote control or cable-converter keypad.

Indeo. Intel’s name for its DVI technology for software-only decoding.

independent. A TV station that has no exclusive affiliation which obliges it to carry programs from one of the national networks.

inline package. A housing, for amplifiers or other CATV components, designed for use without jumper cables. Cable connectors on the ends of the housing are in line with the coaxial cable.

insertion loss. Additional loss in a system when a device such as a directional coupler is inserted; it is equal to the difference in signal level between input and output of such a device.

intelligent agent. Software that helps viewers to find their way around interactive TV material. An intelligent agent acts on behalf of the customer to select material of interest. It can be personalized by each user.

intensity. The density of color, ranging from dark to bright in an image.

interactive video. The name for systems that allow analog information stored on video discs to be accessed interactively by users through a computer.

interchangeability. The ability to exchange tapes between different manufacturers’ videotape recorders with no appreciable degradation of playback image.

interconnect. To link CATV headends, usually with microwave, so that subscribers to different cable systems can see the same programming simultaneously.

interference. Energy that tends to interfere with the reception of the desired signals, such as fading from airline flights, r-f interference from adjacent channels, or “ghosting” from reflecting objects such as mountains and buildings.

interframe compression. The removal of redundant information that is repeated from one frame to another in a moving video sequence.

interlace. The technique of using more than one vertical scan to reproduce a complete image. In television, a 2:1 interlace is used, giving two vertical scans per frame. One scan will be odd lines, the other will be even lines.

interlaced scanning. A scanning process in which each adjacent line belongs to the alternate field.

interleave ratio. The ratio of video to audio frames.

interleaving. Refers to the arrangement of video and audio data in the AVI file, which enables efficient

access of the data as bytes or streams during playback.

Internet. A collection of networks that use the TCP/IP protocol suite and function as a single, cooperative virtual network.

intra-frame compression. The removal of redundant information within an image or within a single frame of a moving video sequence.

IR. Infra Red

Infra Red (IR). Thermal radiation with wavelengths longer than that of visible light. It is often used as a line-of-site beam to control a television.

ISA Bus. Industry Standard Architecture Bus

Industry Standard Architecture Bus (ISA). The standard for card slots in PCs which was developed by IBM for the PCXT/AT series machines.

ISO9660. The standard way for laying directory information on a CD-ROM. Also known as the High-Sierra format.

ISO. International Standards Organization

International Standards Organization (ISO). The worldwide coordinating standards body with a membership composed of national institutions for standards in individual countries such as the British Standards Institution (in the United Kingdom) and the American National Standards Institute (in the United States). One of ISO's major accomplishments is the development of the Open Systems Interconnections (OSI) reference model.

isochronous. Streams of digital audio and video are sampled at a continuous real-time rate at the source, and must be played at the same (constant bit rate) continuous real-time rate at the destination. In circuit switched networks, a real or virtual circuit exists, and although there is propagation delay due to the length of the circuit and intermediate switches, the network is isochronous. Packet switched networks are not isochronous and the digital video stream is grouped into packets of various sizes, and so the packets are separately switched and routed through the network. In addition, the time taken for a packet to transverse the network can vary and results in varying arrival times. The variance in arrival times is known as jitter.

ISV. Independent Software Vendor

Independent Software Vendor (ISV). Any third party software company.

ISVD. Integrated Switched Digital Video.

ITU-T. International Telecommunication Union

International Telecommunication Union (ITU-T). The United Nations specialized agency dealing with telecommunications. One of its bodies, the former CCITT, is the ITU-T (Telecommunications Standardization Sector). Another is ITU-R (Radio communication Sector), formerly the CCIR.

ITU-TSS. International Telecommunications Union-Telecommunication Standardization Sector

International Telecommunications Union-Telecommunication. See CCITT.

IXC. Interexchange Carrier

Interexchange Carrier (IXC). Quite literally, these carriers transmit information between exchanges, frequently called long distance carriers. Major examples are AT&T, MCI, and Sprint.

J

JPEG. Joint Photographic Experts Group (ISO-10918)

Joint Photographic Experts Group (ISO-10918) (JPEG). Refers to a standard for still image compression. This is a "lossy" compression, which means that some data is lost when it is encoded. The amount of loss can be varied by changing the quality ('Q') factor. Compression of 20:1 still looks close to the original. Compression is done in 24-bit color and uses Discrete Cosine Transforms (DCTs).

K

kiosk. A self-contained, free-standing unit used to house an interactive videodisc system. Usually designed for use in public access environments.

L

LAN. Local Area Network

Local Area Network (LAN). Usually refers to a network within a building or even a department. See also MAN and WAN.

LAN Server. IBM's network file server product for the PC.

LDS. Local Distribution System

Local Distribution System (LDS). A wideband microwave system or cable system that is capable of transporting a number of television signals simultaneously. Used to interconnect cable system headends.

LEC. Local Exchange Carrier

Local Exchange Carrier (LEC). The local telephone company. Generally subdivided into Bell operating companies and independents. As competition becomes more common in the local exchange area, it is quite likely that competitive access providers (CAPs) will also qualify for this name.

level. The average intensity of an audio or video source.

level 1 gateway. Knows where information is on the network.

level 2 gateway. Provides connection to other networks. Connects the system to the network and manages the overall system resources.

level diagram. A graphic diagram indicating the signal level at any point in the system.

Light Table. A special Desktop folder that adds new behavior to handle multimedia files and database attachment. A Light Table folder is a tool for collecting, organizing, classifying, and querying multimedia objects.

Light Table Reference. A shadow-like Desktop object that helps manage offline multimedia files. A Light Table Reference can access objects located elsewhere without copying them; it can preserve a reference even if the original object is stored offline or is deleted; it lets you assign and retain a name different from the original object's name.

line. Part of a video signal, which is a series of repeated horizontal lines, consisting of control and picture information.

line device. An external video source device, such as a camcorder, videotape, or videodisc device that is not controlled by the multimedia system.

line extender. Types of amplifiers used in the feeder system.

line frequency. The number of horizontal scans per second, nominally 15,750 times per second.

line protocol. A method of communication where a communications line is opened up and over which some protocol is carried. Most socket-based protocols are line protocol. See also *connectionless protocol*.

linear editing. Editing method used for analog video, in which specific frames can only be accessed sequentially. Linear editing can be a time-consuming process because of the fast-forwarding and rewinding required to select edit points and shuttle to indexed counter numbers.

lossless. Any form of compression in which the original data can be recovered without loss.

luminance. The brightness of an image. The signals that represent the brightness components of the video.

luminance signal. That portion of the NTSC color television signal that contains the luminance or brightness information.

M

M-ACPA. Multimedia-Audio Capture and Playback Adapter

Multimedia-Audio Capture and Playback Adapter (M-ACPA). It contains a programmable Digital Signal Processor (DSP), and stereo CD quality D/A and A/D converters.

M-JPEG. Motion JPEG

Motion JPEG (M-JPEG). A simple technique of stringing a series of JPEG images together into a file to achieve motion video. There is no standard format for this, and so any frame size or rate can be possible. It achieves about 20:1 compression.

M-Motion. (1) Analog video mixing card made by IBM for the Micro Channel bus. Only supports 640x480 display modes. (2) IBM M-Motion Video Adapter/A for the PS/2 Micro Channel adapter. Used to display full-motion color video on a standard PS/2 color monitor.

MAC. Multiplexed Analogue Components

Multiplexed Analogue Components (MAC). A color system designed for satellite broadcasting and for subsequent distribution over cable.

main trunk. The major link from the headend to feeder lines.

MAN. Metropolitan Area Network

Metropolitan Area Network (MAN). Refers to a network between buildings within a geographically local area. A network linking multiple, geographically separate LANs together usually confined to a metropolitan area. See also LAN and WAN.

MCI. Media Control Interface

Media Control Interface (MCI). A standard API for MME and MMPM/2. Provides very high level control of devices.

MHEG. Multimedia and Hypermedia information coding Expert Group

information coding Expert Group (MHEG)

Multimedia and Hypermedia. The MHEG standard provides an interoperable, system independent

encoding/decoding format for multimedia and hypermedia. MHEG is also an ISO/IEC group organized to ensure that MHEG is interoperable with DSM-CC, DSM-VV and MPEG-2 standards. MHEG-5 is a base-level profile that is optimized to the reduced requirements of digital and interactive television systems. MHEG-5 has been chosen by DAVIC as their general multimedia format and key technology for the set-top box. MHEG-5 is also under consideration by DVB as the general multimedia component and by the International Multimedia Association as the Standard Run-Time Environment.

microwave. Line-of-sight, point-to-point transmission of signals at high frequency. Many CATV systems receive some television signals from distant antenna location with the antenna and the system connected by microwave relay.

mid band. The part of the frequency band that lies between television channels 6 and 7, received by the FCC for air, maritime and land mobile units, FM radio and aeronautical and maritime navigation. Mid band frequencies, 108 to 174 MHz, can also be used to provide additional channels on cable television systems.

MIDI. Musical Instrument Digital Interface

Musical Instrument Digital Interface (MIDI). A standard (both hardware and data format) for communication between musical instruments. Records music as a series of events rather than as a waveform.

MIDI channel. The MIDI protocol assigns a channel number from 1 to 16 to each music note and control being transmitted. A synthesizer can choose to respond to all music notes and controls (omni mode) or to just those notes and controls with its own specific channel assignment. Channel allows one data stream to contain musical data that only a specific synthesizer will respond to.

MIDI interface. Hardware interface between MIDI devices. The MIDI interface is labeled MIDI IN, MIDI OUT, or MIDI THROUGH. The industry standard is the Roland MPU-401 interface.

MME. Multimedia Extensions

Multimedia Extensions (MME). The multimedia extensions to MS Windows.

MMPM/2. Multimedia Presentation Manager

Multimedia Presentation Manager (MMPM/2). The multimedia extensions and APIs for OS/2.

modulation. Impressing information upon a radio-frequency carrier wave by varying some parameter of that wave.

modulator. The electronic equipment required to combine video and audio signals from a studio and convert them to radio frequencies (r-f) for distribution on a cable system. Also, a very low-powered television signal generator used to provide signals for distribution on a CATV system.

morphing. The transformation of a digital image into another image.

MPC. Multimedia PC

Multimedia PC (MPC). The Microsoft standard for multimedia PC's. Includes MS Windows, 256-color VGA graphics, a CD-ROM drive and a 386 processor.

MPEG. Motion Pictures Expert Group, ISO-11172

Motion Pictures Expert Group, ISO-11172 (MPEG).

Refers to a standard for motion video that attains a data rate of 1.5Mbps or more with compression of between 50:1 and 200:1. It does this through the use of JPEG technology, motion prediction, and encoding only the differences between frames. Image size is encoded at 352x240 with decode possible at that size or at 176x120. MPEG compresses one frame and then stores the differences between that frame and subsequent frames.

- **I-Frame** - Intra-frames (or important frames). These frames encode the full image.
- **B-Frame** - Bi-directional frames (or between frames). These frames store motion prediction information between the nearest P- or I-Frames.
- **P-Frame** - Predicted frames (or partial frames). These frames store differences from the last I-Frame.

The standard sequence is "IBBPBBPBBPBB/BBPBBPB" but other sequences are allowed including a sequence of all I-Frames (see MJPEG). Note that since prediction is used, frames are sent out of order, so the actual frame order looks like "0 x x 3 1 2 6 4 5 9 7 8 12 10 11" where the "x"s refer to either nothing or the wrap from the previous sequence. Audio compression is at about 6:1, bringing bit rates to 256Kbps for CD quality sound.

MPEG-1. 1.5Mbps, video compression 50:1 to 200:1, audio compression approximately 6:1. VCR quality signal.

MPEG-2. Extension of MPEG-1 to allow between 4Mbps and 16Mbps with the goal of encoding 720x486 (broadcast quality) video in a more scalable form. The goal is quality instead of size restriction.

MSA. Metropolitan Service Area

Metropolitan Service Area (MSA). FCC designated market areas which are the basis for cellular service boundaries. In addition, there are Rural Service Area (RSA) markets.

MServer. The core technology to the Ultimedia Client/Server projects. This refers to the main piece of the system from the Protocol Engine through the Stream Management Subsystem (SMS).

MSO. Multiple System Operator

Multiple System Operator (MSO). A company which owns more than one CATV system.

MTSO. Mobile Telephone Switching Office

Mobile Telephone Switching Office (MTSO). Location of the switch controlling operation of a cellular system.

multitasking. A technique that allows several processes to appear to run simultaneously, even though the computer only has one CPU. This is achieved by sequentially switching the CPU between tasks.

N

narrow band. 2.4Kbps to 128Kbps. Used for voice and switched data information.

net weekly circulation. The estimated number of television households viewing a particular station at least once per week, Monday-Sunday, 6 am to 2 am, EST. Used to determine whether a station is "significantly viewed" in an area and must be carried by a cable system operating in that area.

network. Group of radio or television outlets, linked by cable or microwave, that transmit identical programs simultaneously, or the company that produces programs for them. The three national commercial television networks in the U.S. are the American Broadcasting Company, the Columbia Broadcasting Company and the National Broadcasting Company.

network layers. Three layers of network protocols:

- Local Area - Ethernet, Token Ring, FDDI
- Higher Layer - APPN, NetBios, TCP/IP, OSI, and SMDS
- Backbone - ISDN, ATM, and SONET (switched and non-switched)

network types. Networks can be:

- Dedicated or undedicated
- Switched or continuous
- Symmetric or asymmetric
- Isochronous or not

NFS. Network File Systems

Network File Systems (NFS). A standard way to mount directories from network servers.

NII. National Information Infrastructure

National Information Infrastructure (NII). In the words of Vice President Al Gore, "a seamless web of communications networks, computers, databases and consumer electronics that will put vast amounts of information at users' fingertips."

NIU. Network Interface Unit

Network Interface Unit (NIU). The demarcation point between service providers owned and customer owned wiring and equipment. Also called Network Interface Device.

NLS. National Language Support

National Language Support (NLS). International language support.

NNI. Network-Network Interface

Network-Network Interface (NNI). The interface connecting one network node to another.

noise. The word "noise" is a carryover from audio practice. Refers to random spurts of electrical energy or interference. May produce a "salt-and-pepper" pattern over the picture. Heavy noise sometimes is called "snow."

non-linear editing. Editing method used for digital video, in which frames and segments can be accessed instantaneously and in any order. Nonlinear editing is possible when video is stored as digital data and benefits from the random-access capabilities of digital storage media.

NTSC. National Television Standards Committee

National Television Standards Committee (NTSC). The television transmission standard formulated by the National Television Standards Committee and used in the United States, Canada, Mexico, Japan, and Korea. Uses 512 lines of video with 30 frames/sec interlaced.

NVOD. Near-Video-On-Demand

Near-Video-On-Demand (NVOD). Unlike video on demand, the customer does not control a virtual channel. Popular movies are placed on multiple channels with staggered start times. Customer tunes to appropriate channel for nearest start time. VCR-like controls (for example, pause and stop) are not available.

Nways switch. An IBM high speed, fast packet cell switch for use in the backbone of a broadband network. It provides backbone access functions for the attachment for external devices through several different standard physical interfaces. It guarantees a specified quality of service by reserving the required bandwidth along the connection route.

O

OAM&P. Operation Administration Maintenance & Provisioning

Operation Administration Maintenance & Provisioning (OAM&P). The collection of functions provided by an operations support system. These include monitoring network status, collecting usage data, monitoring performance, and processing orders.

OC-N. Optical Carrier - Level N

Optical Carrier - Level N (OC-N). The hierarchy of optical SONET signals at multiples of 51.840Mbps. It is a direct counterpart to the electrical STS-N. The value of N ranges from 1 to 48.

OCx. Optical Carrier

- OC3 = 155Mbps
- OC12 = 620Mbps
- OC24 = 1200Mbps

off-the-air. Reception of a TV signal that has been broadcast through the air.

optical disc. A disc on which information is read and written using light, usually a laser.

optical fiber. The thin glass tube through which light signals are sent to provide a telecommunications path.

ordinance. A local law which governs the institution and operation of a cable television system in a community.

OSI. Open Systems Interconnection

Open Systems Interconnection (OSI). A seven-layer framework of standards for network communication. OSI creates an open systems networking environment where different systems can share data regardless of vendor or platform.

OSS. Operational Support Systems

Operational Support Systems (OSS). Consist of the following systems:

- *Inventory management* - Used during network operation to maintain network inventory records. It provides a mechanism for accessing and updating information on all network sites, facilities, and equipment.
- *Network Management System* - Used to operate and monitor the network, analyze network incidents, collect network events, and report network performance.
- *Service Ordering System* - Used to automate customer order processing, provision of services, and sell products and services. It handles deposits, payments and tracking of the order

through activation and completion. It allows customer service representatives to add, delete and change subscriber information.

- *Billing System* - Delivers, measures, and bills for services provided.
- *Customer Service System* - Used to service customer needs, respond to service requests and inquiries and receive complaints and fault reports.

OSS. (Operational Support System) - Software that furnishes tools to provide network control, monitoring and business functions. Nearly all pieces of network equipment or major network functions have an OSS.

P

packet. A group of bits that is switched as an integral unit (data packet). A packet typically contains data, destination and source addresses, and control information, all arranged in a special format.

packet switching. Dividing information up in to small chunks, called packets or cells, that are routed individually through the network. Commonly used today in data communications. Future plans are to use it for all information types including voice and video. Packet switching implementations include X.25, Frame Relay, ATM, and SMDS.

pairing. A partial or complete failure of interlace in which the scanning lines of alternate fields do not fall exactly between one another but tend to fall (in pairs) one on top of the other.

PAL. Phase Alternation Line

Phase Alternation Line (PAL). The color video signal standard made up of a 625-line screen updated at 25 frames per second. Developed in Germany and used in most of Europe, Africa, Australia, New Zealand, and some countries in Asia and South America.

palette. The number of colors available in an artwork.

passive device. A circuit or network not using active devices.

PBX. Private Branch Exchange

Private Branch Exchange (PBX). Customer premises version of a central office switch. Switches all calls between phones on-premises and provides a second dial tone for calls over the public network.

PCM. Pulse Code Modulation

Pulse Code Modulation (PCM). The typical way to encode audio data. Standard PCM encodings use 8 or 16 bits per sample and range from 8k samples/sec to 44.1k samples/sec in either mono or stereo. All audio file formats support PCM.

PCM. (Pulse Code Modulation) - A coding scheme for converting analog voice signals into a digital bit stream. A digitizing technique, PCM is the basis for digital communications in North America.

PCMCIA. Personal Computer Memory Card International Association

Personal Computer Memory Card International Association (PCMCIA). An industry group that defines standards for PC cards that conform to the standard are about the size of credit cards. There are three types of varying thickness:

- Type I (3.3mm) cards are usually used for SRAM, DRAM, ROM and flash memory.
- Type II (5.0mm) cards usually accommodate I/O devices as well as mass storage.
- Type III (10.5mm) cards contain miniature hard disks.

PCN. Personal Communications Network

Personal Communications Network (PCN). A wireless telephone network concept similar to cellular, operating in the 1800-2000 MHz range. Smaller, low-power cells reduce range in comparison to cellular, but keep handset cost low.

PDN. Public Data Network

Public Data Network (PDN). A network used for the transmission of data. The packet switched or X.25 network is one example along with the future asynchronous transfer mode (ATM) network.

pel. Picture element. The smallest building block that a screen or bit-mapped image can display. Pel and pixel can be used interchangeably.

performance standards. The minimum technical criteria that must be met by CATV systems, consistent with standards set by the FCC or the local ordinance.

Photo-CD. A CD-ROM format promoted by Kodak for storing photograph quality images on a disc. Fits approximately 100 photos on a disc. Uses ISO9660 directory formatting.

picture tube. A cathode-ray tube used to produce an image by varying the intensity of a scanning beam.

pixel. (1) A picture element forming the basic element in a digital image. (2) A single point of an image, having a single pixel value.

pixel value. A number, or series of numbers, which represent the color and luminance of a single pixel.

PLV. A compression and decompression algorithm for ActionMedia II video.

Plug-and-play. Plug-and-play is a new technology. If adapters support this technology, installation and set-up of these adapters are easy because the adapters would be configured automatically during the start-up.

PostScript. A device independent programming language created by Adobe Systems Incorporated. Currently supported by IBM.

Presentation-Level Video (PLV). In DVI technology, the highest-quality video compression process. It requires the use of a large computer system for compression.

public access. To insure that divergent community opinion is aired on cable television, FCC rules require systems in the top 100 markets to set aside one public access channel along with the education and government channels. The public access channel is free and available at all times on a first-come, first-served basis for noncommercial use by the general public.

Px64. A video standard used for teleconferencing. It can run at any multiple of 64Kbps. Intended for use on ISDN.

Q

QAM. Quadrature Amplitude Modulation

Quadrature Amplitude Modulation (QAM). A digital cable modulation technique over an analog channel:

- 16-QAM=21.5Mbps
- 64-QAM=32.25Mbps

QOS. Quality of Service

Quality of Service (QOS). The characteristics of a network connection that are guaranteed by a service level agreement. They concern mainly end-to-end delay, delay variation, and packet loss ratio.

QuickTime. Apple's standard API for multimedia programming. It is available for the Macintosh and for MS Windows.

R

RAID. Redundant Array of Inexpensive Disks

Redundant Array of Inexpensive Disks (RAID). A technique for using less-expensive and less-reliable disks in an array to get the same level of reliability as more expensive high-reliability disks:

- Level 0 - Striping of data across multiple disks to provide speed but no redundancy.
- Level 1 - Disk mirroring. There are two disks that do redundant operations to protect against one failing.

- Level 2 - Block Interleaving. Data blocks are distributed among disks. Redundant drives are used to store error correcting information.
- Level 3 - Interleaved Data. Data is interleaved over the disks but a separate disk is used for parity and error correcting information. Can get very high transfer speeds.
- Level 4 - Same as Level 0, but with a parity disk.
- Level 5 - Same as Level 0, but parity information is also striped along with the data. Usually done across 5 disks. This means that a portion of each byte is written to each disk. Allows for a one disk to completely fail, or be removed while the system is running, without loss of any data. Also has a speed benefit.
- Level 6 - Same as Level 5, but dual drive controllers are used in order to remove the "single point of failure" problem.

real-time recording. Refers to the capturing of video and audio data in real time, as the analog signals are generated from the video source device. The video source device can be a camcorder or a videotape or videodisc player.

rec chunk. A chunk that surrounds the audio and video chunks of the current frame.

receiver isolation. The attenuation between any two receivers connected to the system.

record. To transfer data from one source (for example, microphone or videodisc) or set of sources to another medium.

redbook. The standard for the CD Audio format.

reference frame. (1) Refers to the complete frame that is created at periodic intervals in the output stream. An editing operation always begins at a reference frame. (2) Also referred to as a *key frame* or an *I-frame*.

reference frame interval. Frequency with which reference frames are to be inserted in the

reflections or echoes. In video transmission, this may refer either to a signal or to the picture produced.

1. Signal:
 - Waves reflected from structures or other objects.
 - Waves that are the result of impedance or other irregularities in the transmission medium.
2. Picture: "Echoes" observed in the picture produced by the reflected waves.

rendering. The generic term for 2D shaded images of 3D objects.

resolution. The ability of an image reproducing system to reproduce fine detail. In television,

resolution is specified in lines per picture height. Examples are 525 or 625 lines.

resolution. The number of dots per unit length measured in one of two directions. The number of pixels measured across and down the screen is also frequently referred to as its resolution.

return path. A communications channel from the customer's premises to the headend in CATV systems. Usually, it can cope with only a narrow bandwidth.

RF. Radio Frequency

Radio Frequency (RF). The radio frequency (RF) spectrum refers to the total range of radio frequencies (3KHz to 300GHz) that are used for telecommunications. A radio frequency wave that is used to carry information is called a carrier wave. By itself, a carrier wave is a repeating signal that conveys no information. The modulation process impressed information upon the carrier wave by altering one or more of its characteristics. These characteristics are the waves amplitude (amplitude modulation, AM), frequency (frequency modulation, FM), or phase angle (phase modulation, PM)

RF Modem. Radio Frequency Modem

Radio Frequency Modem (RF modem). Provides coding and modulation of the digital multimedia or digitally compressed video streams for transmission over the broadband network.

RGB (Red, Green, Blue). (1) A method of processing color images according to their red, green, and blue color content. Colors can also be measured on an HIS color scale. Contrast with composite, Y/C, and YUV. (2) Used to describe the way most video adapters and monitors encode colors.

RGB5-6-5. An image format in which each pixel is represented as 16 bits. The high-order 5 bits are red, the next 6 bits are green, and the low-order 5 bits are blue.

RISC. Reduced Instruction Set Computer

Reduced Instruction Set Computer (RISC). Refers to a CPU that is based around simple-to-implement instructions. Allows for more optimization of the processor because the interactions between instructions are more easily understood. The cost is that programs are bigger since they take more instructions to implement.

roll-off. A gradual attenuation of gain-frequency response at either or both ends of the transmission pass band.

router. A device that connects LANs of different protocols to wide area networks.

RTV. Real-Time Video

Real-Time Video (RTV). A compression and decompression algorithm; used in ActionMedia II video.

RTV. Intel's DVI technology that was meant for real-time encoding and decoding. Version 1.0 of the spec was used in the AVK. Version 2.0 has been renamed as Indeo, having a 256x240 resolution with up to 160:1 compression.

runtime system. A subset of the program files that can be copied free of charge to another computer to enable it to play video presentations.

S

saturation. Describes the purity of a hue. For example, red is more saturated than blue. Any color can be thought of as a mixture of a fully-saturated color (that is, red, blue) with varying amounts of either white, black, or gray.

scanner. A device which performs scanning.

scanning line. A single continuous narrow strip of the picture area containing highlights, shadows, and halftones, determined by the process of scanning.

Script-X. New multimedia scripting language being developed by the IBM and Apple joint venture, Kaleida.

SCSI. Small Computer Systems Interface

Small Computer Systems Interface (SCSI). A standard way to connect peripherals (like hard drives) to computer systems.

- SCSI-1 - 10Mbps bandwidth.
- SCSI-2 - Extends many details of the SCSI spec, and allows (in some cases) up to 20Mbps bandwidth.
- Fast SCSI - Allows up to 20Mbps bandwidth.
- Wide SCSI - Uses two SCSI cables to get double-wide data path, and hence Fast SCSI performance.

SDH. Synchronous Digital Hierarchy

Synchronous Digital Hierarchy (SDH). A set of ITU-T standards for the implementation of SDT.

SDT. Synchronous Digital Transmission

Synchronous Digital Transmission (SDT). A way of allowing individual channels within a multiplexed signal to be retrieved without fully demultiplexing the whole signal.

SECAM. Systeme Electronique Couleur Avec Memoire

Systeme Electronique Couleur Avec Memoire (SECAM). The color television standard developed in France and used in certain other countries. It specifies a 625-line screen updated at 25 frames per second.

SH. Stream Handler

Stream Handler (SH). A stream handler is a dynamically loaded module that is designed to move or control multimedia data. A list of the different types of stream handlers follows:

- *Source* - A stream handler that acts as a data source. Usually this involves reading data from some input device.
- *Sink* - A stream handler that consumes data. Usually this involves sending the data to some output device.
- *Filter* - A stream handler that converts data from one form to another or manages the flow of data.
- *Analog* - A stream handler that does not actually move data around. All it does is control an external device, like a videodisc player or VCR.

signal level. The RMS voltage measured during the r-f signal peak. It is usually expressed in microvolts referred to an impedance of 75 ohms, or in dBmV, the value in decibels with respect to a reference level of 0 dBmV, which is 1 millivolt across 75 ohms.

signal-to-noise ratio. The ratio of the signal to noise level with both measured either at the input or output of electronic equipment, usually expressed in dB.

skew. The number of frames that the audio stream leads the video stream in the AVI file. Having the audio stream lead the video stream allows audio buffers to stay full as the movie is played.

SLIC. Subscriber Line Interface Circuit

Subscriber Line Interface Circuit (SLIC). The line card that provides the interface between local loop and telephone company switching equipment.

slope. Difference in amplifier gain, or change in cable attenuation, between lowest and highest frequency present.

smear. A term used to describe a picture condition in which objects appear to be extended horizontally beyond their normal boundaries in a blurred or "smeared" manner.

socket. A UNIX term used to refer to a simple bi-directional network connection. It makes a connection appear like a file which can be read from or written to.

Software Motion Video. Digital video that uses software-based decompression algorithms; it requires no hardware (for example, video board) for playback.

solid state. A term taken from physics, used interchangeable with the word transistorized; also includes other semiconductor elements, such as diodes. Generally refers to tubeless equipment.

SONET. Synchronous Optical Network

Synchronous Optical Network (SONET). The proposed standard transport layer for ATM, capable of sending light pulses at 2.5Gbps. The technology is called "synchronous" because transmitted signals are synchronized to a standard using an external timing mechanism. This promotes better network monitoring and signal manipulation because the carriers know exactly where a signal is on the network at any given time. In contrast, traditional telecommunications networks are "asynchronous," or not completely in synch. The term "optical" is used because signals are transmitted optically rather than electronically.

SONET can be used in point-to-point links, but the telephone companies most popular application is in so-called "rings." That is, a ring of fiber optics is installed, usually in densely built business districts, to connect central offices and office buildings. Transmissions are sent in both directions around the ring.

First and foremost, the SONET standard is meant to allow for an optical interface between two different vendors' equipment. It also provides a means to make channel inserts and drops easy without the complex process of demultiplexing and remultiplexing.

SONET standards include a hierarchy of optical transmission speeds, called Optical Carrier at Level n (OC-n). Each OC-n level is a multiple of SONET's basic signal speed of 51.84Mbps.

Sound Blaster. An audio adapter for the PC made by Creative Labs.

spacing. Length of cable between amplifiers expressed as dB loss at the highest TV channel provided for in a system, equal to amplifier gain in maintrunks.

span. Distance between line extenders or distribution amplifiers; also, distance between taps.

SPE. Synchronous Payload Envelope

Synchronous Payload Envelope (SPE). A term referring to the information carrying capability of the SONET signal. Payload is information carried and envelope refers to the container and its format.

special effects. Electronic or optical patterns or illusions created between two or more video sources.

special effects generator. A device permitting combinations of images on a television screen supplied by one or more video inputs.

spectrum. The range of wavelengths or frequencies of electromagnetic radiation, including radio waves and light.

splitter. A passive device (one with no active electronic components) that distributes a television signal carried on a cable in two or more paths and sends it to a number of receivers simultaneously.

sprite. A small graphic that can be moved independently around the screen, producing animated effects.

star. A network topology in which there is a dedicated path from the headend to every customer.

still frame. Still material, including photographs, graphics, pages, and so forth. Designed and presented as a single videodisc frame.

story. A term for a multimedia presentation or application. Contains AVA/2 instructions in Text view, story frames in Graphics view.

streaking. A term used to describe a picture condition in which objects appear to be extended horizontally beyond their normal boundaries. This will be more apparent at vertical edges of objects when there is a large transition from black to white or white to black. The change in luminance is carried beyond the transition, and may be either negative or positive. For example, if the tonal degradation is an opposite shade to the original figure (white following black), the streaking is called negative; however, if the shade is the same as the original figure (white following white), the streaking is called positive. Long streaking may extend to the right edge of the picture, and in extreme cases of low-frequency distortion, can extend over a whole line interval.

stream. Data flow. Usually refers to a 1.5 megabit data flow. For example, the MediaSTREAMER™ can send up to 32 video streams.

STS. Synchronous Transport Signal

Synchronous Transport Signal (STS). The electrical equivalent of the SONET-defined optical signal with a base rate of 51.840Mbps.

STS-n. Synchronous Transport Signal Level n

Synchronous Transport Signal Level n (STS-n). The electrical equivalent of Optical Carrier Level n. STS-n signals are designed to be able to be converted to light and sent over the same level of optical carrier. See also *SONET*.

switcher. A control which permits the selection of one image from any of several cameras to be fed into the television display or recording system.

switcher/fader. A device permitting gradual, overlapping transition from the image of one camera to another. Sometimes incorporated as part of a special effects generator.

switching. The routing of information through the network.

symmetric compression. An approach to the encoding and decoding of digital information in which the decompression process is a step-by-step reversal of the compression process. The two processes therefore take the same length of time. The color sync signal (NTSC) is known as the color burst.

sync level. The level of the tips of the synchronizing pulses.

synchronization. Maintenance of simultaneous audio and video signals so that sound and picture operate in phase. Abbreviated "sync."

synthesizer. A musical instrument where the sounds are electronically generated and may be altered by the user.

system level. The level of signal in a CATV system at the output of each amplifier. It must be carefully chosen and maintained for the least amount of distortion and noise.

system noise. Refers to the random energy generated by thermal and shot effects in the system. It is specified in terms of its RMS level as measured in a 4 MHz bandwidth centered within a 6 MHz cable television channel.

T

T1. A phone company name for a 1.5Mbps leased phone line.

T3. A phone company name for a 45Mbps leased phone line.

tap. A device installed in the feeder cable which connects the home TV set to the cable network. Also called a drop.

TARGA. The trademark of True Vision Inc. for one of its video display cards. However, the term is widely used to refer to the file format that was established for these cards and used in the multimedia field.

Targa files. A standard still image format for the PC. Supports up to 24-bit images. The file extension is usually ".TGA."

tariff. A schedule of services and rates filed by common carriers with regulatory bodies.

TCP/IP. Transmission Control Protocol/Internet Protocol

Transmission Control Protocol/Internet Protocol (TCP/IP). A communications protocol linking different computer platforms across networks. TCP/IP functions at the 3rd and 4th layers of the open system integration model. This is the defacto standard way to ship data on local area networks and across the Internet. TCP is the transport layer and IP is the network layer.

tempo. The speed that a piece of music is played at.

TIFF. Tagged Image File Format

Tagged Image File Format (TIFF). A standard still image format for the PC and for Unix. Supports 8-bit and 24-bit images.

tint. Saturation: amount of white in a color.

Token Ring. A networking standard promoted by IBM. Runs at either 4Mbps or 16Mbps. Called a Token Ring because it was originally implemented in a ring configuration. Now, it is typically implemented in a star configuration with the "ring" feature being simulated in the hub.

transform. In data compression, refers to a process which converts a block of data into an alternate form.

transistor. A type of relay system that picks up signals from distant or blocked-out television stations, converts the signals to another channel to avoid interference and retransmits them into areas the original signals could not have reached. Translators do not use cable to reach subscribers' homes and do not offer the other kinds of services that cable can provide (local organization, two-way operation, and so forth).

transmission. The way data is encoded and transported across a network. It includes a network's data rates, multiplexing schemes, encoding techniques, and communications media.

U

Ultimotion. IBM's motion video encoding technique. It is typically stored in an AVI file format. It takes advantage of the fact that each frame may be encoded using a different encoding technology in order to achieve maximum quality and compression.

upstream. Signals traveling from subscribers to the headend.

UTP. Unshielded Twisted Pair

Unshielded Twisted Pair (UTP). The pairs of wire that are used for telephony in homes and business today.

UTS. Ultimedia Tool Series

Ultimedia Tool Series (UTS). A collection of multimedia tools for the PC which share the Tool Series architecture. Includes DOS, Windows, and OS/2 applications.

V

VBI. Vertical Blanking Interval

Vertical Blanking Interval (VBI). Consists of the first part of a video signal, which is used to direct the beam back to the upper-left corner of the screen to start the next frame. The VBI is the most common place for extra information to be sent, such as test signals or a data stream.

VCA. Video Capture Adapter

Video Capture Adapter (VCA). A Micro Channel card made by IBM which does live video in a window and video capture.

VDT. Video Dial Tone

Video Dial Tone (VDT). An FCC concept where telephone companies act as a common carrier serving video programmers to deliver video-based services to customers.

velocity of propagation. Velocity of signal transmission. In free space, electromagnetic waves travel with the speed of light. In coaxial cables, this speed is reduced. Commonly expressed as the percentage of the speed in free space.

VHF. Very High Frequencies

Very High Frequencies (VHF). The range of frequencies extending from 30 to 300 MHz; also television channels 2 through 13.

video. The visual components of a television signal.

video band. The frequency band utilized to transmit a composite video signal.

videodisc. An optical disc that can be used to store analog video and audio information. Some forms may also be able to store digital audio.

video for windows. Microsoft's motion video technique. It is based on Intel's Indeo/DVI technology. High quality video uses Indeo.

video server. Hardware and software for storing, retrieving, and playing out video material.

video tape. Used to electronically record sight and sound for instant playback. Videotape comes in half-inch, three-quarters, one and two-inch widths and can be erased and re-recorded. Operates at 30 frames/sec with a 4:3 aspect ratio.

video transmission. The original video signal before it is modulated and converted to radio-frequency and broadcast or cablecast. A home television set reconverts radio-frequencies to a video signal.

virtual circuit. A packet switched circuit (non-dedicated) that gives the appearance of a switched circuit (dedicated).

virtual star. A network topology that appears to give a dedicated path to every customer, although it may not really do so.

VOC Files. Creative Labs (Sound Blaster) standard audio file format.

VOD. Video On Demand

Video On Demand (VOD). Similar to the video store, customers request video programming from their home and receive it immediately. They control the video stream transmitted from within the network and have full VCR functions over it (for example, pause, fast forward, rewind).

VSAT. Very Small Aperture Terminal

Very Small Aperture Terminal (VSAT). A small antenna used for transmitting and receiving data communications.

VSB. Vestigial Sideband Transmission

Vestigial Sideband Transmission (VSB). Analog cable modulation recommended for use in HDTV:

- 4-VSB=21.5Mbps
- 16-VSB=43Mbps

VSWR. Voltage Standing Wave Ratio

Voltage Standing Wave Ratio (VSWR). Reflections present in a cable due to mismatch (faulty termination) combine with the original signal to produce voltage peaks and dips by addition and subtraction. The ratio of the peak-to-dip voltage is termed VSWR. A perfect match with zero reflections produces a VSWR of 1.

VTR. Videotape Recorder

Videotape Recorder (VTR). A device which allows the recording and playback of magnetic tape sound and picture recordings.

W

WAN. Wide Area Network

WATS. Wide Area Telephone Service

WAVE Files. A standard file format for storing waveform audio. File extension is usually ".WAV."

Wavelength Division Multiplexing (WDM). A method for transmitting two or more separate signals on the same fiber path by carrying each signal at a different wavelength.

WDM. Wavelength Division Multiplexing

Wide Area Network (WAN). (1) A network which spans any amount of distance. Currently, only phone system-based networks are typically used to WANs. (2) An integrated data network linking metropolitan or local networks over common carrier facilities.

Wide Area Telephone Service (WATS). Discounted toll service offered on an inward or onward basis. Inward WATS is better known as 800 Service.

wide band. 1.5Mbps to 45Mbps. Used for high speed (T1, T3) data networks.

windshield wiper effect. Onset of overload in multichannel CATV systems caused by cross-modulation, where the horizontal sync pulses of one or more TV channels are superimposed on the desired channel carrier. Both black and white windshield wiping are observed and are caused by different mechanisms.

WLFS. Workstation Lan File Server

Workstation Lan File Server (WLFS). A video file server based on LanServer and the ES/9000.

Supports hundreds to over one thousand video streams.

X

X.25. A network protocol for telephone lines or other point-to-point connections. Maximum speed is 56Kbps.

Y

Y. In color video, the abbreviation for luminance.

Y/C. Y represents luminance and C represents chroma (color). The luminance contains both the image detail and intensity levels, while the chroma has the color information for the image. The letter "Y" (luminance) refers to the color yellow.

YUV. Luminance, chrominance color space.

YUV4-1-1. An image format in which each pixel is represented as 16 bits. Each pixel has a unique luminance value, and four pixel horizontally arrayed share the same chrominance.

Z

zooming. Reducing the source image size by scaling it down to produce the target image size.

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