StreamRunner™ AVA/ATV
User's Manual

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Software Version 5.1.x

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WARNING: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void this user's authority to operate this equipment.

NOTE: The AVA-300 and ATV-300 have been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of the equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

DOC CLASS A NOTICE

This digital apparatus does not exceed Class A limits for radio noise emission for a digital device as set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class A prescrites dans le reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

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- EN 55022 - "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment."
- EN 50082-1 - "Electromagnetic compatibility - Generic immunity standard Part 1: Residential, commercial, and light industry."
- IEC 1000-4-2 - "Electromagnetic compatibility for industrial-process measurement and control equipment Part 2: Electrostatic discharge requirements."
- IEC 1000-4-3 - "Electromagnetic compatibility for industrial-process measurement and control equipment Part 3: Radiate electromagnetic field requirements."
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AUSTRALIA EMC COMPLIANCE

This product has been tested and found to comply with the Class A electromagnetic compatibility limits specified in AS/NZ 3548.

SAFETY CERTIFICATIONS

ETL certified to meet Information Technology Equipment safety standards UL 1950, CSA 22.2 No. 950, and EN 60950.

Table of Contents

Preface

Video and Audio Over ATM

The intent of this manual is to supply users of FORE Systems' *StreamRunner*™ AVA / ATV hardware and software with all the necessary information to configure and use this equipment successfully. This document also provides general product information, network configuration information, and video / audio-over-ATM theory. This document was created for users with various levels of experience, but assumes a basic familiarity with ATM and video / audio concepts. Please read this document carefully before attempting to perform the procedures contained in it. If you have any questions or problems with installation or configuration after reading this manual, please contact FORE Systems' Technical Support.

Chapter Summaries

Chapter 1 - Introduction - Provides an overview of the ATM Standard and describes FORE Systems' *StreamRunner* AVA / ATV hardware and software.

Chapter 2 - The AVA-300 - Provides an overview of the *StreamRunner* AVA-300.

Chapter 3 - The ATV-300 - Provides an overview of the *StreamRunner* ATV-300.

Chapter 4 - UNIX Basic Setup - Describes how to get started with *StreamRunner* AVA / ATV hardware and software on UNIX-based platforms over an ATM network.

Chapter 5 - Windows NT/95/98 Basic Setup - Describes how to get started with *StreamRunner* AVA / ATV hardware and software on Windows-based platforms over an ATM network.

Chapter 6 - SVA Control - Provides an overview of SVA Control, the Windows NT graphical user interface for configuring managers, traders, and patches.

Chapter 7 - AVA/ATV Applications - Describes how to construct user applications using SVA commands.

Chapter 8 - SVA Architecture - Describes the basic components of the *StreamRunner* SVA Software distribution including system architecture, device managers, and stream definitions.

Chapter 9 - svc-rtds - Provides an overview of the *StreamRunner* SVA Software distribution's Real-Time Display Software (RTDS) and describes how to operate its graphical user interface.

Chapter 10 - World Wide Web Applications - Discusses **`netpatch`**, the *StreamRunner* SVA Software distribution's WWW plug-in.

Chapter 11 - MBone Applications - Describes how to use **`vic`** and **`vat`**, the *StreamRunner* SVA Software distribution's MBone tools.

Chapter 12 - Conferencing - Describes how to configure two- or multi-site video conferences using the *StreamRunner* AVA / ATV system.

Chapter 13 - PVC Applications - Discusses using Permanent Virtual Circuits to configure a network which may not support or require SVCs.

Chapter 14 - Troubleshooting - Describes how to recognize, isolate, and resolve various problems associated with video and audio over ATM.

Appendix A - User-Directed SPVCs - Describes the use of User-Directed Soft Permanent Virtual Circuits which allow remote devices to establish connections without signalling interaction.

Appendix B - PVC Control Channels - Describes how to configure PVC-based control channels.

Appendix C - svamgr: PVC Control Channels - Provides an explanation of PVC-based manager registration.

Appendix D - svamgr: Early AVA-300 Units - Describes how to configure signalling channels with devices carrying early firmware versions.

Appendix E - Windows NT/95/98: Manual De-install - Describes how to manually de-install the SVA Software distribution from your Windows NT/95/98 workstation.

Appendix F - Manager Downlink - Describes the manager downlink facility which communicates changes in stream characteristics to all clients in the link.

Technical Support

In the U.S.A., customers can reach FORE Systems' Technical Assistance Center (TAC) using any one of the following methods:

1. Select the "Support" link from FORE's World Wide Web page:

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2. Send questions, via e-mail, to:

   support@fore.com

3. Telephone questions to "support" at:

   800-671-FORE (3673) or **724-742-6999**

4. FAX questions to "support" at:

   724-742-7900

Technical support for customers outside the United States should be handled through the local distributor or via telephone at the following number:

+1 724-742-6999

No matter which method is used to reach FORE Support, customers should be ready to provide the following:

- A support contract ID number
- The serial number of each product in question
- All relevant information describing the problem or question

Typographical Styles

Throughout this manual, all specific commands meant to be entered by the user appear on a separate line in bold typeface. In addition, use of the `Enter` or `Return` key is represented as `<ENTER>`. The following example demonstrates this convention:

`cd /usr <ENTER>`

File names that appear within the text of this manual are represented in the following style: "...the `fore_install` program installs this distribution."

Command names that appear within the text of this manual are represented in the following style: "...using the **`flush-cache`** command clears the bridge cache."

Subsystem names that appear within the text of this manual are represented in the following style: "...to access the **`bridge`** subsystem..."

Parameter names that appear within the text of this manual are represented in the following style: "...using *`<seg-list>`* allows you to specify the segments for which you want to display the specified bridge statistics."

Any messages that appear on the screen during software installation and network interface administration are shown in `Courier` font to distinguish them from the rest of the text as follows:

```
.... Are all four conditions true?
```

Important Information Indicators

To call your attention to safety and otherwise important information that must be reviewed to ensure correct and complete installation, as well as to avoid damage to the FORE Systems product or to your system, FORE Systems utilizes the following *WARNING/CAUTION/NOTE* indicators.

WARNING statements contain information that is critical to the safety of the operator and/or the system. Do not proceed beyond a ***WARNING*** statement until the indicated conditions are fully understood or met. This information could prevent serious injury to the operator, damage to the FORE Systems product, the system, or currently loaded software, and is indicated as follows:

WARNING!

Hazardous voltages are present. To reduce the risk of electrical shock and danger to personal health, follow the instructions carefully.

CAUTION statements contain information that is important for proper installation/operation. Compliance with **CAUTION** statements can prevent possible equipment damage and/or loss of data and are indicated as follows:

CAUTION

You risk damaging your equipment and/or software if you do not follow these instructions.

NOTE statements contain information that has been found important enough to be called to the special attention of the operator and is set off from the text as follows:

These `mute` and `pause` controls are local to the ATV-300. Their use does not effect an AVA-300 sending video or audio streams to the ATV-300.

Safety Precautions

For your protection, observe the following safety precautions when setting up equipment:

- Follow all warnings and instructions marked on the equipment.
- Ensure that the voltage and frequency of your power source matches the voltage and frequency inscribed on the equipment's electrical rating label.
- Never push objects of any kind through openings in the equipment. Dangerous voltages may be present. Conductive foreign objects could produce a short circuit that could cause fire, electric shock, or damage to your equipment.

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CAUTION

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WARNING!

FORE Systems products are designed to work with single-phase power systems having a grounded neutral conductor. To reduce the risk of electrical shock, do not plug FORE Systems products into any other type of power system. Contact your facilities manager or a qualified electrician if you are not sure what type of power is supplied to your building.

WARNING!

Your FORE Systems product is shipped with a grounding type (3-wire) power cord. To reduce the risk of electric shock, always plug the cord into a grounded power outlet.

CHAPTER 1 Introduction

This chapter provides an introduction to the ATM Standard and FORE Systems' *StreamRunner* AVA / ATV hardware and software.

1.1 Overview of the ATM Standard

Asynchronous Transfer Mode, or ATM, is a communication architecture based on the switching of small, fixed-length packets of data called cells. In ATM, all data is transferred in 53-byte cells. Each cell has a 5-byte header that identifies the cell's route through the network and 48-bytes containing user data. The user data carries any headers or trailers required by higher- level protocols.

Perhaps the most important advantage offered by ATM, in addition to the speed at which data is transferred, is its open-ended growth path. ATM is not locked into a single, physical medium or speed. The fixed-size ATM cell allows traffic from multiple sources (simultaneous video, audio, and data communication) to be switched to multiple destinations by fast ATM switches.

For any two parties to communicate over an ATM network, a connection, either a Permanent Virtual Circuit (PVC) or a Switched Virtual Circuit (SVC), must be established between them. How such connections are set up depends on the particular ATM network in use. However, in all cases, an end-to-end ATM connection can be thought of as a set of sub-connections through the network.

Each sub-connection is defined by a Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI) pair. Thus, an ATM connection is a set of VPI / VCI pairs, with one pair for each directly connected piece of equipment.

1.2 *StreamRunner* SVA Software

The *StreamRunner* SVA Software (hereafter referred to as the SVA Software) controls and manages the *StreamRunner* AVA-300 and the *StreamRunner* ATV-300, creating a distributed multimedia environment.

1.3 *StreamRunner* AVA-300

The *StreamRunner* AVA-300 (hereafter referred to as the AVA-300) receives audio and video signals from conventional sources such as a VCR, camcorder, or stereo receiver, and digitizes these signals for transfer over an ATM network. The AVA-300 supports PAL and NTSC video formats for optimal workstation reception and Motion-JPEG compression for real-time video applications.

1.4 *StreamRunner* ATV-300

The *StreamRunner* ATV-300 (hereafter referred to as the ATV-300) decodes digital signals transmitted over the ATM network by an AVA-300 and converts them into conventional analog signals. The ATV-300 provides full-frame-rate interlaced video output with up to DAT-quality audio. The ATV-300 can decode multiple video streams from the ATM network and display them in a tiled or picture-in-picture presentation.

The ATV-300 also supports an infrared remote control facility which is capable of interacting with software running remotely in the network.

CHAPTER 2 The AVA-300

This chapter provides an overview of the AVA-300. Information about unpacking, general features, technical and physical specifications, and front and rear panel details is included.

2.1 Unpacking Information

Before installing the AVA-300, inspect the package for any damage that may have occurred during shipping. If the package shows any sign of external damage or rough handling, notify your carrier's representative. When unpacking the AVA-300, be sure to keep all original packing materials for storing, transporting, or returning the product.

CAUTION

All products returned to FORE Systems under warranty must be packed in their original packing materials.

Verify the contents of the package. The following items should be present:

- AVA-300
- External Power Supply Unit
- Release Notes (if applicable)

If any of the above items is missing or damaged, please contact FORE Systems' Technical Support or your local distributor immediately. Before proceeding with any installation, please read the enclosed release notes that may accompany the unit.

2.2 AVA-300 Overview

As new applications drive the requirement for more bandwidth, users are turning to ATM to provide a method for implementing high quality video transfer. The AVA-300 provides an efficient platform for one-way video and audio multicasts. The AVA-300 is a stand-alone device that is suitable for a wide variety of applications.

The output from a camcorder, VCR, or any other standard video and/or audio source may be directly connected to an ATM network through the AVA-300. The AVA-300 converts video and audio inputs from their analog format to an uncompressed or compressed digital format encoded over an ATM cell stream. The ATM network can then be used to switch or multicast the video and audio to any number of desired locations.

The only additional hardware required to display video and playback audio on a UNIX or Windows NT/95/98 workstation is an ATM network interface card. In the very near future, it is speculated that many vendors will supply workstations and PCs with an ATM network interface as standard. Also, the capability of workstations is improving to the extent that the video performance currently attainable by software decode could only recently be achieved by specialized third-party video boards.

2.3 AVA-300 Technical and Physical Specifications

The Technical Specifications of the AVA-300 are detailed in Table 2.1:

Table 2.1 - AVA-300 Technical Specifications

Feature	Specification
ATM Interface	25 & 155 Mbps UTP (RJ-45 connectors) 155 Mbps MMF (SC connectors) 155 Mbps intermediate reach SMF (SC connectors)
Video Formats	PAL (50Hz) and NTSC (60Hz), software selectable
Video Connectors	6 RCA/Phono sockets configurable as 6 composite channels or 3 S-Video channels; video inputs may be multiplexed onto a maximum of 4 video output streams
Digital Video	Uncompressed 24-bit, 16-bit, or 8-bit RGB or 8-bit mono; or compressed using Motion JPEG with software-selectable compression factors
Video Sizing	Analog sampling region and digital display size configurable on a per-stream basis (down-scaling of sampled region to fit display size)
Video Controls	Input brightness, contrast, and color all controllable over network
Video Performance	50 fields per second (PAL) or 60 fields per second (NTSC)
Audio Connectors	6 RCA/Phono input sockets equalling 3 stereo input channels; one input channel selectable for ATM network transmission at a time
Digital Audio	8- or 16-bit PCM, A-Law or μ-Law (stereo/mono) formats; sampling rate from 5kHz to 44.1kHz (CD) and 48kHz (DAT)
Rate Control	Software configurable cell pacing for ATM output streams to ensure traffic contract compliance
Serial Interface	RS-232, accessible over the ATM network
Auxiliary Connector	External Configuration Module (ECM) plug-in stores video and audio stream configurations for power-up auto-loading
ATM Protocols	ATM Forum's UNI 3.0 and UNI 3.1 supported by accompanying SVA software
Emissions	FCC Part 15, Class A; CISPR 22, Class A; VCCI Class 1
Safety	US: UL1950; Canada: CSA 22.2; No. 950-M89; Europe: EN60950

The Physical Specifications for AVA-300s with a hardware version less than 300.10 are detailed in Table 2.2:

Table 2.2 - Physical Specifications for AVA-300 Hardware Version less than 300.10

Feature	Specification
Dimensions	H: 2.4” (6 cm) x W: 10.6” (27 cm) x D: 9.8” (25 cm)
Weight	3.8 lb. (1.8 kg)
Operating Temperature	32° F to 104° F (0° C to 40°C)
Operating Humidity	10% to 90% non-condensing
Power	External PSU: 120/240Vac, 50/60 Hz (autoranging) Tolerance: 88-132Vac/176-264Vac, 47-63 Hz Maximum Power Consumption: 25 W

The Physical Specifications for AVA-300s with a hardware version of 300.10 or later are detailed in Table 2.3:

Table 2.3 - Physical Specifications for AVA-300 Hardware Version 300.10 or later

Feature	Specification
Dimensions	H: 2.4” (6 cm) x W: 10.6” (27 cm) x D: 9.8” (25 cm)
Weight	3.8 lb. (1.8 kg)
Operating Temperature	32° F to 104° F (0° C to 40°C)
Operating Humidity	10% to 90% non-condensing
Power	External PSU: 120/240Vac, 50/60 Hz (autoranging) Tolerance: 88-132Vac/176-264Vac, 47-63 Hz Maximum Power Consumption: 25 W

2.4 AVA-300 Front Panel Detail

The AVA-300's physical front panel features, including connection sockets, indicator lights, and their functions, are described in this section. Figure 2.1 shows the AVA-300's front panel arrangement, and is followed by an explanation of each feature.

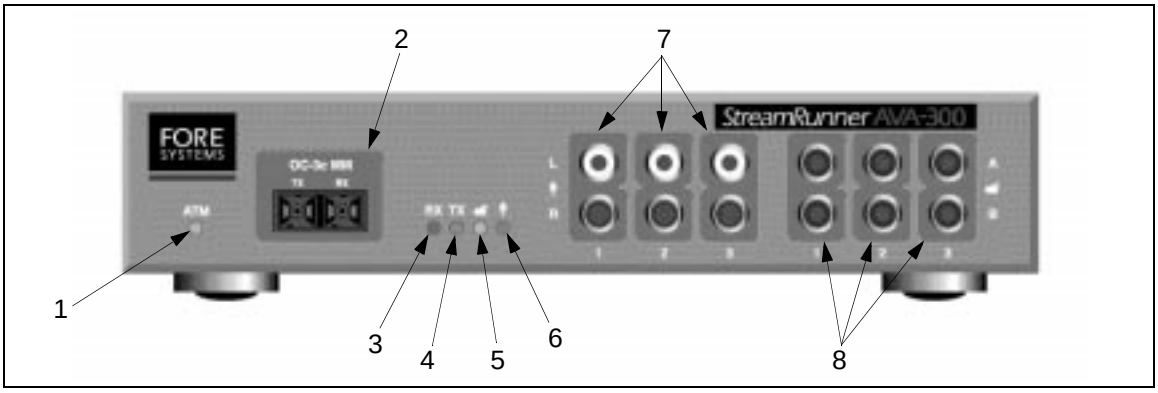

Figure 2.1 - AVA-300 Front Panel Detail

ATM LED (1) Indicates the status of ATM network connectivity. **Green** indicates connectivity to the network. **Red** indicates connectivity has not been achieved.

ATM Interface (2) Provides connectivity to the ATM network. Figure 2.1 illustrates an AVA-300 with a fiber optic interface.

RX LED (3) Indicates that cells are being received from your switch by the AVA-300 when it blinks **blue**.

TX LED (4) Indicates that cells are being transmitted by the AVA-300 to the switch when it blinks **red**.

Video LED (5) Indicates that video signals are being digitized by the AVA-300 when it is solid or blinks **yellow**.

Audio LED (6) Indicates that audio signals are being digitized by the AVA-300 when it is solid **green**.

Audio Connectors (7) Provide three stereo input channels, one of which may be selected for ATM network transmission at a time.

Video Connectors (8) Provide three S-Video or six composite video input channels. Inputs may be multiplexed onto a maximum of four video output streams.

2.5 AVA-300 Rear Panel Detail

The AVA-300's physical rear panel features are described in this section. Figure 2.2 shows the AVA-300's rear panel arrangement, and is followed by an explanation of each feature.

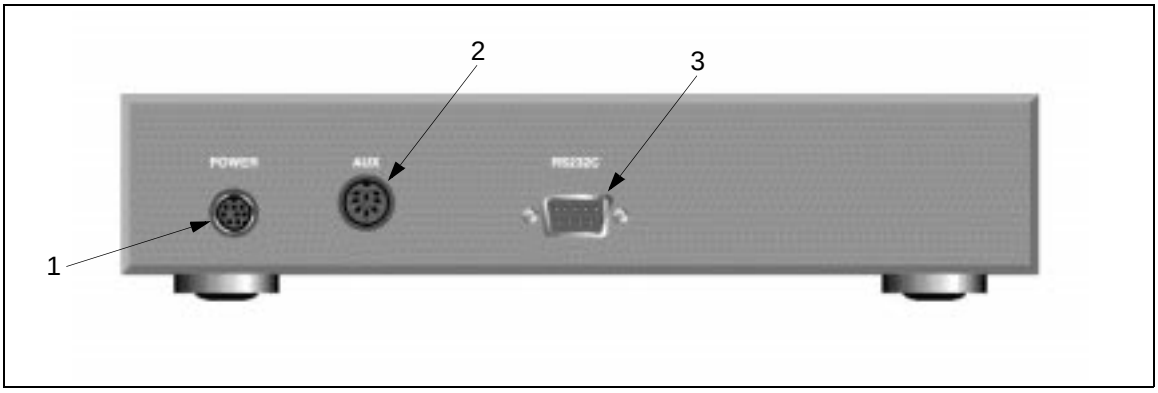

Figure 2.2 - AVA-300 Rear Panel Detail

Power DIN Connector (1) Provides External Power Supply Unit (PSU) connectivity.

AUX DIN Connector (2) Provides External Configuration Module (ECM) connectivity.

RS232C Port (3) Provides serial connectivity to and from the ATM network.

NOTE Some AVA-300 models (hardware version earlier than 300.10) have a power switch.

2.5.1 AVA-300 Serial Port Hardware

The AVA-300 RS232C serial port, located on the unit's rear panel, is a 9-pin male D-connector. The serial port's pinout is shown in Figure 2.3.

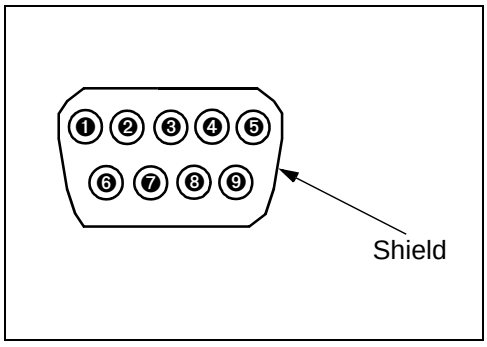

Figure 2.3 - AVA-300 Serial Port Pinout

The individual pins and cable shield have the following functions:

Shield	Ground
Pin ❷	Receive data to the AVA-300
Pin ❸	Transmit data from the AVA-300
Pin ❹	Tied high (to 9V)
Pin ❺	Ground
Pin ❼	Tied high (to 9V)

The remaining pins are unconnected.

NOTE

A null modem (cross-over) cable is required to connect to a workstation or similar device. Hardware flow-control (RTS / CTS-type schemes) are not supported.

NOTE

The AVA-300 serial hardware operates at 8 bits data plus 1 stop bit with no parity. Hardware flow-control schemes (e.g., RTS / CTS) are not supported.

WARNING!

Care must be taken when using the serial interface on AVA-300 systems at hardware versions earlier than 300.10. The hardware version of your AVA-300 may be ascertained using the `avareset` program. Please refer to Section 4.5. In particular, using a serial cable with pins 4 (DTR) and 8 (CTS) connected from the AVA-300 (Data Set end) to the remote device (Data Terminal end) may result in permanent damage to the AVA-300 serial port hardware. Using a cable with DTR directly connected to CTS at the AVA-300 end will not cause any problems. Under normal circumstances, a cross-over (Null Modem) cable with only pins 2 (Rx), 3 (Tx) and 5 (Ground) connected will work without any problems. However, the only safe option is to ensure that pins 4 and 8 are not connected.

2.6 External Power Supply Unit (PSU)

The AVA-300 and ATV-300 external Power Supply Unit (PSU) is shown in Figure 2.4. The PSU is a step-down transformer that automatically senses the correct line voltage. The PSU attaches to the Power DIN connector located on the AVA-300's rear panel. The power cable attaches to the PSU's IEC connector port.

Some AVA-300 and ATV-300 models are shipped with a slightly different power supply.

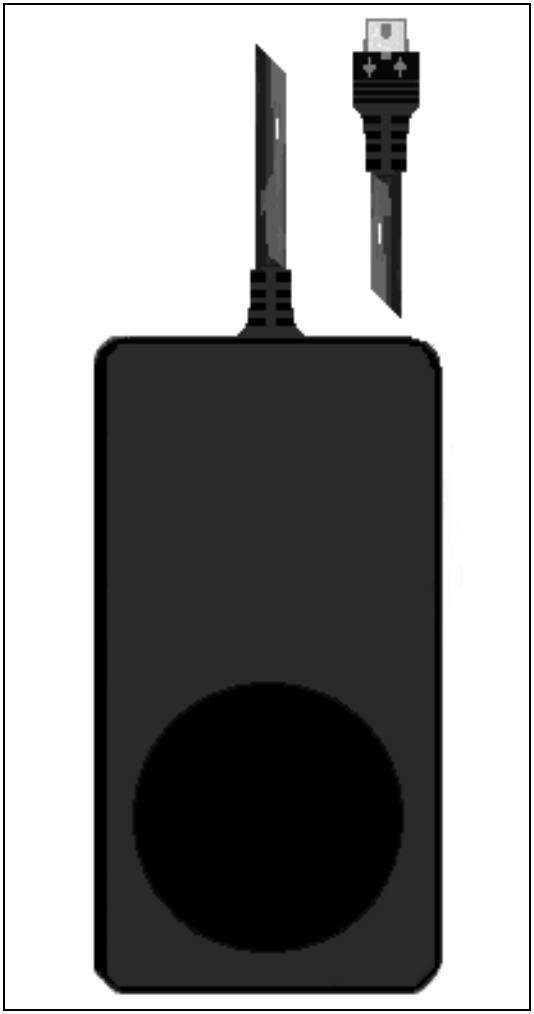

Figure 2.4 - External Power Supply Unit (PSU)

CHAPTER 3 The ATV-300

This chapter provides an overview of the ATV-300. Information about unpacking, general features, technical and physical specifications, front and rear panel details, and the remote-controlled menu system is included.

3.1 Unpacking Information

Before installing the ATV-300, inspect the package for any damage that may have occurred during shipping. If the package shows any sign of external damage or rough handling, notify your carrier's representative. When unpacking the ATV-300, be sure to keep all original packing materials for storing, transporting, or returning the product.

CAUTION

All products returned to FORE Systems under warranty must be packed in their original packing materials.

Verify the contents of the package. The following items should be present:

- ATV-300
- ATV-300 Infrared Remote Control Unit
- External Power Supply Unit
- Release Notes (if applicable)

If any of the above items is missing or damaged, please contact FORE Systems' Technical Support or your local distributor immediately. Before proceeding with any installation, please read the enclosed release notes that may accompany the unit.

3.2 ATV-300 Overview

ATM provides both greater bandwidth and a method for implementing high-quality video and audio transfer. The ATV-300, when used together with the AVA-300, provides a flexible, high-performance solution for video and audio signal transmission over an ATM network.

The AVA-300 digitizes video and audio signals for direct transmission onto an ATM network. These digital media streams may be received and processed by UNIX workstations and Windows NT-equipped PCs that are directly connected to the ATM network. They may also be received and processed by the ATV-300.

The ATV-300 is a dedicated unit for receiving and decoding the digital streams generated by an AVA-300, either via an ATM network or by direct connection. The ATV-300 is suitable for situations in which high-quality output signals are required or in which it would be unsuitable to place a desktop computer.

3.3 ATV-300 Technical and Physical Specifications

The Technical Specifications of the ATV-300 are detailed in Table 3.1:

Table 3.1 - ATV-300 Technical Specifications

Feature	Specification
ATM Interface	25 & 155 Mbps UTP (RJ-45 connectors) 155 Mbps MMF (SC connectors) 155 Mbps intermediate reach SMF (SC connectors)
Video Formats	PAL (50 Hz) and NTSC (60 Hz), software selectable
Digital Video	Concurrent decompression of up to 4 multiple AVA format Motion JPEG digital video streams Picture-in-picture and tiled video presentation
Audio Connectors	2 RCA / Phono sockets for stereo output
Digital Audio	8- or 16-bit PCM, A-Law or µ-Law (stereo / mono) formats; sampling rate from 5kHz to 44.1kHz (CD) and 48kHz (DAT)
User Control	Infrared remote controlled on-screen menu system
Auxiliary Connector	External Configuration Module (ECM) plug-in stores video and audio stream configurations for power-up auto-loading
ATM Protocols	ATM Forum's UNI 3.0 and UNI 3.1 supported by accompanying SVA software
Emissions	FCC Part 15, Class A; CISPR 22, Class A; VCCI Class 1
Safety	US: UL1950; Canada: CSA 22.2; No. 950-M89; Europe: EN60950

The Physical Specifications for ATV-300s with a hardware version less than 300.10 are detailed in Table 3.2:

Table 3.2 - Physical Specifications for ATV-300 Hardware Version less than 300.10

Feature	Specification
Video Connectors	2 RCA / Phono sockets for S-Video output 2 RCA / Phono sockets for duplicated composite signal
Dimensions	H: 2.4” (6 cm) x W: 10.6” (27 cm) x D: 9.8” (25 cm)
Weight	3.8 lb. (1.8 kg)
Operating Temperature	32° F to 104° F (0° C to 40°C)
Operating Humidity	10% to 90% non-condensing
Power	External PSU: 120 / 240Vac, 50 / 60 Hz (autoranging) Tolerance: 88-132Vac / 176-264Vac, 47-63 Hz Maximum Power Consumption: 25 W

The Physical Specifications for ATV-300s with a hardware version of 300.10 or later are detailed in Table 3.3:

Table 3.3 - Physical Specifications for ATV-300 Hardware Version 300.10 or later

Feature	Specification
Video Connectors	1 S-Video connector for S-Video output 1 RCA / Phono socket for composite output
Dimensions	H: 2.36” (6 cm) x W: 9.945” (25.24 cm) x D: 9.35” (23.77 cm)
Weight	3.8 lb. (1.8 kg)
Operating Temperature	32° F to 104° F (0° C to 40°C)
Operating Humidity	10% to 90% non-condensing
Power	External PSU: 115 / 230Vac (normal voltage), 100Vac to 250Vac (voltage range) 47 Hz to 63 Hz (frequency) Maximum Power Consumption: 25 W

3.4 ATV-300 Front Panel Detail — Single-Mode and UTP

The ATV-300's physical front panel features, including connection sockets, indicator lights, and their functions, are described in this section. Figure 3.1 shows the ATV-300's front panel arrangement for single-mode and UTP interfaces, and is followed by an explanation of each feature.

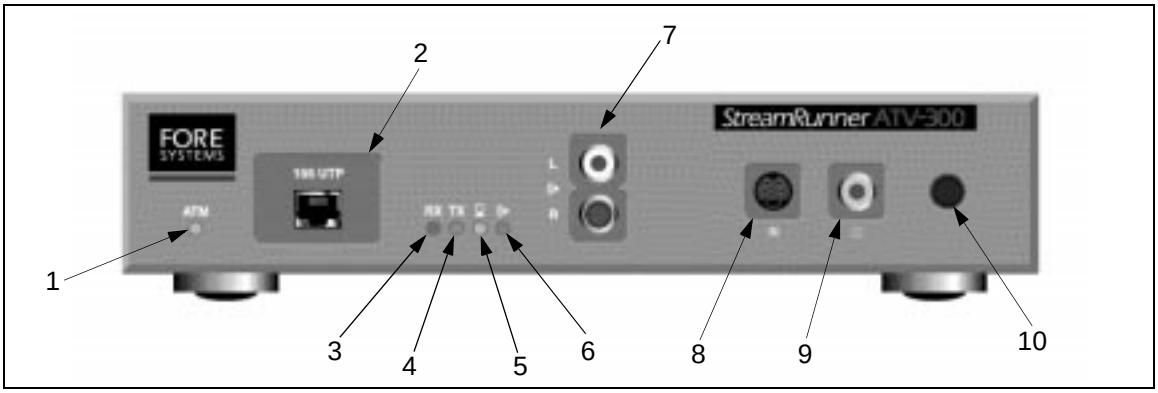

Figure 3.1 - ATV-300 Front Panel Detail - Single-Mode and UTP

ATM LED (1) Indicates the status of ATM network connectivity. **Green** indicates connectivity to the network. **Red** indicates connectivity has not been achieved.

ATM Interface (2) Provides connectivity to the ATM network. Figure 3.1 illustrates an ATV-300 with a UTP interface.

RX LED (3) Indicates that cells are being received from your switch by the ATV-300 when it blinks **blue**.

TX LED (4) Indicates that cells are being transmitted through the ATV-300 when it blinks **red**.

Video LED (5) Indicates that video signals are being sent through the ATV-300 when it is solid or blinks **yellow**.

Audio LED (6) Indicates that audio signals are being sent through the ATV-300 when it is solid **green**.

Audio Connectors (7) Provides one stereo audio output channel.

S-Video Connector (8) Provides one S-Video Ⓢ output channel.

Composite Video Connector (9) Provides one composite video ▤ output channel.

Infrared Receiver Eye (10) Provides line-of-sight infrared control for the ATV-300.

3.5 ATV-300 Front Panel Detail — Multimode

The ATV-300's physical front panel features, including connection sockets, indicator lights, and their functions, are described in this section. Figure 3.2 shows the ATV-300's front panel arrangement for multimode interfaces, and is followed by an explanation of each feature.

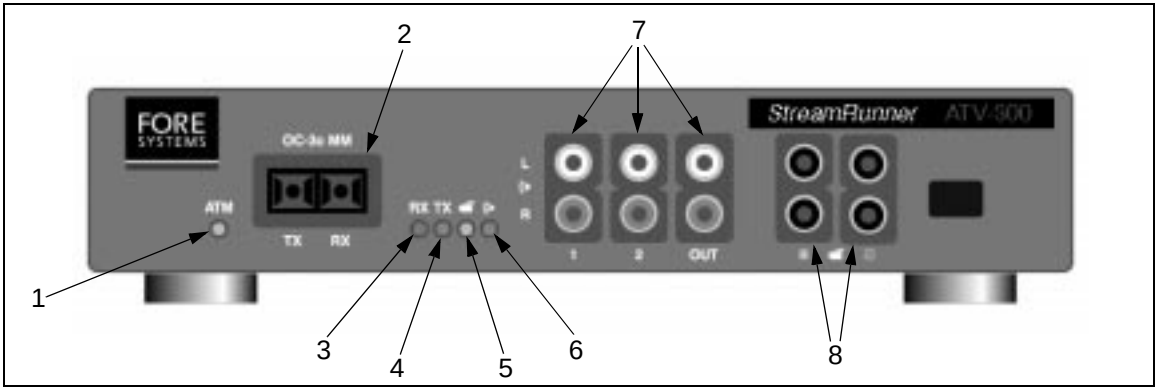

Figure 3.2 - ATV-300 Front Panel Detail - Multimode

ATM LED (1) Indicates the status of ATM network connectivity. **Green** indicates connectivity to the network. **Red** indicates connectivity has not been achieved.

ATM Interface (2) Provides connectivity to the ATM network. Figure 3.1 illustrates an ATV-300 with a fiber optic interface.

RX LED (3) Indicates that cells are being received from your switch by the ATV-300 when it blinks **blue**.

TX LED (4) Indicates that cells are being transmitted through the ATV-300 when it blinks **red**.

Video LED (5) Indicates that video signals are being sent through the ATV-300 when it is solid or blinks **yellow**.

Audio LED (6) Indicates that audio signals are being sent through the ATV-300 when it is solid **green**.

Audio Connectors (7) Provide two stereo input channels and one stereo output channel.

Video Connectors (8) Provide one S-Video [S] output channel (`Top` chrominance output, `Bottom` luminance output) and two composite video [≡] output channels.

3.6 ATV-300 Rear Panel Detail

The ATV-300 has the same rear panel as the AVA-300. Please see Section 2.5 for a description of the ATV-300's rear panel format and functionality.

NOTE

Some earlier ATV-300s also provide an IR Modular Pin Jack on the rear panel. This is not a user-supported feature.

3.7 External Power Supply Unit (PSU)

The ATV-300 uses the same external Power Supply Unit (PSU) that is used with the AVA-300. Please refer to Section 2.6 for information on and illustrations of the applicable PSUs.

3.8 ATV-300 Infrared Remote Control Unit

The ATV-300 Infrared Remote Control Unit, shown in Figure 3.3, gives you access to the Graphical User Interface (GUI) which may be used to control the operation of the ATV-300. The Remote uses line-of-sight transmission, much like the infrared controls supplied with TVs and VCRs. To maximize efficiency when using the Remote, you should aim for the infrared receiver eye located on the extreme right of the ATV-300's front panel.

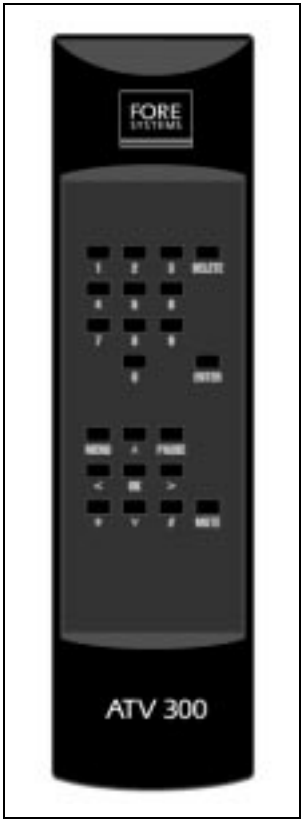

Figure 3.3 - ATV-300 Infrared Remote Control Unit

3.9 ATV-300 Interface Control

The ATV-300's interface consists of three types of components:

- Menus
- Numeric input boxes
- Slider bars

If you make an incorrect entry or operation, an error box will be displayed, providing you with information about how to correct your entry/operation. The methods by which menus, numeric input boxes, and slider bars are controlled with the Remote are described below.

3.9.1 Menus

The `menu` button on the Remote is used to display the ATV-300 `Main Menu` (described in Section 3.10) or to remove a submenu from the display. Some menus are **modal,** which means you are required to select an item from that menu rather than remove the menu using the `menu` button.

When you display a menu, a white ◆ indicator will be positioned to the left of one of the menu items. Pressing the ∧ or ∨ button on the Remote moves the ◆ up or down one item, and pressing `OK` or `<Enter>` selects the item it is alongside.

Selecting a menu item causes an associated operation to be performed, or causes another menu, numeric input box, or slider bar to be displayed. In the case in which another GUI component is displayed, pressing the `>` button does the same thing as `OK` or `<Enter>`, and pressing the `<` button returns you to the previous menu.

3.9.2 Numeric Input Boxes

Certain operations, such as designating a VCI, require you to input a numeric value. You do this by using a **numeric input box**. A brief description of the value to be entered is displayed, followed by the range of valid values in parentheses, followed by the current or default value. A pair of vertical arrows (↑ and ↓) is displayed on the right-hand side of the box.

Pressing the ∧ or ∨ button on the Remote increases or decreases the value being displayed in the box. When the desired value is reached, pressing `OK` or `<Enter>` confirms that value. The `<` button returns you to the previous menu or input box, and the `>` button moves you to the next menu or input box (if applicable).

You may also enter a value using the `digit` buttons `0` through `9` rather than using the ∧ or ∨ to get to the appropriate value. The `delete` button may be used to remove the rightmost digit of the current value.

NOTE

There may be situations in which the displayed value temporarily drops below the minimum-allowed value. In these cases, the background and outline of the numeric input box turns red and the value cannot be selected until the current value moves back into the valid range. It is impossible to enter a value which is greater than the maximum allowed.

To leave the current operation while in a numeric input box, press the `menu` button to remove the box and display the ATV-300 `Main Menu`.

NOTE

Some numeric input boxes require a value to be entered and cannot be removed by pressing the `menu` button. (These are modal fields.)

3.9.3 Slider Bars

A **slider bar** works in much the same way as a numeric input box, but is used in situations in which it is useful to see the current value as it relates to the maximum setting (such as changing the volume level). A red bar on a gray background is used to represent this relationship. In most cases, the effect of altering a slider bar setting is immediately visible or audible while the adjustment is being made.

Pressing the ∧ or ∨ button increases or decreases the current value. To confirm the current slider setting, press `OK` or `<Enter>`.

Pressing the `menu` button removes the slider bar and displays the ATV-300 `Main Menu`, pressing < returns you to the previous menu, and pressing `delete` restores the slider setting to its default value. Pressing the `digit` buttons `0` through `9` has no effect on a slider bar. Figure 3.4 illustrates a typical slider bar.

Figure 3.4 - Slider Bar

3.9.4 Mute and Pause Controls

Two Remote buttons, `mute` and `pause`, allow you to globally disable or re-enable all audio and/or video streams. Pressing `mute` once disables all audio output from the ATV-300. While the ATV-300 is in this state, the first icon shown in Figure 3.5 is displayed in the bottom-right corner of the display. Pressing `mute` again re-enables audio output. Similarly, pressing `pause` once stops all video streams, displaying the middle icon shown in Figure 3.5, and pressing it again restarts them. If audio and video are both disabled, the combined icon shown on the right in Figure 3.5 is displayed.

NOTE

These `mute` and `pause` controls are local to the ATV-300. Their use does not effect an AVA-300 sending video or audio streams to the ATV-300.

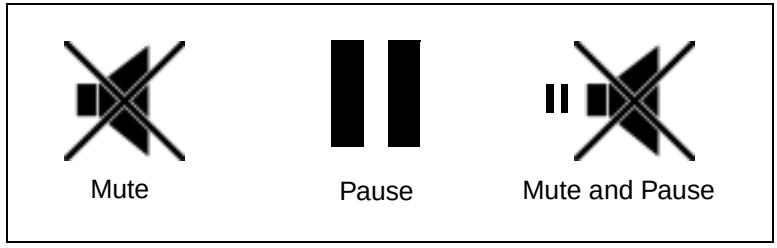

Figure 3.5 - Mute and Pause Icons

It is possible to disable the effect of these buttons to avoid streams being stopped inadvertently (see Section 3.10.3.7).

3.9.5 Power-Up Configuration Menu and Video Mode

When powered-up, the ATV-300 displays the `Power-up Configuration` menu, similar to the illustration shown in Figure 3.6.

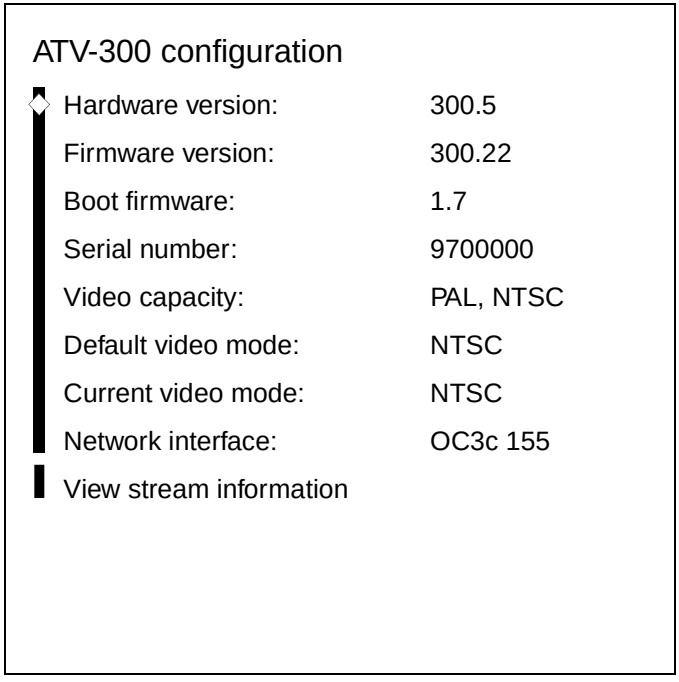

Figure 3.6 - ATV-300 Power-up Configuration Menu

NOTE

The `Power-up Configuration` menu will not be displayed if the ATV-300 has an External Configuration Module (ECM) attached which contains valid stream settings. At start-up, the stream configuration will immediately be restored.

The `Power-up Configuration` menu is removed if the ATV-300 is reset by remote SVA software (e.g., **`svarun`**.)

3.9.5.1 Selecting NTSC or PAL at Power-Up

Pressing the * button while the `Power-up Configuration` menu is being displayed sets the ATV-300 to PAL output mode and removes the `Power-up Configuration` menu from the screen. PAL becomes the default mode on future power-ups or resets.

Similarly, pressing the # button while the `Power-up Configuration` menu is being displayed sets the ATV-300 to NTSC output mode and removes the `Power-up Configuration` menu from the screen. NTSC becomes the default mode on future powerups or resets.

If the ATV-300 is already in the required video output mode, pressing the corresponding button will have no effect. This option is provided so that if an ATV-300 is connected to a Video Display Unit (VDU) which is incapable of displaying the current default output (seen as a blank or scrolling image), the mode can be changed easily without any need to see what is being displayed.

3.10 The ATV-300 Main Menu

The ATV-300 `Main Menu`, shown in Figure 3.7, is the top-level of the ATV-300 system interface. The `Main Menu` provides the gateway to various options and submenus which allow you to examine and alter the ATV-300 configuration and to perform limited single-stream communication with a single AVA-300.

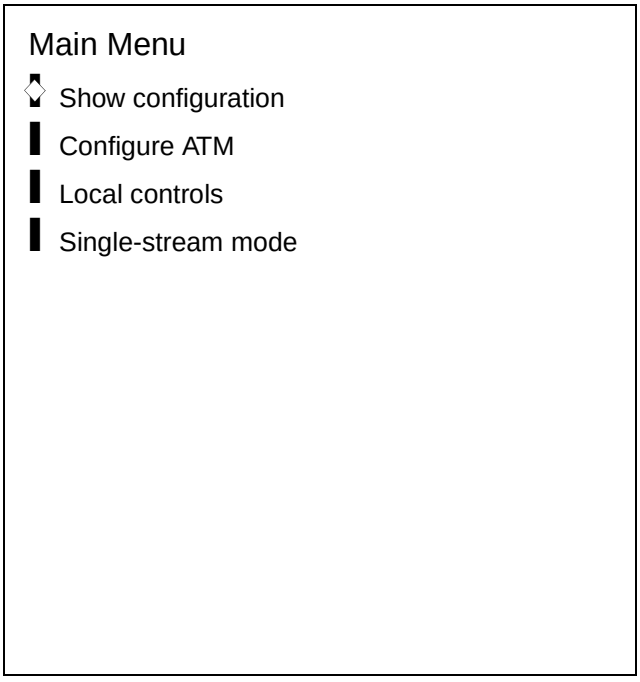

Figure 3.7 - The ATV-300 Main Menu

NOTE

Unless otherwise indicated, any configuration changes made only remain in effect until the ATV-300 is reset again. To make a permanent change, use the `Save User Preferences` option, as described in Section 3.10.3.4.

3.10.1 Show Configuration

Selecting the `Show Configuration` option displays a submenu consisting of two parts, as shown in Figure 3.8.

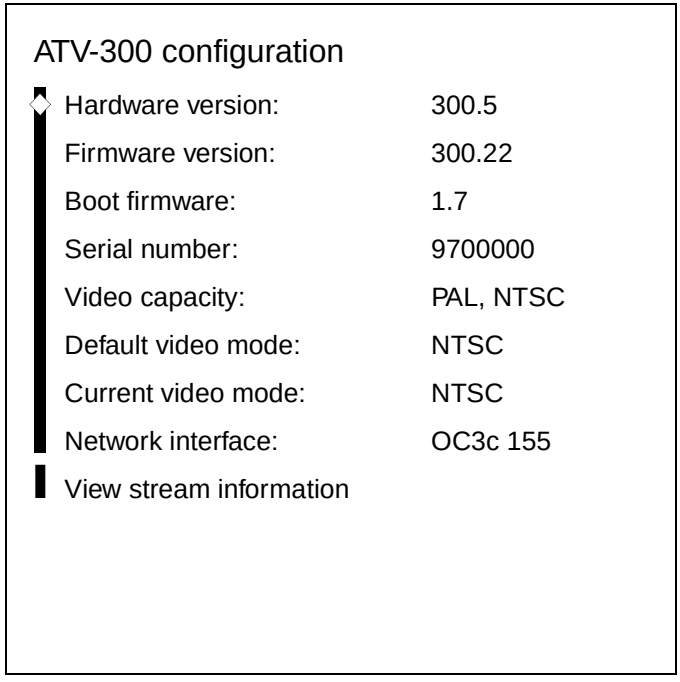

Figure 3.8 - The Show Configuration Submenu

The top section displays the current settings for various ATV parameters, similar to the `Power-up Configuration` menu displayed when the ATV-300 is powered-up. The second item, `View Stream Information`, displays a list of the names of all currently-configured streams, or indicates that none are configured. Selecting one of those streams displays information on the characteristics of the stream, including:

- VCI number
- Pack factor
- Q-factor (video streams)
- Sample rate (audio streams)

3.10.2 Configure ATM

The `Configure ATM` option displays a submenu indicating the ATV-300's network interface type and the current setting of any configurable network interface parameters, as shown in Figure 3.9.

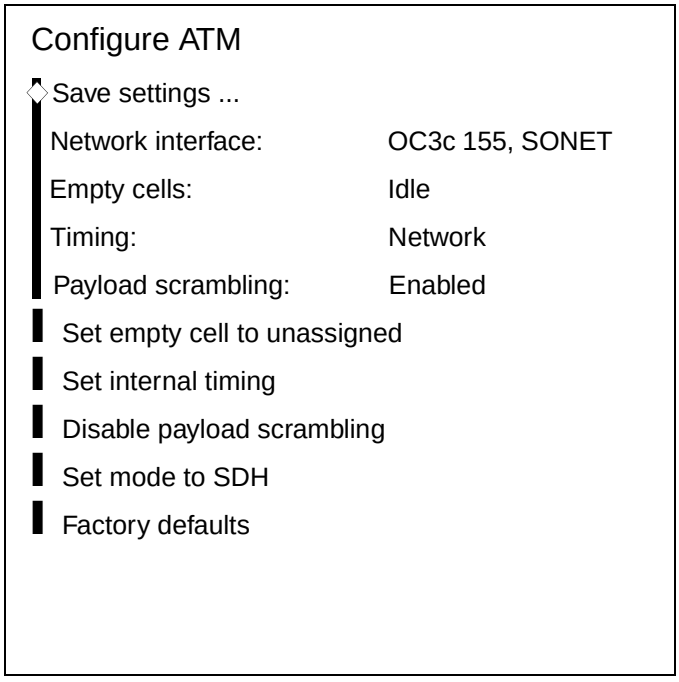

Figure 3.9 - The Configure ATM Submenu

If any parameters are configurable, further menu items will allow you to change those settings. For example, an ATM 155 Mbps unit would allow payload scrambling on the transmission interface to be enabled or disabled.

If you alter any configurable parameters, a confirmation menu is displayed after you remove the `Configure ATM` menu by pressing the `menu` or < button. The `Configure ATM` menu reminds you that changes made to the ATM configuration are not permanent, and gives you the option of saving the current user preferences to make them permanent.

NOTE

Selecting this option saves all user preferences, including display settings and the GUI configuration, not just the ATM configuration parameters.

3.10.3 Local Controls

Selecting `Local Controls` allows you to customize many ATV-300 characteristics, including the menu overlay, video mode, stream diagnostics, and the Remote, as shown in Figure 3.10.

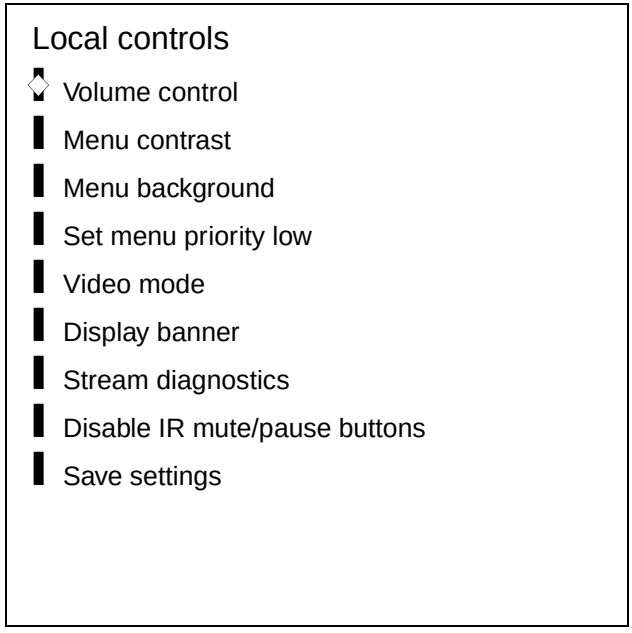

Figure 3.10 - The Local Controls Submenu

3.10.3.1 Volume Control

The `Volume Control` option displays a slider bar that you can use to alter the volume level of the audio output from the ATV-300.

3.10.3.2 Menu Contrast and Menu Background

The `Menu Contrast` option displays a slider bar that you can use to alter the contrast of the GUI components. `Menu Contrast` only affects GUI components and does not alter the appearance of any video streams.

The `Menu Background` option allows you to select the degree of transparency of the menu background color ranging from completely transparent to completely opaque.

3.10.3.3 Set Menu Priority

The priority taken by GUI operations over the processing of video and audio streams may be toggled between high and low:

Set Menu Priority High — GUI operation receives a higher priority over video and audio stream processing. This ensures good GUI response, but may cause temporary video and audio stream pause when you are using the GUI.

Set Menu Priority Low — Video and audio stream reproduction receives priority over GUI operation. This may result in slower GUI response when the ATV-300 is under heavy load from incoming ATM data. This is the default and recommended setting.

3.10.3.4 Video Mode

The ATV-300 provides video output in either PAL (50Hz, 625 lines) or NTSC (60Hz, 525 lines) format. The Video Mode option displays a menu that allows you to set the current output mode, the default output mode to be used on reset, and the video capability of the display device being used.

The first option on the Video Mode submenu, Set Video Mode to PAL (or NTSC), allows you to set the current and default video modes to PAL or NTSC. When you update the video format, the message screen shown in Figure 3.11 is displayed.

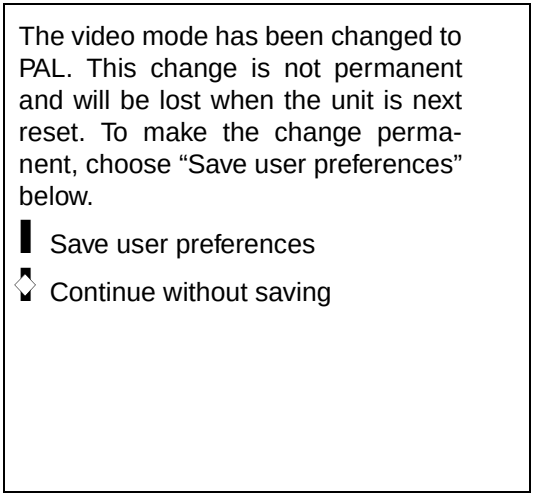

Figure 3.11 - Set Video Mode Message Screen

As stated in this screen, you may either save the updated setting, or continue without saving, thereby reverting back to the original video mode the next time the ATV-300 is powered-up.

In addition to the video mode settings, the `Set Video Mode to NTSC` (or `PAL`) option saves all other user preferences. Changing the current video mode causes the current ATV-300 stream configuration to be lost.

The second option on the `Video Mode` submenu, `Further Options`, allows the current and default modes to be altered individually and the video capability of the display device being used to be set. Setting the video capability has no direct effect on the operation of the ATV-300, but it does allow the ATV-300 to prompt for confirmation when a request is made to change to a video mode which the display device may not be able to support. If you attempt to change the current or default video mode to one which is not supported, the ATV-300 indicates this and suggests that you check the video output capability setting.

Changing the default mode or video capability automatically saves all current user preferences without further prompting.

On power-up, if the default video mode of the unit is found to be one which is not supported by the display device, the * and # buttons may be used to change the video mode.

3.10.3.5 Display (or Remove) Banner

Invoking the `Display Banner` option displays the following text near the bottom of the screen:

```
ATV-300 - Live ATM Video
```

The banner is useful during demonstrations. Selecting `Remove Banner` deletes it.

3.10.3.6 Stream Diagnostics

If a stream error occurs when the ATV-300 is displaying a video stream, an error box is overlaid on the stream indicating the type of error which has occurred; e.g., a size mismatch between the stream which the ATV-300 expects and the stream actually arriving. The `Stream Diagnostics` option allows you to specify whether such errors will be reported.

Selecting `Enable` (or `Disable`) `Stream Diagnostics` toggles the current state of error reporting. When error reporting is enabled, the length of time after an error has cleared until the error box is removed may be set using the `Set Delay Before Removal` option. Error boxes may be set for removal after 1, 2, or 5 seconds.

NOTE

In single-stream mode all error reporting is disabled, irrespective of the state which you have configured.

3.10.3.7 IR Mute—Pause Buttons

This option may be used to disable and re-enable the `mute` and `pause` buttons on the remote control when not in use. This is useful in order to avoid streams being stopped accidentally.

If mute or pause is in operation (indicated by an icon in the lower right corner of the display) when `Disable IR Mute–Pause Buttons` is selected, you are reminded of this and asked if you wish to switch off `mute` and `pause` before disabling the IR buttons. When `mute` and `pause` are not in operation no confirmation is requested.

3.10.3.8 Save Settings

If an External Configuration Module (ECM) is attached to the ATV-300, you may save the current stream settings to the ECM. An ATV-300 which is then powered-up or reset while that ECM is attached will automatically reconfigure itself with the same stream settings. The first item on the `Save Settings` menu performs this stream saving to the ECM.

The second item, `Save User Preferences`, internally saves the values of all user-configurable options, such as the current audio volume, display mode, and any network interface options (this does not require an ECM to be attached). If this is not used after changing the unit's configuration, the changes will generally be lost at the next reset or power-down (the few exceptions to this rule are mentioned specifically in the above text).

3.10.4 Single-stream mode

The Single-stream mode option lets you create a single video and a single audio stream between an ATV-300 and an AVA-300. This option is discussed in detail in Chapter 13 in this User's Manual.

CHAPTER 4 UNIX Basic Setup

This chapter is a step-by-step guide to get you started with your *StreamRunner* AVA / ATV hardware and SVA software system over an ATM network using a UNIX platform. Included are an overview of the system components and how to configure them, and how to install, configure, and use the software. This chapter assumes:

- A working knowledge of UNIX
- A basic knowledge of ATM networking concepts
- ATM connectivity using UNI 3.0 or UNI 3.1 signalling

The Basic Setup involves the following steps, each of which is detailed in this chapter:

- Installing the SVA Software
- Configuring the Hardware
- Verifying Proper Setup
- Setting up a Trader and Manager
- Running the Real-Time Display Software (`svc-rtds`)
- Running `svapatch` (optional)

4.1 Hardware Requirements

You will need the following equipment to complete the Basic Setup configuration:

- AVA-300
- ATV-300 (optional)
- ATM switch
- UNIX workstation with a FORE Systems' ATM adapter card
- VCR or similar video / audio source to generate input to the AVA-300
- TV or similar monitor to display output from the ATV-300 (optional)
- Appropriate ATM cables (e.g., fiber optic cables)
- RCA video and audio cables (shielded, with gold-plated tips recommended)

4.1.1 Workstation Requirements

Your UNIX workstation must contain the proper FORE Systems' ATM adapter card to be connected to the switch. Table 4.1 lists the UNIX operating systems supported by the *StreamRunner* AVA / ATV platform and their corresponding FORE Systems' ATM adapter cards.

Table 4.1 - UNIX Operating Systems and Supported Adapter Cards

UNIX Operating Systems	FORE Systems ATM Adapter Card(s)
Solaris 2.5 and 2.6	SBA-200, SBA-200E, PCA-200 EUX, or HE series

As stated at the beginning of this chapter, the Basic Setup configuration assumes you have basic ATM connectivity using UNI 3.0 or UNI 3.1 signalling. If not, please consult the appropriate User's Manual for switch and / or adapter configuration.

SVA 5.1 requires *ForeThought* 4.3 UNIX device driver software or later.

It is strongly recommended that *ForeThought* 5.1 UNIX device driver software or later is used.

4.2 Installing the SVA Software

After you have set up your hardware with the appropriate adapter card, the next step is to install the SVA software. The software is shipped as a compressed tar file that needs to be uncompressed and extracted.

To install the SVA software, do the following:

1. Go to the directory where you wish to install the software. In these examples your HOME directory is assumed. Type one of the following to get to your HOME directory:

   `cd $HOME` or **`cd`**

2. Copy the distribution file into your HOME directory.
3. Uncompress the file using the following command:

   `uncompress` *`<release-specific>`* **`.tar.Z`**

4. Extract the file contents using the following command:

   `tar xvf` *`<release-specific>`* **`.tar`**

NOTE

Do not install the release over a previous copy of the SVA distribution. Move or delete any old release prior to performing this step. Be careful not to delete any old manager configuration files that you may want to re-use.

The system creates a directory called `SVA-5.1.0`. The following sub-directories, containing the various files that make up the SVA software distribution, are created in this directory:

./etc	Manager and utility binaries
./config	Manager configuration files
./bin	Application binaries and support files
./lib	SVA (shared) libraries
./man	On-line documentation
./html	HTML files
./plugin	SVA Netscape Plug-in
./firmware	ATV-300 firmware release
./include	Developer header files
./src	Example developer source

You have successfully installed the SVA software.

4.2.1 Environment Variables

Now that you have successfully installed the software, the next step is to set some environment variables to allow you to access the installed binaries and on-line documentation.

To set environment variables, extend your PATH environment variable by typing the following if you are using Bourne shell syntax:

```
prompt$ PATH=$PATH:$HOME/SVA-5.1.0/bin; export PATH
```

or by typing the following if you are using C-shell syntax:

```
prompt% setenv PATH "$PATH":$HOME/SVA-5.1.0/bin
```

Once your PATH environment is set correctly, you can invoke SVA applications. For example, to display the manual page for the **avareset** command, type the following:

```
svaman avareset
```

The **svarun** command is a wrapper script for invoking SVA applications. It automatically sets up any further environment variables that are needed by the SVA software.

If you know how to edit your login script, you may want to permanently add the SVA `bin` to your PATH environment variable.

An HTML version of the SVA manual system is also provided. The root of this system is the HTML file:

<SVA install directory> **/html/uguide.html**

It is recommended that this entry be added as a bookmark to your browser of choice.

4.3 Configuring the Hardware

The Basic Setup configuration will enable you to send a video image over an ATM network for display on a workstation / PC and a TV. Figure 4.1 illustrates the components you will need and their general positions in the network.

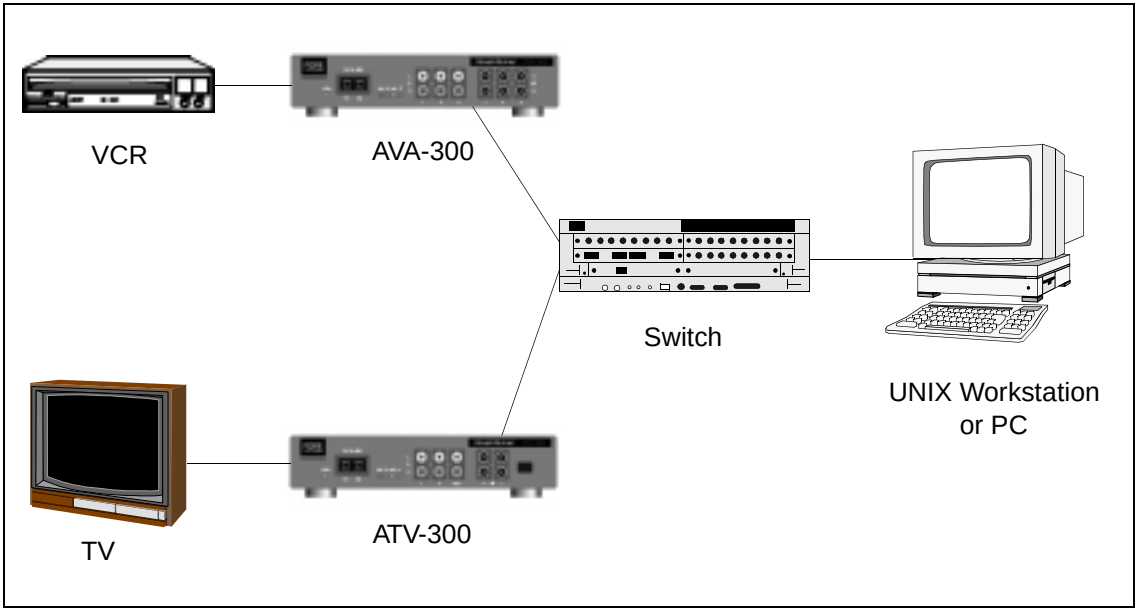

Figure 4.1 - Basic Setup Configuration

The goal of this configuration is to send an analog signal from a VCR tape to the AVA-300. The AVA-300 converts the analog signal to digital and sends it to the ATM switch as ATM cells. The switch in turn sends the cells over a Switched Virtual Circuit (SVC) to the workstation / PC. The SVA software on the workstation / PC decodes and then displays the incoming stream. Additionally, you may also convert the digital signal back to analog through an ATV-300 for display onto the TV. Connecting the hardware consists of five steps:

- Connecting the workstation / PC to the switch
- Connecting the VCR to the AVA-300
- Connecting the AVA-300 to the switch
- Connecting the TV to the ATV-300 (optional)
- Connecting the ATV-300 to the switch (optional)

4.4 Configuring the AVA-300

4.4.1 Connecting the VCR to the AVA-300

To connect the VCR to the AVA-300, perform the following steps:

1. Power up the VCR and AVA-300.

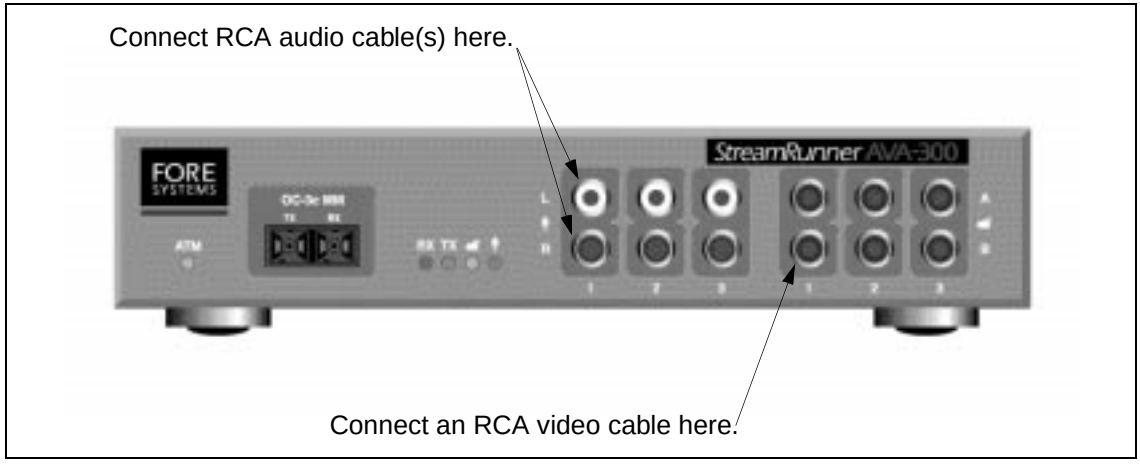

Figure 4.2 - AVA-300 Video and Audio Cable-to-Port Connection Detail

2. Connect one end of an RCA cable to the `1B` video port on the front panel of the AVA-300. Refer to Figure 4.2 for AVA-300 video / audio port locations. Connect the other end of the RCA cable to the video out port on the rear panel of the VCR.
3. If you have a stereo VCR, connect one end of an RCA cable to the `1L` audio port on the front panel of the AVA-300 and connect the other end to the Left audio port on the rear panel of the VCR. Connect one end of another RCA cable to the `1R` audio port on the front panel of the AVA-300 and connect the other end to the Right audio port on the rear panel of the VCR.

   For non-stereo VCRs, you can use either the `1L` or `1R` audio port on the AVA-300.

NOTE

If you are not sure where to connect cables on your VCR or on any other video/audio source you are using in the Basic Setup (e.g., discrepancies in port labelling from different manufacturers), please consult the User's Manual that came with the source equipment for clarification.

The VCR is successfully connected to the AVA-300.

4.4.2 Connecting the AVA-300 to the Switch

To connect the AVA-300 to the switch, perform the following steps:

1. Connect one end of a fiber optic cable to the appropriate pair of OC3 ports on the front panel of the switch. These are usually labeled Rx (receive) and Tx (transmit).

NOTE

Some later examples in this User's Manual assume that the AVA-300 is attached to port `1A1` on switch `orion`. Also assumed is the use of fiber optic cables.

2. Connect the other end of the fiber optic cable to the pair of `OC3` ports on the front panel of the AVA-300.

NOTE

Each connection on the AVA-300 must match the corresponding connection on the switch and vice versa. When you achieve proper connectivity, the `ATM` LED on the AVA-300 changes from red to green, and the red and green receive and transmit LEDs on the switch extinguish. If the `ATM` LED on the AVA-300 remains red or the red and green receive and transmit LEDs on the switch port are illuminated, your equipment is not properly connected. Switch the fiber optic cable pair's positions on either piece of equipment to achieve proper connectivity.

The AVA-300 is successfully connected to the switch.

4.5 Verifying Proper AVA-300 Setup

Once you have configured the hardware, installed the software, and set the environment variables, you should verify that you have performed these steps properly. You verify the proper setup using the **avareset** command.

To verify proper setup, use the **avareset** command as follows:

```
svarun avareset -device orion:1A1
```

Since you have already set the PATH in Section 4.2.1 or Section 5.2.1, you are not required to type in the full path name at this point.

If you do not wish to use the User-Directed SPVC facility, refer to Appendix B for details on using **avareset** with a PVC control channel.

If set up properly to this point, the system displays version information similar to the following:

```
Hardware:     300.20
Firmware:     4.8
Serial No:    98000000
Interface:    ATM 155 Mbps
Release:      ForeThought 5.1.0 (SVA sva51@268)
```

If your firmware version is less than 4.3, then it is strongly recommended that you consider upgrading your firmware by contacting FORE Systems Technical Support for a *StreamRunner* AVA-300 PROM Upgrade Kit.

If not set up properly, the system displays the following error message:

```
avareset: failed to contact AVA ... retry
```

If you receive this error message, double-check your connections and/or your configuration syntax. Also make sure that no managers are running. Refer to Section 4.6 for a description of managers.

4.5.1 Verifying Video Environment

The AVA-300 and ATV-300 devices support either PAL (Phase Alternate Lines) or NTSC (National Television Systems Committee) standard video. The standard you use typically depends on your location: NTSC is used primarily in the United States and Japan whereas PAL is used primarily in the United Kingdom and Europe. A more detailed discussion on video standards may be found in Section 8.4.1.

The SVA software uses the local time zone of the computer on which it is running to make an informed choice as to the default video standard to use. In order to ascertain the default video standard selected, type the following:

```
svarun svavideo
```

The system displays on of the following messages:

```
The default video standard is PAL
```

or:

```
The default video standard is NTSC
```

If the video standard is incorrect for your environment, then a number of alternatives exist:

1. The time zone on your computer may be set incorrectly. If this is the case, reset the time zone accordingly.
2. Set the VSTANDARD environment variable to either PAL or NTSC. This variable is inspected on SVA command startup and will override the default based on the local time zone.
3. Some SVA commands, such as **avaconfig**, take the video standard to use as a command line argument, such as **-pal** or **-ntsc**. Using this method overrides both the time-zone-based default and any VSTANDARD setting.

4.6 Setting Up a Trader and AVA-300 Manager

After verifying the proper setup, your next steps involve:

- Starting a trader
- Registering the AVA-300's manager with the trader

The **trader** is an application that lists and keeps track of the available managers. Therefore, the **svamgr** software representing an AVA-300 needs to register with the trader.

The **manager** is an SVA software application that is responsible for setting up audio and video streams. The application is called **svamgr**. You may use a program called **svarun** to invoke the **svamgr**.

This example shows one AVA-300, and, therefore, one manager being registered with one trader. In actual network applications, one trader running on a single network server is sufficient for most installations. However, it is possible to have many traders available for managers to register with.

4.6.1 Starting a Trader

You must now start a trader to provide a place for your manager to register. A video network could be comprised of several (and at least one) traders.

To start a trader, open a window on the workstation / PC and type the following:

```
svarun trader
```

Since a trader must run continuously, it must either run in its own window or in the background.

The following message is displayed to let you know that the **trader** application is running:

```
(Date and time): trader: started on host "phoenix"
```

You have started a trader.

4.6.2 Registering the AVA-300's Manager with the Trader

If your AVA-300 firmware version is less than 4.3, then refer to Appendix D for details on starting the AVA-300 manager.

If you are not using the User-Directed SPVC facility, then refer to Appendix C for details on starting the AVA-300 manager.

Once you have started the trader, you need to start the AVA-300 manager so it registers with the trader. To register a manager, open a window on the workstation / PC and type the following:

```
svarun -name ava1 -device orion:1A1
```

SVA 5.1 defaults to run managers with UNI 3.1 unless otherwise instructed. If you are restricted to using UNI 3.0 signalling, you must type the following command:

```
svarun -name ava1 -device orion:1A1 -uni30
```

The following message lets you know that the **manager** application is running:

```
(Date and time): svamgr: started on host "phoenix"
```

In addition, a list of available video and audio streams follows the message.

You have started the AVA-300 manager and registered it with the trader.

4.7 Running svc-rtds

Once your trader and manager are running, you can use the SVC Real-Time Display Software (**svc-rtds**) application to create, display, and edit video and audio streams on your workstation / PC. **svc-rtds** needs to know the IP address or hostname of a workstation on which a trader was started. If no trader is specified, **svc-rtds** assumes there is one running on the local machine.

To run **svc-rtds**, do the following:

1. Open a window on the workstation / PC.
2. At the prompt, type:

```
svc-rtds -edit
```

The AVA/ATV Manager Browser, shown in Figure 4.3, is displayed.

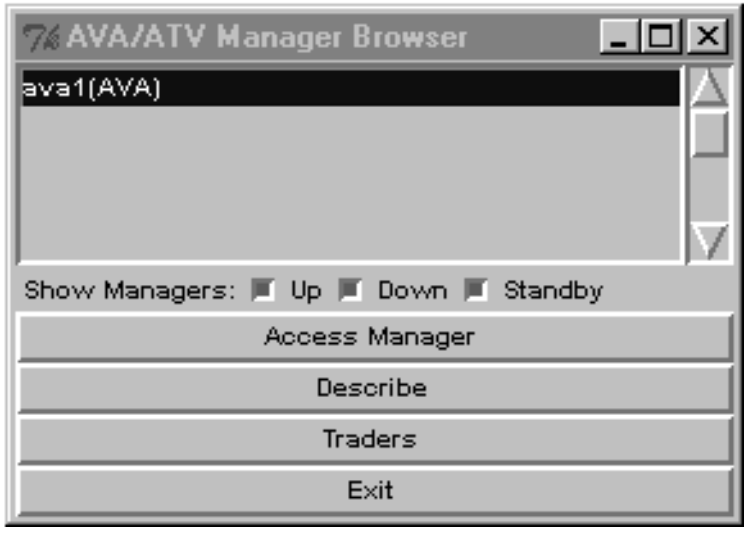

Figure 4.3 - AVA / ATV Manager Browser Window

The AVA/ATV Manager Browser is a GUI containing a list of managers. In the Basic Setup, the list is composed of the one manager you named, started, and registered with the trader earlier. (This example calls it ava1.)

3. Double-click on ava1 or highlight it with a single-click and then click on the Access Manager button.

The AVA/ATV `Manager Window`, similar to that shown in Figure 4.4, is displayed.

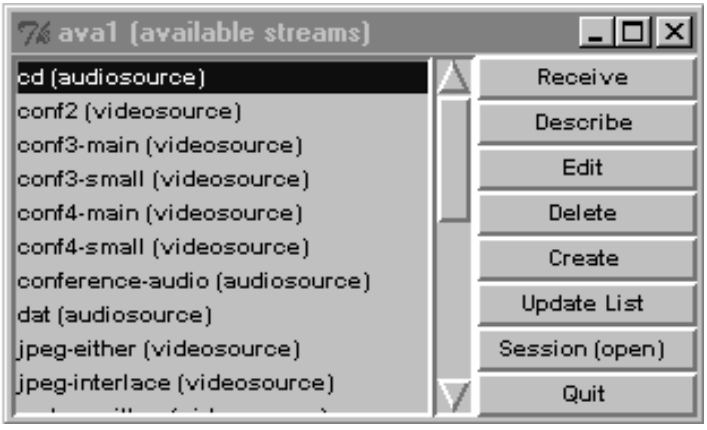

Figure 4.4 - AVA / ATV Manager Window

This window displays the audio and video streams available to designated manager `ava1`. In the Basic Setup, these are from the default stream file (**`svadefaults`**) in the directory specified by the **`-configdir`** parameter which is automatically set by the **`svarun`** command.

4. With a tape running in your VCR, double-click on the video stream named `mono` or highlight it with a single click and then click on `Receive` to start the stream.
5. Double-click on the audio stream named `cd` or highlight it with a single click and then click on `Receive` to start the stream.

NOTE

The streams you have joined are defined to be easily decoded and displayed on most workstations / PCs. Depending on your machine, you will be able to experiment with other stream definitions to achieve better stream quality.

System resources may limit your ability to display some video streams. For example, a workstation lacking decompression hardware support may be unable to decode and display a full-frame rate compressed video stream. Refer to Chapter 14 to find out more about resolving video quality issues.

You have now completed the AVA-300 Basic Setup configuration. This provided the basic information required to send video and audio over an ATM network. The rest of this User's Manual will provide you with more in-depth information to explore and use the *StreamRunner* AVA / ATV platform to its fullest advantage. Refer to the next section for information on adding an ATV-300.

4.8 Configuring ATV-300

Your ATM network may include one or more ATV-300s. If your setup requires the additional flexibility of decoding digital video and audio streams back to a conventional analog signal, perform the tasks in the following sections.

4.8.1 Connecting the TV to the ATV-300

To connect the ATV-300 to the TV, do the following:

1. Power up the TV. Refer to Figure 4.5 for ATV-300 video / audio port locations.

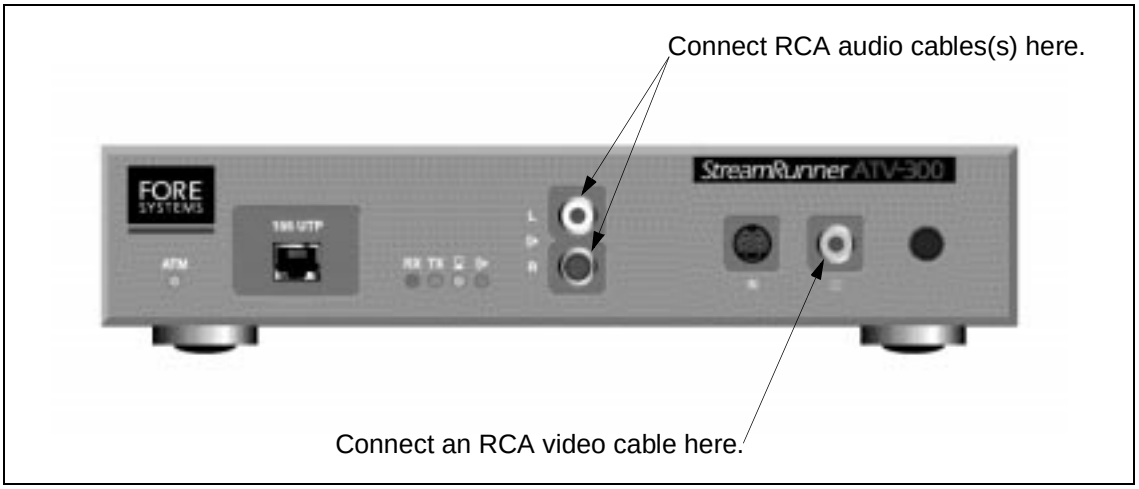

Figure 4.5 - ATV-300 Video and Audio Cable-to-Port Connection Detail

2. Connect one end of an RCA cable to the `composite video port` (identified by the ▤ symbol) on the front panel of the ATV-300. Connect the other end of the RCA cable to the video input port on the rear panel of the TV.
3. If you have a stereo TV, connect one end of an RCA cable to the `L out` audio port on the front panel of the ATV-300 and connect the other end to the Left In audio port on the rear panel of the TV. Connect one end of another RCA cable to the `R out` audio port on the front panel of the ATV-300 and connect the other end to the Right In audio port on the rear panel of the TV.

   For non-stereo TVs, you can use either the `L out` or `R out` audio port on the ATV-300.

   The ATV-300 is successfully connected to the TV.

4.8.2 Connecting the ATV-300 to the Switch

To connect the ATV-300 to the switch, do the following:

1. Power up the ATV-300.
2. Connect one end of a fiber optic cable to the appropriate pair of OC3 ports on the front panel of the switch. These are usually labeled Rx (receive) and Tx (transmit).

Some later examples in this User's Manual assume that the ATV-300 is attached to port `1B1` on switch `orion`. Also assumed is the use of fiber optic cables.

3. Connect the other end of the fiber optic cable to the pair of `OC3` ports on the front panel of the ATV-300.

Each connection on the ATV-300 must match the corresponding connection on the switch and vice versa. When you achieve proper connectivity, the `ATM` LED on the ATV-300 changes from red to green, and the red and green receive and transmit LEDs on the switch extinguish. If the `ATM` LED on the ATV-300 remains red or the red and green receive and transmit LEDs on the switch port are illuminated, your equipment is not properly connected. Switch the fiber optic cable pair's positions on either piece of equipment to achieve proper connectivity.

The ATV-300 is successfully connected to the switch.

4.9 Verifying Proper ATV-300 Setup

Once you have configured the hardware, you should verify that your ATV-300 is properly set up, as you did in Section 4.5 for the AVA-300. You verify the proper setup using the **atvreset** command.

To verify proper setup, use the **atvreset** command as follows:

```
svarun atvreset -device orion:1B1
```

If you do not wish to use the User-Directed SPVC facility, refer to Appendix B for details on using PVC control channels.

If the control channel is configured properly, the system displays version information similiar to the following:

```
Hardware:     300.20
Firmware:     300.23
Serial No:    98000000
Interface:    ATM 155 Mbps
Release:      ForeThought 5.1.0 (SVA sva51@268)
```

If the control channel is not configured properly, the system displays the following error message:

```
atvreset: failed to contact ATV ... retry
```

If you receive this error message, double-check your connections and/or your configuration syntax.

If you receive an error message similar to:
`firmware 300.xx outdated`
your control channel is configured properly. However, you must update your ATV-300 firmware version. See Section 4.10 or the online **atvdownload** manual page for details.

4.10 Setting Up the ATV-300 Manager

After testing the control channels and determining that they are properly set up, your next step involves registering the ATV-300's manager with the trader.

4.10.1 Registering the ATV-300's Manager with the Trader

If you are not using the User-Directed SPVC facility, then refer to Appendix C for details on starting the ATV-300 manager.

You must start the ATV-300 manager so it registers with the trader that you configured in Section 4.6.1. To register a manager, open a window on the workstation/PC and type the following:

```
svarun -name atv1 -device orion:1B1
```

If the program detects that the ATV-300 is running old firmware, then it automatically upgrades it.

The following message lets you know that the `manager` application is running:

```
(Date and time): svamgr: started on host "phoenix"
```

You have started the ATV-300 manager and registered it with the trader.

If you are still running the **`svc-rtds`** browser, it appears as an entry.

4.11 Running svapatch

In order to get video and audio onto the TV by way of the ATV-300, an SVC must be established between the AVA-300 and the ATV-300. You do this using **svapatch**.

To connect a video and audio stream to the ATV-300 using **svapatch**, type the following on your workstation / PC:

```
svarun svapatch -from ava1 -to atv1 jpeg-interlace cd
```

The video image and associated audio sound from the VCR is displayed and heard on the TV.

Both the AVA-300's and ATV-300's managers must be started and registered for **svapatch** to be successful.

You have added an ATV-300 to the Basic Setup configuration and have completed all of the tasks in this chapter. Refer to the other chapters in this User's Manual to acquire more in-depth information on the hardware, software, and system configuration possibilities available to you.

CHAPTER 5 Windows NT/95/98 Basic Setup

This chapter is a step-by-step guide to get you started with your *StreamRunner* AVA / ATV hardware and SVA software system over an ATM network using a Windows NT, 95, or 98 platform. Included are an overview of the system components and how to configure them, and how to install, configure, and use the software. This chapter assumes:

- A working knowledge of Windows NT, Windows 95, and / or Windows 98.
- A basic knowledge of ATM networking concepts
- ATM connectivity using UNI 3.0 or UNI 3.1 signalling

The Basic Setup involves the following steps:

- Installing the SVA Software
- Configuring the Hardware
- Verifying Proper Setup
- Setting up a Trader and Manager
- Running the Real-Time Display Software (**`svc-rtds`**)
- Running **`svapatch`** (optional)

5.1 Hardware Requirements

You will need the following equipment to complete the Basic Setup configuration:

- AVA-300
- ATV-300 (optional)
- ATM switch
- PC with a FORE Systems' ATM adapter card
- VCR or similar video / audio source to generate input to the AVA-300
- TV or similar monitor to display output from the ATV-300 (optional)
- Appropriate ATM cables (e.g., fiber optic cables)
- RCA video and audio cables (shielded, with gold-plated tips recommended)

5.1.1 PC Requirements

Your PC must contain the proper FORE Systems' ATM adapter card to be connected to the switch. Table 5.1 lists the PC operating systems supported by the *StreamRunner* AVA / ATV platform and their corresponding FORE Systems' ATM adapter cards.

Table 5.1 - PC Operating Systems and Corresponding Adapter Cards

PC Operating Systems	FORE Systems ATM Adapter Cards
Windows NT 4.0 (SP3)	PCA-200E, LE-155, HE 622, or LE-25
Windows 95 / 98	PCA-200E, LE-155, HE 622, or LE-25

To work with SVA properly, Windows NT 4.0 must be running Service Pack 3 (SP3). If you do not have SP3, it may be downloaded from Microsoft free-of-charge.

FORE Systems' `Winsock2.SDK` files, available on the CDROM shipped with the appropriate adapter card or at `www.fore.com`, must be installed on your PC.

As stated at the beginning of this chapter, the Windows Basic Setup configuration assumes you have basic ATM connectivity using UNI 3.0 or UNI 3.1 signalling. If not, please consult the appropriate User's Manual for switch and / or adapter configuration.

5.1.2 Windows 95/98 Support

Although Windows 95 / 98 support clients, they do not support "servers" such as **`svamgr`** and **`trader`**. To use the full suite of SVA software, you should upgrade to Windows NT 4.0.

The Basic Setup cannot be performed using Windows 95 / 98.

5.2 Installing the SVA Software

After you have set up your hardware and confirmed that you have connectivity, the next step is to install the SVA software. The SVA software contains programs to operate both the AVA-300 and ATV-300. Also included is a sample stream configuration file. The software is shipped with the hardware on CD-ROM, and is also available over the Internet.

To install the SVA software, do the following:

1. Insert the CD into your CD-ROM drive or download the software from the Internet. A list of all the files contained in the SVA 5.1 software is displayed.
2. Double click on `SETUP.EXE`. The *ForeThought* `SVA-5.1 Setup Screen` is displayed.

If you have a previously-installed version of an SVA software distribution on your system, you will be asked to remove it prior to installing SVA 5.1. Do not simply delete these files, but instead use the `Add/Remove` feature accessed through the `Control Panel`. Please refer to Section 5.3. Be careful not to delete any old manager configuration files that you may want to re-use. It is also advisable to exit from any other Windows-based applications you may be running. If you encounter difficulties during the SVA de-install procedure, refer to Appendix E.

3. Follow the on-screen setup instructions that are displayed. Read the information contained in each window and click on the `Next>` button to advance through the setup sequence.

The setup installs the SVA software in the default destination folder:
`C:\Program Files\FORE\SVA-5.1`.
Click on `Browse...` to select another folder if you choose to do so.

NOTE

NRLTRADERS is a list of host machines that are running traders. On the NRLTRADERS Screen, you are prompted to enter the hostname(s) of the machine(s) that are running traders and managers that you may wish to access. Consult your system administrator if you are not sure of the appropriate hostnames. In addition, traders and managers are not supported on machines running Windows 95/98; host machines must be running either Windows NT or UNIX.

NOTE

Windows 95/98 do not automatically provide a path for the HOME directory. Therefore, when prompted by the HOME Screen, provide the system with the location of your HOME directory.

4. Complete the software installation by clicking Finish in the Setup Complete Screen.

   You have successfully installed the SVA software.

NOTE

If you are running as the administrative user on Windows NT, you have the option of making the installation available to all users (recommended); other users may only install the software for themselves.

In the current version of the installer, you cannot install the software more than once on a machine; if user A installs it, user B cannot install or remove it, or view it from their Start Menu or on their PATH.

Therefore, the administrative user is strongly advised to install the software on the machine before another user does, thus allowing all users to see it.

5.2.1 Environment Variables

SETUP.EXE automatically sets the environment variables to their proper settings during the installation process. While the defaults are suitable for most applications, you may edit the environment variables to match your system requirements.

5.2.1.1 Setting Environment Variables in Windows NT

The environment variables may be modified at the System Variables Window. To access the System Variables Window in order to set the environment variables in Windows NT, do the following:

1. Click on Start, then on Settings, then on Control Panel, and finally on System.
2. In the System Properties Window, click on Environment. The System Variables Window, shown in Figure 5.1, is displayed.

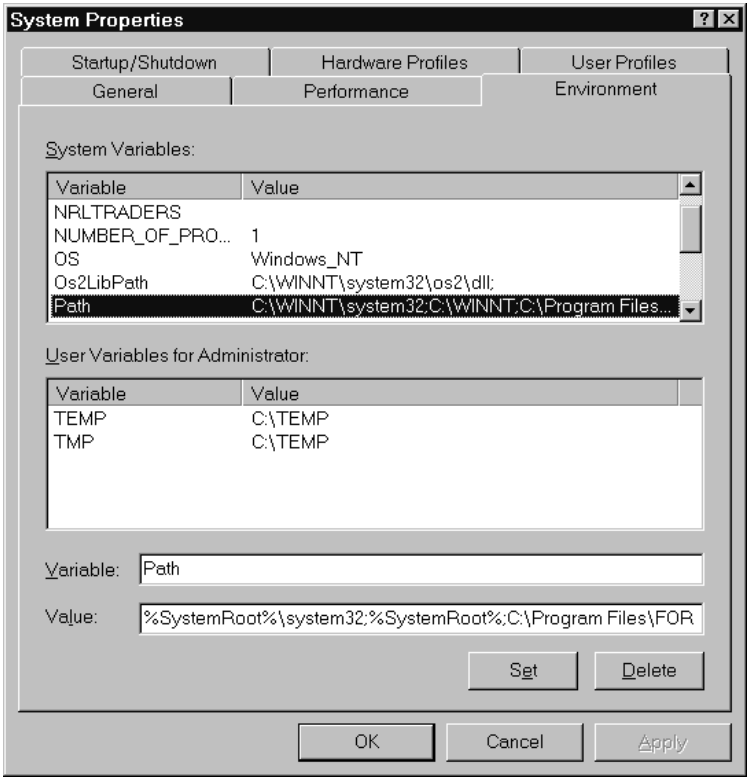

Figure 5.1 - System Variables Window

3. Modify either the PATH or NRLTRADERS settings by clicking on either variable and editing its value when it is displayed in the Value field.
4. Click Set to set the modified variable value.
5. Click OK when you have made all of your required modifications.

5.2.1.2 Setting Environment Variables in Windows 95/98

The environment variables may be modified through the AUTOEXEC.BAT file located in the software distribution. To set the environment variables in Windows 95/98, do the following:

1. Open a DOS shell and access the AUTOEXEC.BAT file by typing the following at the C:\ prompt:

   EDIT AUTOEXEC.BAT

2. Type your desired path as follows:

   PATH=%PATH%;*<drive>******<path>***

   where *<drive>* is the drive on which you wish to install and *<path>* is the path to the "bin" directory of the SVA installation.

The system automatically sets the following path at setup:

C:\Program Files\FORE\SVA-5.1\BIN

Windows 95/98 users are advised to use the short (8.3) filename format without spaces. Some installers corrupt the autoexec.bat file if you put spaces in the PATH definition.

5.3 Removing the SVA Software

It is important that you do not move or delete any files (except manager configuration files) in the SVA software distribution from their installed location, except by the recommended method. Therefore, to properly remove the SVA software distribution, do the following:

1. Click on `Start`, then on `Settings`, then on `Control Panel`, and finally on `Add/Remove Programs`.
2. Double-click on `ForeThought SVA-5.1`.

   The software distribution is removed in the proper manner.

If you receive the message:

```
"Internal error, unable to load or call
external DLL. Please contact your vendor for
more information,"
```

attempt a reinstall. The installer will detect the problem and correct it. After doing this, perform the steps detailed above again.

On the rare occasion that these procedures do not properly remove the SVA software distribution, please refer to Appendix E for further instructions.

5.4 Configuring the Hardware

Once your environment variables have been set, the next step is to configure the hardware. Turn to Section 4.3 to complete the Basic Setup using the command line method or Chapter 6 using SVA Control.

CHAPTER 6 SVA Control

This chapter introduces you to SVA Control, the Windows NT graphical user interface for implementing SVA program tasks including managers, traders, and patches. Although these tasks can also be started from a command prompt within a DOS shell, as described in Chapter 4, SVA Control provides an alternate tool that may be favored by Windows operating system users.

6.1 Accessing SVA Control

To access SVA Control, do the following:

1. Click on `Start`, then on `Programs`, then on `ForeThought SVA-5.1`, and finally on SVA `Control`.

   The SVA `Control Main Window`, shown in Figure 6.1, is displayed.

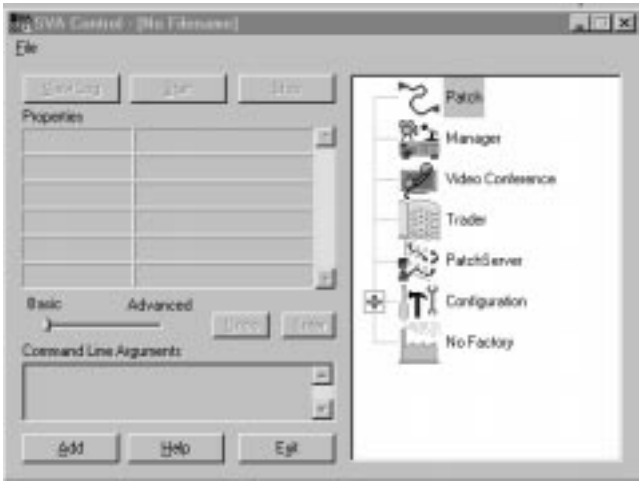

Figure 6.1 - SVA Control Main Window

In addition to the SVA Control Main Window, a console window where logs are displayed, is also displayed.

The window on the right displays a tree that shows the tasks that are or can be configured. It works like the Windows NT Explorer application; the tree may be expanded or collapsed by clicking on the "plus" or "minus" icons located on the extreme left. If no managers or patches are defined, the tree is empty (with no underlaying branches) and a plus or minus icon is not present. There may be any number of managers, patches, traders, and video conferences, and up to one PatchServer.

Managers and traders are not supported on Windows 95/98; you must use Windows NT to utilize these program features.

The Configuration tools do not represent specific tasks, but instead run for only a few seconds, which is the time required to download the configuration to the device. After doing so, they stop.

The Configuration tools for AVA-300 and ATV-300 are *not* stored in a configuration file, nor can they be started automatically. This is due to the fact that they are typically reconfigured each time they are used.

The Properties dialog to the left is where you enter or modify the parameters of the task you have highlighted in the right. Pressing the Undo button returns the highlighted property to its original setting before you made the error.

The Command Line Arguments box displays the commands you invoke when performing tasks with SVA Control. Any application's progress or current status is also displayed in the DOS console window which was opened along with SVA Control.

6.2 SVA Control and Basic Setup

As stated earlier, any tasks you wish to complete with a DOS shell can also be implemented within SVA Control. The following sections detail:

- Starting a Trader
- Registering an AVA-300's Manager
- Registering an ATV-300's Manager
- Patching the AVA-300 and ATV-300

6.2.1 Starting a Trader

To start a trader with SVA Control, do the following:

1. Click on the `Trader` icon in the SVA `Control Main Window`.

   The `Trader` icon illuminates as shown in Figure 6.2.

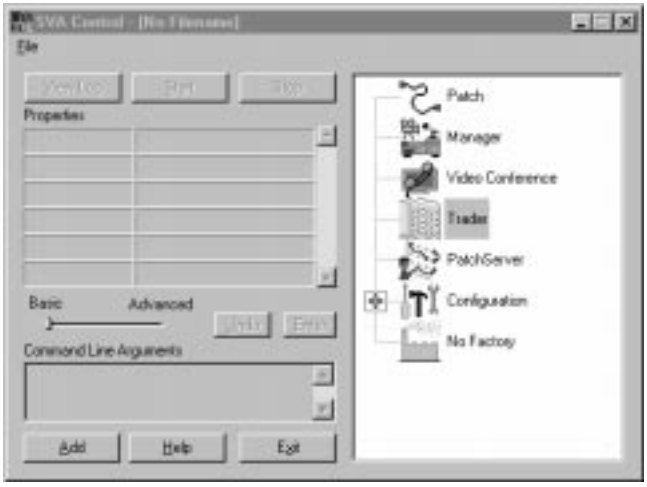

Figure 6.2 - Accessing the Trader Button

2. Click on the `Add` button.

The “plus” icon is displayed on the left of the icon tree, as shown in Figure 6.3.

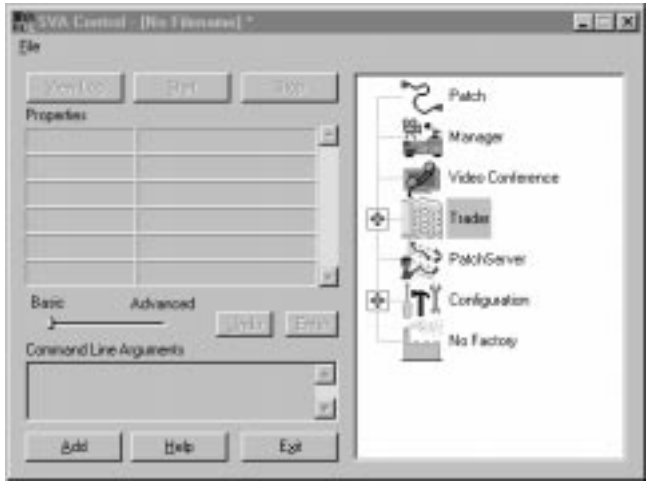

Figure 6.3 - Trader Icon Illumination

3. Click on the “plus” icon. The “plus” changes to a “minus” and a default trader is added, as shown in Figure 6.4.

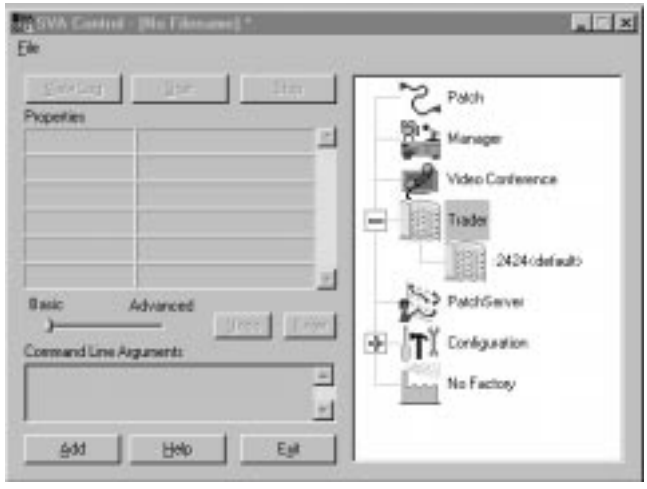

Figure 6.4 - Default Trader Screen

4. Click on the default trader icon. The icon is illuminated, as shown in Figure 6.5.

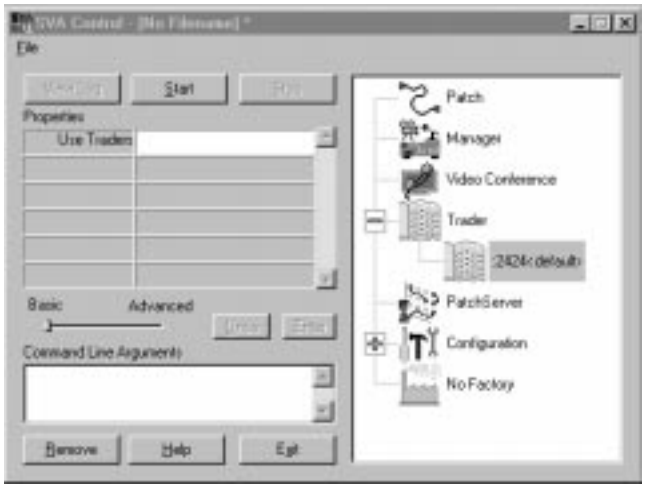

Figure 6.5 - Trader Icon Illumination

In addition, the `Add` button is replaced by the `Remove` button and the `Start` button is illuminated.

5. Click on the `Start` button. The `Start` button dims, as shown in Figure 6.6.

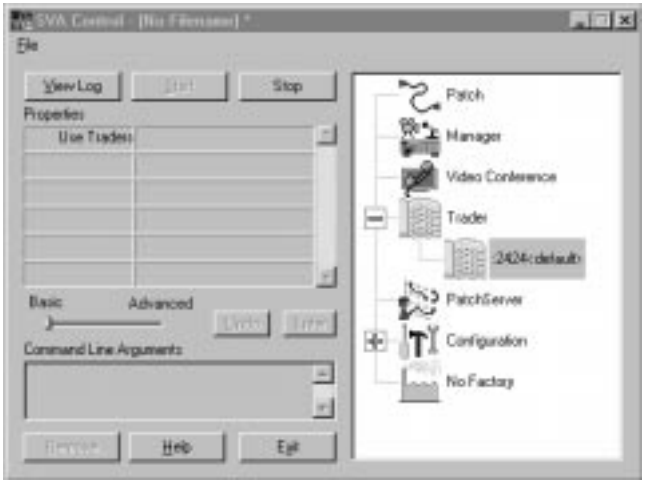

Figure 6.6 - Trader Running Screen

The Trader is started, and the following message is displayed in the underlaying command prompt window to let you know that the **`trader`** application is running:

```
(Date and time): trader: started on host ”phoenix”
```

You have started a trader.

6.2.2 Registering an AVA-300's Manager

To register the AVA-300's manager, do the following:

1. Click on the `Manager` button.

   The `Manager` icon is illuminated, as shown in Figure 6.7.

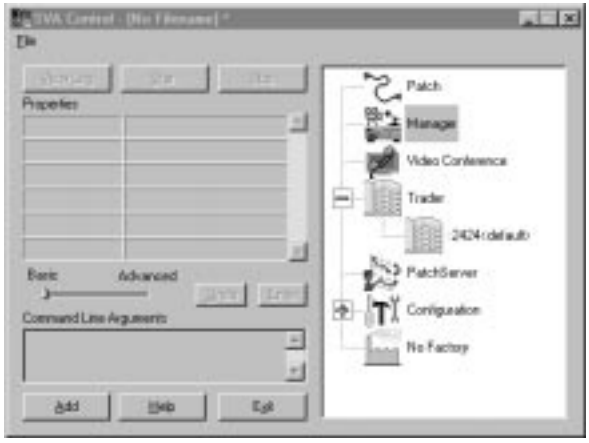

Figure 6.7 - Manager Icon Illumination

2. Click on the `Add` button.

   The "plus" icon is displayed on the left of the icon tree, as shown in Figure 6.8.

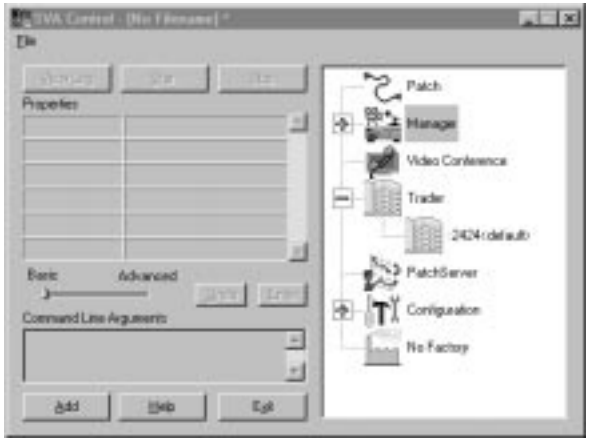

Figure 6.8 - Add Manager Screen

3. Double-click on the `Manager` icon.
   The `Unassigned` icon is displayed underneath, as shown in Figure 6.9.

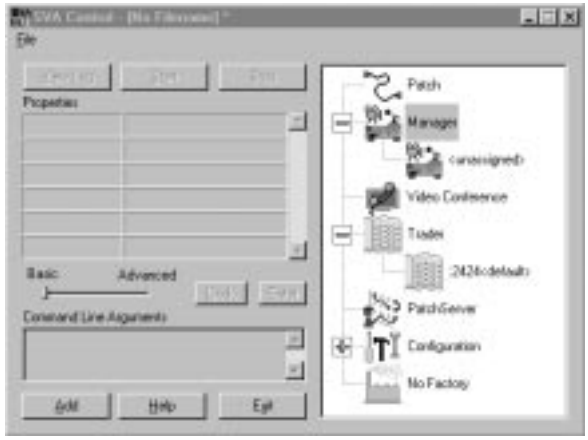

Figure 6.9 - Unassigned Manager Screen

4. Click on the `Unassigned` icon.
   The `Properties` dialog is illuminated, as shown in Figure 6.10.

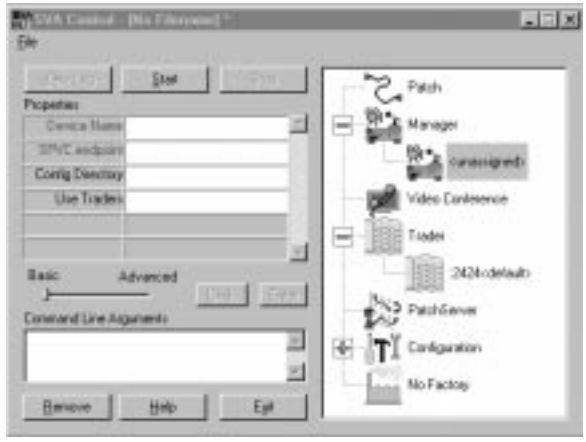

Figure 6.10 - Properties Dialog Screen

5. Click in the Device Name field.
   The Properties dialog remains illuminated while the rest of the screen is grayed to the background.
6. Type ava1 in the Device Name field, then Tab to the SPVC endpoint field. Type orion:1A1 in the SPVC endpoint field.
   Figure 6.11 illustrates the result of this procedure.

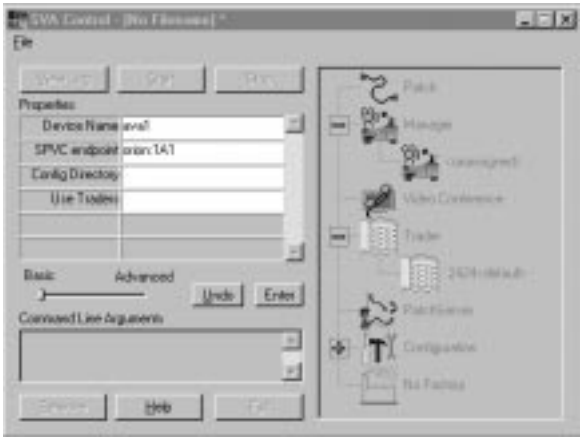

Figure 6.11 - Enter Properties Screen

7. Click on the Enter button.
   The screen illuminates and the ava1 manager is assigned. In addition, the Command Line Arguments box displays the command you have just invoked. Figure 6.12 illustrates the result of this procedure.

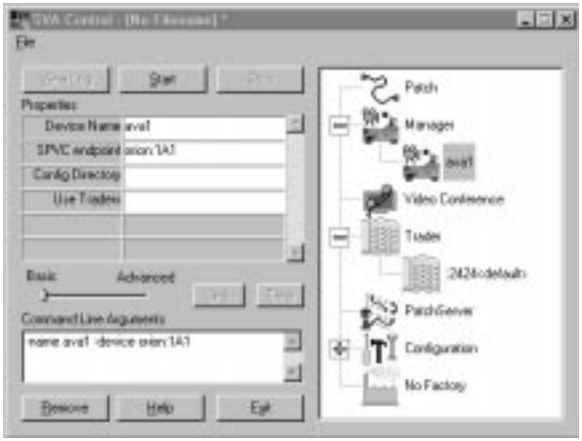

Figure 6.12 - Assign AVA-300 Manager Screen

8. Click on the `Start` button.

   The screen display shown in Figure 6.13 lets you know that the AVA-300 manager application is running. Also, the following message is displayed in the underlaying command prompt window to let you know that the `manager` application is running:

```
(Date and time): svamgr: started on host "phoenix"
```

   In addition, a list of available video and audio streams follows the message.

   You have started the manager and registered it with the trader.

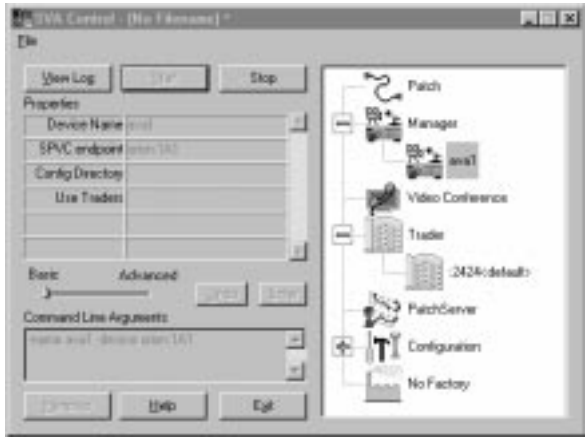

Figure 6.13 - AVA-300 Manager Application Running Screen

6.2.3 Registering an ATV-300's Manager

To register the ATV-300's manager, follow the procedures outlined in the previous section. Be sure to type `atv1` in the `Device Name` field and `orion:1B1` in the `SPVC endpoint` field.

6.2.4 Patching the AVA-300 and ATV-300

Once you register the AVA-300 and ATV-300, the next step is to establish an SVC between the AVA-300 and the ATV-300. To patch the two devices, do the following:

1. Click on the `Patch` button.

   The `Patch` icon is illuminated, as shown in Figure 6.14.

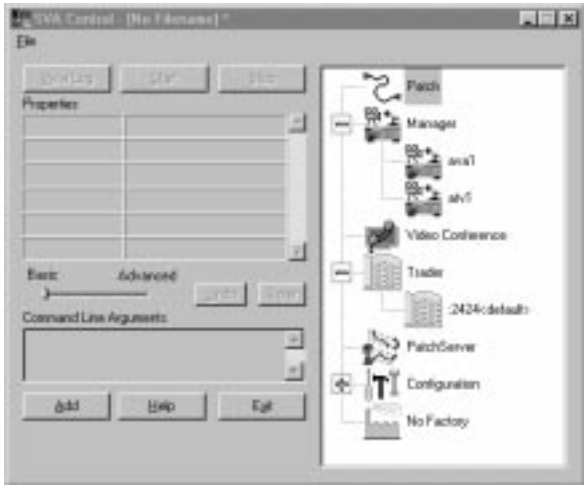

Figure 6.14 - Patches Icon Illumination

2. Click on the `Add` button.

   The "plus" icon is displayed on the left of the icon tree, as shown in Figure 6.15.

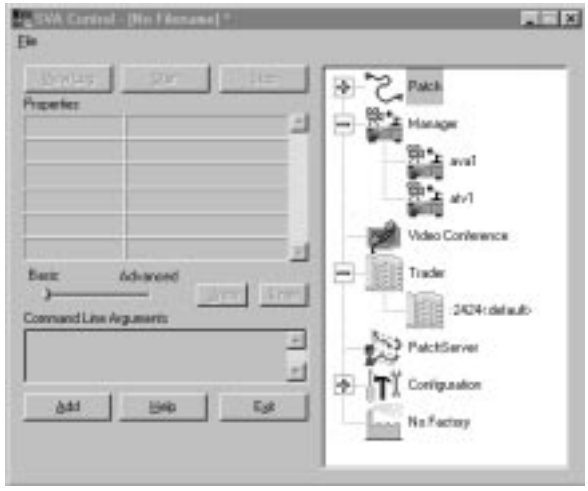

Figure 6.15 - Add Patch Screen

3. Double-click on the `Patch` icon.
   The `Unassigned` icon is displayed underneath, as shown in Figure 6.16.

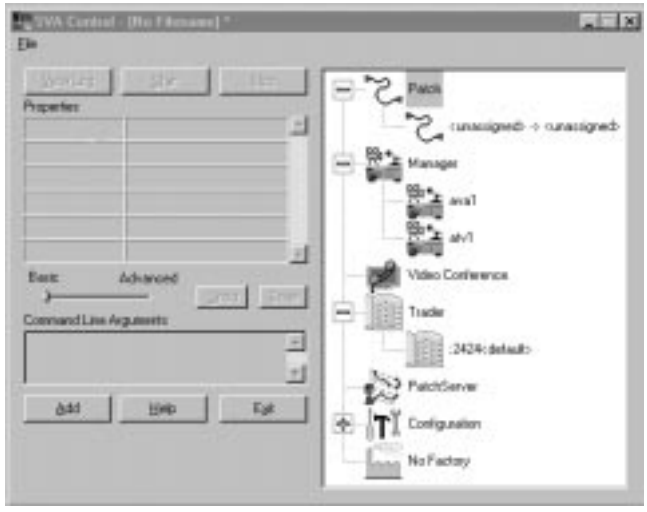

Figure 6.16 - Unassigned Patches Screen

4. Click on the `Unassigned` icon.
   The `Properties` dialog is illuminated, as shown in Figure 6.17.

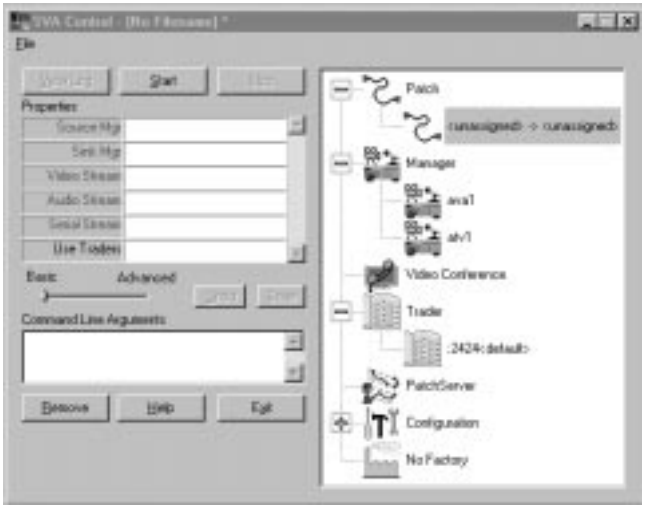

Figure 6.17 - Properties Dialog Screen

5. Click in the `Source Mgr` field. Type `ava1` in the `Source` field, `atv1` in the `Sink Mgr` field, `jpeg-interlace` in the `Video Stream` field, and `cd` in the `Audio Stream` field. Figure 6.18 illustrates this procedure.

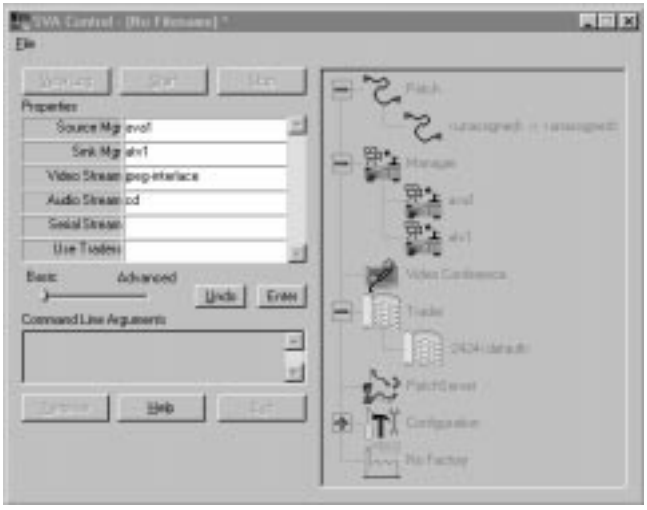

Figure 6.18 - Enter Properties Screen

6. Click on the `Enter` button.

   The screen illuminates and the `ava1-to-atv1` patch is assigned. In addition, the `Command Line Argument` box displays the command you have just invoked. Figure 6.19 illustrates the result of this procedure.

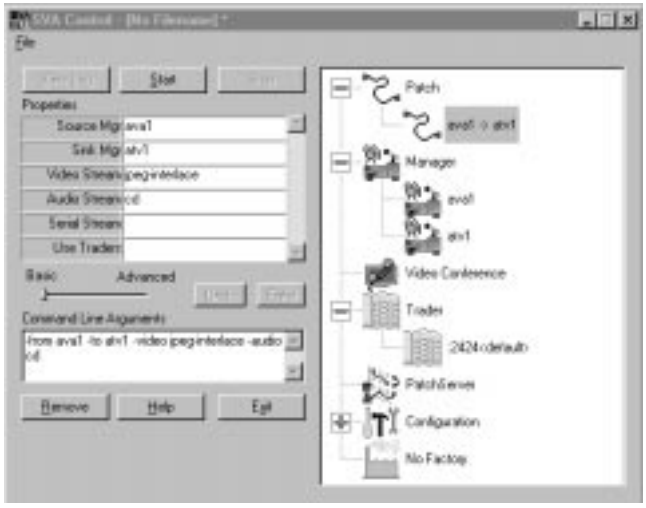

Figure 6.19 - Assign Patch Screen

7. Click on the `Start` button.

   The screen display shown in Figure 6.20 lets you know that the `patch` application is running. Also, the video image and associated audio sound from the VCR is displayed and heard on the TV.

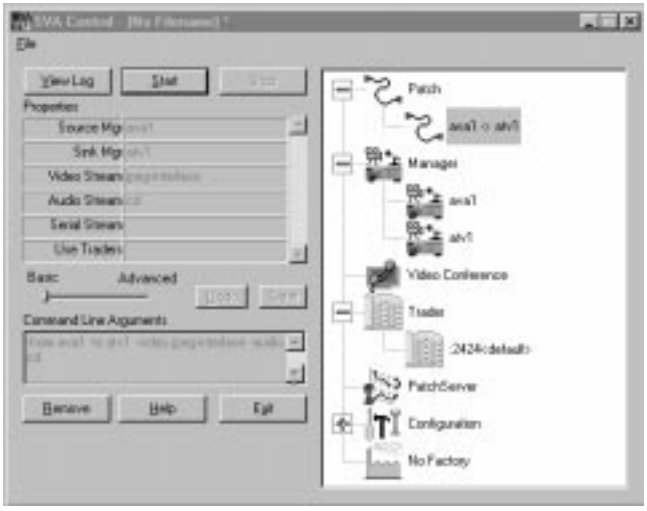

Figure 6.20 - Patch Running Screen

You have completed the Basic Setup configuration using the SVA Control interface.

6.3 Load/Save File

After completing the Basic Setup, you can perform a number of operations which allow you save and open the configuration file you have just created.

6.3.1 Saving the Basic Setup File Configuration

To save the Basic Setup file configuration, do the following:

1. Go to the `File` menu and select `Save As`.
2. Type `Basic` in the `Filename` dialog box and press `Ok`.

   The Basic Setup configuration is saved to disk.

6.3.2 Creating a New File Configuration

To create a new file configuration, do the following:

1. Go to the `File` menu and select `New`.

   You have a “clean slate” with which you can create a new configuration.

6.3.3 Opening an Existing File Configuration

To open an existing file configuration, do the following:

1. Go to the `File` menu and select `Open`.
2. Use the Explorer-like interface to find a previously-saved file configuration.
3. When you find the file you wish to open, select it and press `Ok`.

   The file configuration loads back from disk.

CHAPTER 7 AVA/ATV Applications

This chapter describes how to use the user commands supplied with SVA 5.1 to build commonly-requested user applications. The following applications are covered:

- Connecting AVA-300s to ATV-300s - Use **svapatch** to create single and multi-stream configurations.
- Using ATV-300 menus - Use **atvmenu** to create single and multi-level menus that use **svapatch** to create stream connections.
- Using the PatchServer with **atvmenu** - Use **atvmenu** in conjunction with the PatchServer to create complex and fast stream configurations.
- Using the Factory - Use the Factory to ensure that a given set of managers is always running.
- Dynamically creating an AMF Conference - Use **atvmenu** and the PatchServer to dynamically create AMF conferences using the ATV menu system.

7.1 Connecting AVA-300s to ATV-300s

7.1.1 Single Stream Configurations

svapatch is a client of the SVA manager RPC interface. It is used to connect a source stream from an AVA-300 to an ATV-300. In order for an SVC to be established between the two devices, a sink stream definition must be created in the destination device manager by **svapatch**.

Figure 7.1 illustrates some of the main RPC control paths that are used when establishing a multimedia SVC stream between an AVA-300 and ATV-300 using **svapatch**.

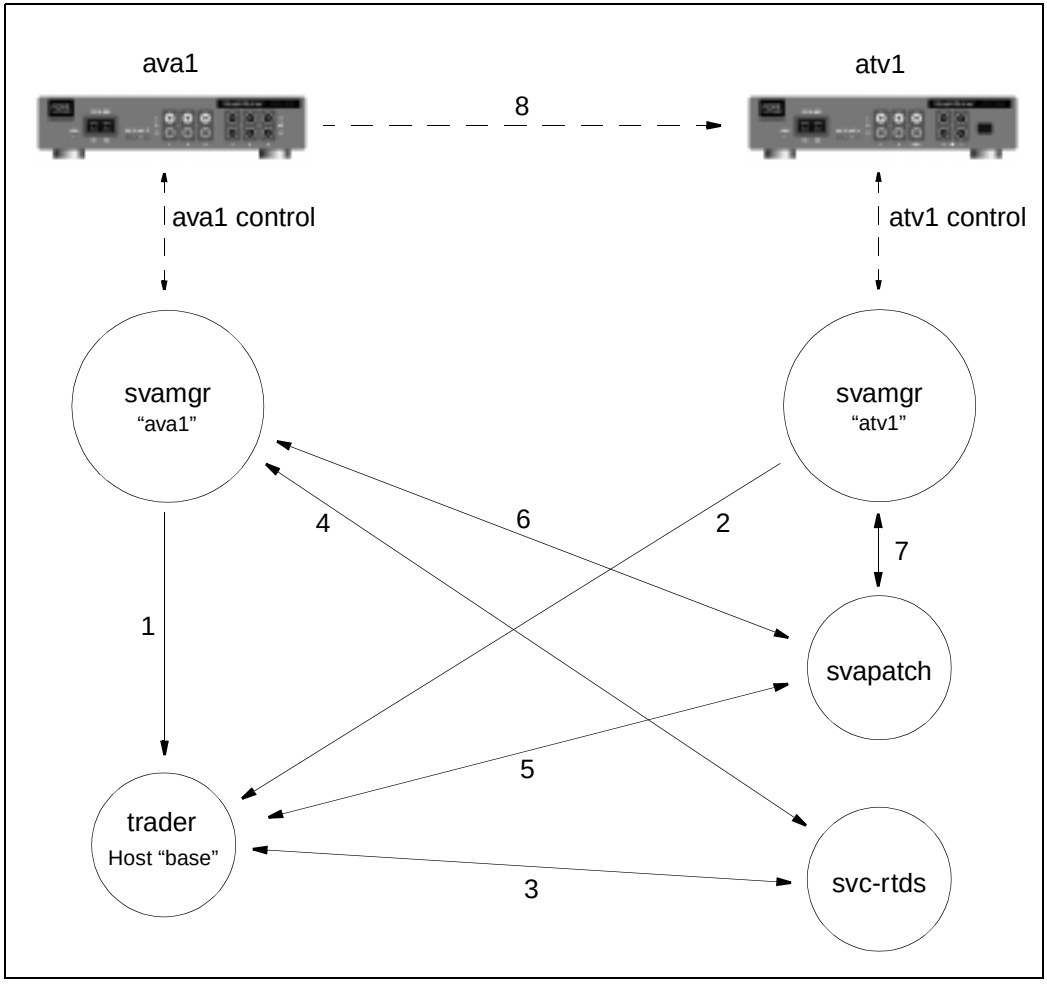

Figure 7.1 - RPC Paths and svapatch

Each circle represents an SVA process which may be running on any host in the network. Since all control communication is via RPC, the placement of these processes is decided by your local network administrator. A possible sequence of events, corresponding to the numbered arrows in Figure 7.1, for a connection to be established between the AVA-300 and ATV-300 is as follows:

1. The `ava1` manager process registers its interface with the **`trader`** process.
2. The `atv1` manager process registers its interface with the **`trader`** process.
3. The **`svc-rtds`** process looks up the interface of the `ava1` manager process. This step is only necessary if the client wishes to create a new stream definition or modify an existing one prior to performing the patch.
4. The **`svc-rtds`** process interacts directly with the `ava1` manager process. This may be because the client is creating or modifying the source stream definition or simply checking that it has the expected parameters.
5. The client knows the type and name of the stream(s) to be patched. For example, a single video stream called `jpeg-interlace` could be selected. In this case, the command required to perform the patch is:

```
svarun svapatch -trader base -from ava1 -to atv1 jpeg-interlace
```

6. **`svapatch`** contacts the `ava1` manager process to query the details of the video stream `jpeg-interlace`.
7. **`svapatch`** opens a session with the `atv1` manager process. A sink stream definition compatible with that for video stream `jpeg-interlace` is created.
8. The video stream SVC from the AVA-300 to the ATV-300 is created.

`svapatch` continues to run after creating the initial sinks and SVC connections. Stream changes that are received on the downlink connection from the source device managers are passed to the appropriate sink device managers. So, if **`svc-rtds`** is used to change the size of a source video stream, **`svapatch`** passes the size change through to the destination.

`svapatch` attempts to maintain the specified connections in the face of device manager restarts, stream deletions and re-creations, connection failures (such as switch failures) and other error conditions.

NOTE

When **`svapatch`** opens a session with the ATV-300 manager, another client cannot open a session to the same manager. Therefore, it is not possible to use two instances of **`svapatch`** to patch multiple streams to the same ATV-300.

Similarly, it is not possible to use **`svapatch`** and the Patchserver at the same time to configure video / audio streams on the same ATV-300.

7.1.2 Multi-Stream Configurations

svapatch supports complex multi-stream configurations via its **-format** option. The supported formats are discussed in the following sections.

7.1.2.1 1up Format

The 1up configuration displays a single image over the entire screen, as illustrated in Figure 7.2. It requires one AVA source stream.

Figure 7.2 - 1up Stream Configuration

7.1.2.2 2up Format

The 2up configuration divides the screen in half vertically, as illustrated in Figure 7.3. It requires two AVA source streams.

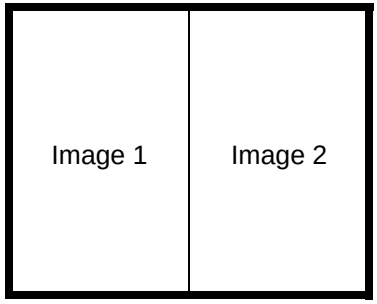

Figure 7.3 - 2up Stream Configuration

7.1.2.3 4up Format

The 4up configuration divides the screen in half both vertically and horizontally, as illustrated in Figure 7.4. It requires four AVA source streams.

Figure 7.4 - 4up Stream Configuration

7.1.2.4 Picture-in-Picture (PIP) Format

The picture-in-picture (pip) configuration divides the screen in two with a smaller image overlaying a larger, predominant image, as illustrated in Figure 7.5. It requires two AVA source streams.

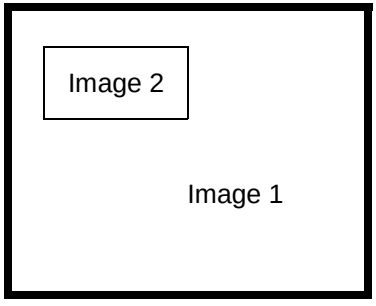

Figure 7.5 - PIP Stream Configuration

7.1.2.5 conf3 Format

The conf3 configuration divides the screen into a large, roughly square, window occupying two-thirds of the screen and two smaller windows arranged in a vertical column to the right. The conf3 configuration is illustrated in Figure 7.6. It requires three video sources.

Figure 7.6 - conf3 Stream Configuration

7.1.2.6 conf4 Format

The conf4 configuration is similar to the conf3 configuration, except that there are three windows in the right vertical column. The conf4 configuration is illustrated in Figure 7.7. It requires four video sources.

Figure 7.7 - conf4 Stream Configuration

NOTE

Only a single audio stream can be sent to the ATV-300 unless the AMF functionality is used.

7.1.2.7 Screen Format and Stream Definitions

svapatch provides a naming scheme for identifying where each source stream is to be displayed on the ATV-300. The default set of stream definitions supplied with SVA 5.1 includes source streams compatible with all of the screen placements shown in the previous sections. The following sections show how each screen format is named and what the corresponding source stream definitions are called. The **bold** typography indicates screen format, while the term in parentheses indicates the stream name.

7.1.2.7.1 1up Format

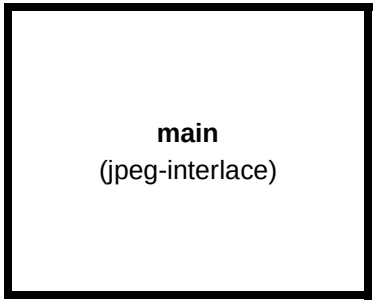

Figure 7.8 - 1up Screen Format and Stream Definition

7.1.2.7.2 2up Format

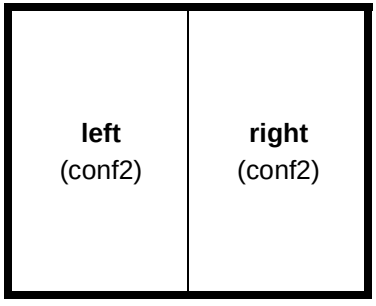

Figure 7.9 - 2up Screen Format and Stream Definitions

7.1.2.7.3 4up Format

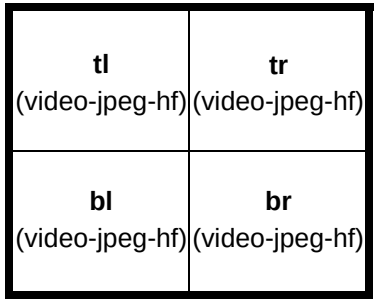

Figure 7.10 - 4up Screen Format and Stream Definitions

7.1.2.7.4 Picture-in-Picture (PIP) Format

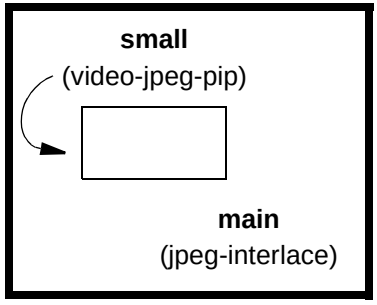

Figure 7.11 - PIP Screen Format and Stream Definitions

7.1.2.7.5 conf3 Format

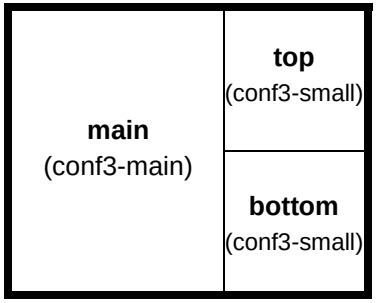

Figure 7.12 - conf3 Screen Format and Stream Definitions

7.1.2.7.6 conf4 Format

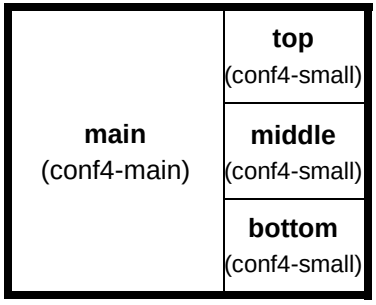

Figure 7.13 - conf4 Screen Format and Stream Definitions

7.1.2.7.7 Example Stream Commands

```
$ svapatch -to atv1 -format pip \
   -from vcr -video main=jpeg-interlace -audio cd \
   -from cameras -video small=video-jpeg-pip

$ svapatch -to atv1 4up \
   -from vcr -video tl=video-jpeg-hf -audio cd \
   -from camera1 -video bl=video-jpeg-hf \
   -from camera2 -video tr=video-jpeg-hf \
   -from camera3 -video br=video-jpeg-hf

$ svapatch -to atv1 conf4 \
   -from camera1 -video main=conf4-mail \
   -from camera2 -video top=conf4-small \
   -from camera3 -video bottom=conf4-small \
   -from vcr -video middle=conf4-small -audio cd

$ svapatch -to atv1 conf3 \
   -from camera1 -video main=conf3-mail \
   -from camera2 -video top=conf3-small \
   -from camera3 -video bottom=conf3-small -audio cd
```

7.2 Using ATV-300 Menus

7.2.1 ATV-300 Menu Control

The ATV-300's on-screen menu system can be used to initiate both local and remote actions. The local functionality is described in Chapter 3. A variety of SVA applications are provided which interact remotely with an ATV-300 user via the menu system. These applications require the ATV-300 to be under the control of a management process. The two primary applications for remotely controlling the menu system are **atvpatch** and **atvmenu**. A description of **atvmenu** is provided in the next section. Consult the online **atvpatch** manual page for more information.

7.2.2 atvmenu

atvmenu allows you to generate menu boxes on a remote ATV-300 and allows an action to be associated with each menu item. Since these actions may be shell commands such as **svapatch** (see Section 7.1.1), you can use the ATV-300 menu to join the streams generated by remote AVA-300s. **atvmenu** also supports the creation of submenus through which you may navigate. The submenus can themselves be generated by arbitrary shell commands, allowing sophisticated control systems to be built.

This section presents two examples which illustrate how to use **atvmenu**:

- Combining **atvmenu** and **svapatch**
- Creating submenus and gaining independent control over multiple video windows

7.2.2.1 Combining atvmenu and svapatch

To create a menu that combines the use of **atvmenu** and **svapatch**, type the following:

```
$ atvmenu -at tv -title 'Channel Menu' \
   -item "Camera" -main "svapatch -from camera jpeg-interlace" \
   -item "VCR" -main "svapatch -from vcr jpeg-interlace"
```

This command creates an onscreen menu at the ATV-300 named `tv` with two items called `Camera` and `VCR`. The shell commands for each of these items run **svapatch**. When `Camera` is selected, a patch is created from the stream `jpeg-interlace` at the AVA-300 called `camera` to the ATV-300 called `tv`.

Including the **-main** key as part of the command line structure ensures that only one **svapatch** is executing at any given time. When you select one option while the other is running, the running **svapatch** is terminated.

The **svapatch** command does not need to explicitly specify **-to tv**; when **atvmenu** runs a shell command, it exports the name of the ATV-300 in the environment variable SVA_AT_DEV, and **svapatch** uses the value as the default **-to** device. See the online **atvmenu** manual page for full details of the environment variables that **atvmenu** exports.

atvmenu can share access to its session with the **svapatch** process it creates, but not with independently-created **svapatch** processes.

VCR creates a similar patch from the AVA-300 named vcr. If the remote user selects Camera and then selects VCR, it is like changing channels on an ordinary TV; the patch from the camera AVA-300 is removed before creating the patch from the vcr AVA-300. To make sure that this happens, the shell commands for the two items have both been tagged with the same **-main** key.

Since neither of the choices in this example is tagged with the special **-exit** key, **atvmenu** remains running as the remote user makes menu selections instead of exiting after the first choice.

7.2.2.2 Using atvmenu to Create Submenus and Gain Independent Control over Multiple Video Windows.

To create submenus and gain independent control over multiple video windows, type the following, assuming the file `inset.menu` exists (see below):

```
$ atvmenu -at tv -title 'Main Window' \
   -item "Camera" -main "svapatch -from camera jpeg-interlace" \
   -item "VCR" -main "svapatch -from vcr jpeg-interlace" \
   -item "Inset window menu..." -menu "cat inset.menu"
```

The first two items use **`atvmenu`** and **`svapatch`** as described in the previous section. The third item is tagged with the special key **`-menu`**. When selected, this key runs the shell command **`cat inset.menu`** and interprets the command's output as a new submenu to download to the ATV-300. Suppose that the file `inset.menu` has the following contents:

```
$ cat inset.menu
  -title 'Inset Window'
  -item "Camera" -inset "svapatch -from camera -format pip video-jpeg-pip"
  -item "VCR" -inset "svapatch -from vcr -format pip video-jpeg-pip"
  -item "Back" -exit
```

Selecting the `"Inset window menu..."` item on the top level menu displays a three-item submenu. The last item, `"Back"`, has the special **`-exit`** tag; choosing it takes the remote user back to the original `Main Window` menu. Pressing the < button on the Remote also returns your user to the `Main Window` menu. The first two items on the `Inset Window` submenu run **`svapatch`** to make patches from the picture-in-picture streams at the two AVA-300s named `camera` and `vcr`. These two items have the **`-inset`** tag. Whenever one of these items is selected, **`atvmenu`** ensures that the **`svapatch`** run by the other item is terminated first. Because the key used is distinct from the one used for the `Main Window` in the top-level menu, switching between patches for the inset window has no effect on the patches for the `Main Window`, and vice versa. There is nothing inherently special about the **`-main`** and **`-inset`** tags other than that they are distinct. **`atvmenu`** ensures that there is only one command running at a time for each distinct tag. In this example, the contents of the submenu are fixed. Because submenus are created from the outputs of shell commands, more dynamic menus are possible. The **`atvmenudemo`** program in the SVA software illustrates this by producing menus similar to those in this example for any ATV-300 and pair of AVA-300s specified on its command line. The shell mechanism means that menus can also be altered at runtime in response to user actions.

7.3 Using the PatchServer with atvmenu

This section shows how to use the PatchServer to create an ATV menu-driven application. The PatchServer is fully documented in the *PatchServer Developer's Manual* which should be consulted for information on how to build complete applications. The following descriptions assume an understanding of the PatchServer API.

The principal reason for using the PatchServer in place of **svapatch** as described above is the PatchServer's ability to concurrently display or *salvo* multiple video connections simultaneously. This provides a significant performance improvement for complex multi-stream configurations.

In these examples **atvmenu** is used in the same way as above, but the actions associated with the menu selections invoke operations on the PatchServer rather than using **svapatch**.

7.3.1 Sessions

The PatchServer's concept of the *session* is essentially a container within which related patches are defined and used. For this application it is convenient to use a different session for each ATV-300 to be managed.

The **pssession** command is provided for managing PatchServer sessions. It is typically used to create and destroy sessions. Please refer to the online **pssession** man page for more information.

The following command line,

```
$ pssession persil -create atv1
```

which outputs,

```
session_3
```

contacts **pserv** at `persil` and creates a new session with the tag `atv1`. It prints the id `session_3` allocated by the PatchServer for the session.

Conversely, the command line:

```
$ pssession persil -cleanall atv1
```

destroys all sessions with the tag `atv1`. This is ensures a completely clean starting point from within scripts.

Once a session is created, it is possible to define patches within it for subsequent use. The **pscl** command is used for this task. Please refer to the online **pscl** man page for more information.

NOTE

The syntax for specifying patches is identical to that used for **svapatch**.

The following example uses **pssession** and **pscl**. **pssession** is used to create a new session with the tag atv. The session id is stored in the UNIX shell variable session for subsequent use by other commands. The script passed to **pscl** on its command line simply attaches to the newly-created session and defines two patches to the same ATV-300 from different AVA-300s (ava1 and ava2).

```
$ session=`pssession persil -create atv`
$ pscl persil -script "session attach $session
   patch item1 -from ava1 -to atv -video jpeg-interlace -audio cd
   item1 retry forever
   patch item2 -from ava2 -to atv -video jpeg-interlace -audio cd
   item2 retry forever"
```

NOTE

pssession *<host>* **-getId** *<tag>* can be used to obtain the session id of the session with the given tag.

Once these commands have been executed, the PatchServer is primed with patch definitions. It is now possible to run **atvmenu** with actions that use **pscl** and the PatchServer to show the patches on the ATV-300.

For example:

```
$ atvmenu -at atv -title 'PatchServer Channel Menu' \
   -item ava1 "pscl $host -script \"session attach $session p; item2
   disconnect next; item1 show next; commit\"" \
   -item ava2 "pscl $host -script \"session attach $session p; item1
   disconnect next; item2 show next; commit\""
```

NOTE

The PatchServer's salvo functionality (i.e., **next; commit**) is used to ensure almost instantaneous switchover from one stream to the other.

pscl runs to completion and does not execute in background as **svapatch** would. Monitoring and recreation of the patches in the face of error is managed by the PatchServer, and thus system load is reduced for large installations running many **atvmenu** commands as compared to the equivalent **svapatch** configuration.

The above example is included in the SVA 5.1 distribution as **psatvmenudemo**.

To tear down any patches left running, you use **pssession** as follows:

$ pssession *<host>* **-destroy** *<sessionid>*

Therefore, used in conjunction with the previous examples, this command is as follows:

$ pssession persil -destroy session_3

This tears down the specific session and all of its patches. Alternatively, you can use the following:

$ pssession persil -clearall atv

to tear down all sessions with the tag **atv**.

7.4 Using the Factory

The Factory provides a means of starting and stopping SVA services in a uniform manner regardless of the underlying operating system. An instance of the Factory is run on each workstation or PC that is to run SVA services. The Factory is fully documented in the *PatchServer and Factory Developer's Manual*.

Three commands are provided in SVA 5.1 for using the Factory:

- **`fsensure`**
- **`pscl/psp`**
- **`fsc`**

`fsensure` provides a convenient means of ensuring that a particular set of services are running on a given host. **`fsensure`** is most useful in scripts to guarantee that the trader, managers, and possibly PatchServer are running before going to use **`atvmenu`**, **`psconfer`**, etc.

`pscl` and **`psp`** may be used with the Factory and PatchServer, and provide a command line and interactive interface to the Factory, respectively.

The following example shows how to use the Factory to ensure that a trader and PatchServer are running on a given host. The Factory service must be running beforehand.

```
$ fsensure persil -trader mytrader -patchserver mypatchserver
Creating trader: mytrader ""
Creating PatchServer: mytrader ""
Waiting 9 seconds for services to start ... checking services
All services started
```

The tags **`mytrader`** and **`mypatchserver`** are used to uniquely identify the service being created and/or used. If a service with the specified tag does not exist, then a new definition is created. If the service definition already exists, it is used. If the service is not running, it is started. If the service is running, it is left alone. In this way, **`fsensure`** may be used to ensure that a given set of services is running. For example, running it again would produce the following:

```
$ svarun fsensure persil -trader mytrader -patchserver mypatchserver
PatchServer already running: mypatchserver
Trader already running: mytrader
All the services you requested are already running!
```

fsensure can also be used to run managers. This is best done in conjunction with corresponding entries in your SVAauth file. Consider the following SVAauth file:

```
s1:*:mercury/1c2
s2:*:light/1a3
s3:*:light/1a4
s4:*:rotary/1d1
amf:*:mercury/1b4
```

The file shows that there are four managers, named s1, s2, s3, s4, and amf, each of which is connected to the corresponding switch ports, i.e., mercury/1c2, light/1a3, light/1a4, rotary/1d1, and mercury/1b4. The **-name** argument is now all that is required for **svamgr**. For example:

```
$ svarun svamgr -name s1
```

runs the manager against mercury/1c3.

fsensure can then be used as follows:

```
$ svarun fsensure persil \
    -mgr s1 "-name s1" -mgr s2 "-name s2"
    -mgr s3 "-name s3" -mgr s4 "-name s4"
    -mgr amf "-name amf"
```

This ensures that all five managers are running.

If you wish, you can also specify the **-device** arguments using **fsensure**.

It is possible to define and run multiple traders and PatchServers on the same host. Care must be taken to ensure that these multiple instances of the same service are given appropriate command line arguments to distinguish them from one another, as in this example:

```
$ fsensure persil -trader mytrader1 "-port 5656"

$ fsensure persil -trader mytrader2 "-port 5657"
```

It is not possible to start multiple traders and PatchServers via a single invocation of **fsensure**.

7.5 Dynamic AMF Conferences

psconfer provides equivalent functionality to **svaconfer** but using the PatchServer instead of multiple **svapatch** sub-commands. (See Chapter 12 for details on how to set multi-site conferences). This means that **psconfer** can use salvo switching to ensure a near instantaneous start of all conference participants and also reduces system load. Each site can easily be captioned as well.

psconfer can be easily used as an action for **atvmenu** and an example script **psconfdemo** is provided to show how to do this. This script also uses **fsensure** to start all managers. Assuming all SVA software is running on machine "persil," **psconfdemo** does the following:

```
$ fsensure persil -trader cos \
    -patchserver cos "-init -no_auth" \
    -mgr s1 "-name s1" \
    -mgr s2 "-name s2" \
    -mgr s3 "-name s3" \
    -mgr s4 "-name s4" \
    -mgr amf "-name  amf" -showlog || exit 1

atvmenu -at s1 -title "Conferencing @ s1" \
    -item "conf 1up" -key \
      "psconfer persil -captions -format 1up amf s1 s2" \
    -item "conf 2up" -key \
      "psconfer persil -captions -format 2up amf s1 s2" \
    -item "conf conf3" -key \
      "psconfer persil -captions -format conf3 amf s1 s2 s3" \
    -item "conf 4up" -key \
      "psconfer persil -captions -format 4up amf s1 s2 s3 s4"\
    -item "conf conf4" -key \
      "psconfer persi; -captions -format conf4 amf s1 s2 s3 s4" \
    -item "end conference" -key ""
```

You will need to run one instance of the above **atvmenu** command against each ATV-300 that can initiate a conference.

psconfer uses the PatchServer's locking commands to ensure that only one site can initiate a conference at a time.

CHAPTER 8 SVA Architecture

This chapter describes the core components of the SVA system in greater detail than has been covered in earlier chapters. Succeeding chapters describe specific SVA applications which build on the concepts introduced here. This chapter is organized into the following sections:

System Architecture	Provides an overview of devices, managers, and traders and their relationship with SVA client applications.
Device Managers	Discusses device manager concepts including CellChain configuration.
Video Streams	Discusses SVA video streams.
Audio Streams	Discusses SVA audio streams.
Serial Streams	Discusses SVA serial streams.

8.1 System Architecture

The SVA software uses a client server architecture to separate the management of devices from their use by applications.

8.1.1 Devices

The AVA-300 and ATV-300 hardware components are sometimes referred to as devices. These components, fully described in their chapters earlier in this manual, are stand-alone devices whose only connection to other computers is through the ATM network. They are managed over the network by device-specific managers, which are described in the next section.

8.1.2 Managers

Managers are SVA software applications that have two primary functions:

- maintain ATM signalling on behalf of the device
- make the device accessible to applications

Managers control all aspects of a device's operation, particularly the interaction with the ATM network to establish Switched Virtual Circuits (SVCs) dynamically for the video and audio streams generated or consumed by the device. Maximum performance is ensured since all video and audio data is communicated directly over the ATM network and does not flow through the manager.

Together, devices and managers constitute a service which provides video and audio streams for use by applications. One such application is **`svc-rtds`**, which stands for Real-Time Display Software and conveys the fact that **`svc-rtds`** provides real-time presentation of video and audio streams on your workstation. The interaction between devices, managers, and applications is illustrated in Figure 8.1.

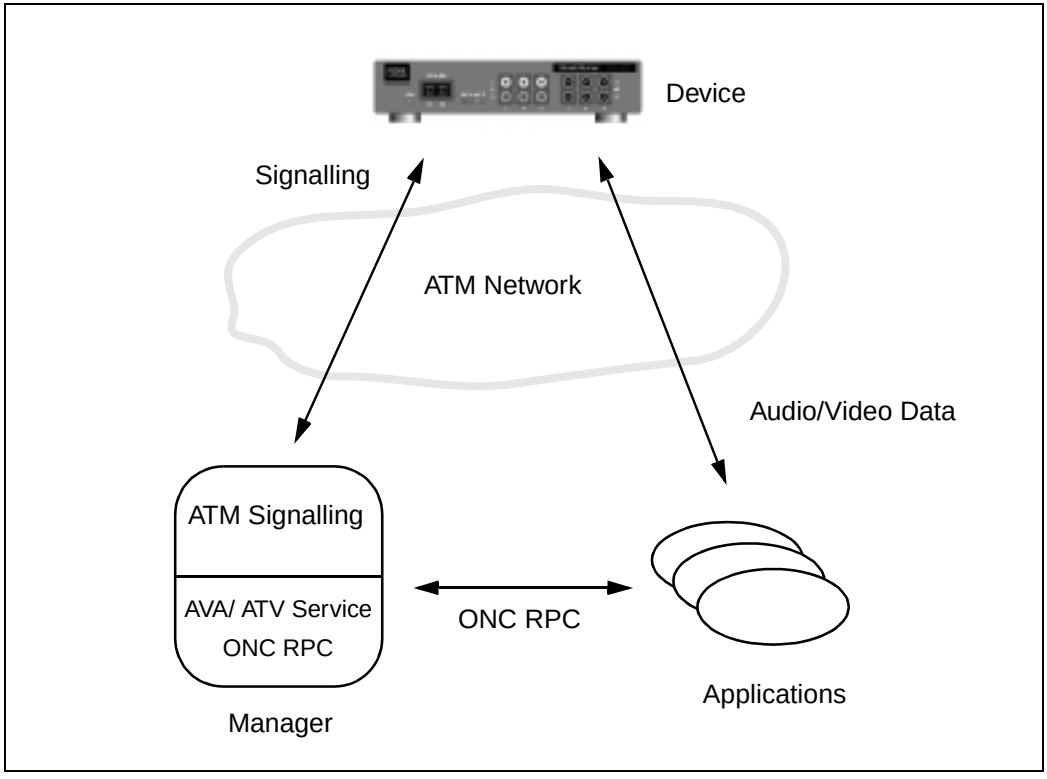

Figure 8.1 - How a Device, Manager, and Applications Interact

Managers also provide an ONC (Sun) Remote Procedure Call (RPC) interface for use by client applications. This interface allows a single device to be accessed by multiple applications and their users simultaneously, and provides a high-level view of the device's video and audio stream configuration and operation.

8.1.3 Traders

Traders provide a distributed database with which managers register their existence and from which applications locate all running managers. In this way, applications do not need to know the location of managers, just the name of the host machine(s) running a trader(s). Figure 8.2 illustrates the interaction between managers, traders, and applications.

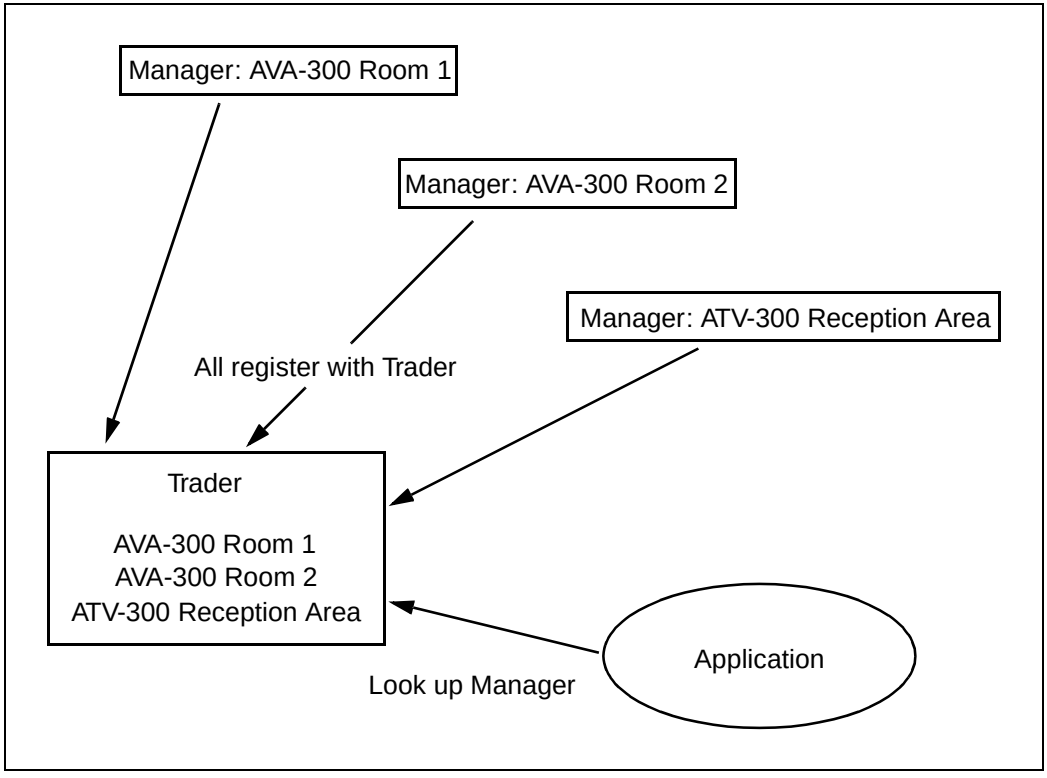

Figure 8.2 - How Managers, Traders, and Applications Interact

Managers register with one or more traders. Applications must look up managers in the trader to determine where the managers are located before they can invoke any operations on the manager's RPC interface.

8.2 Device Managers

Managers implement ATM signalling on behalf of the devices they manage using a technique called proxy signalling. Proxy signalling relies on the devices being able to forward all signalling messages they receive from the ATM network to their manager, and on the manager being able to send signalling messages to the ATM network via the device. This means that the device appears to be the producer and consumer of all signalling messages sent to and received from the ATM network. The network is unable to distinguish whether the device itself is implementing ATM signalling, or if the manger is doing so on behalf of the device. The SVA software supports two types of ATM signalling:

- ATM Forum UNI 3.0
- ATM Forum UNI 3.1

The ATM Forum is an industry consortium created to accelerate the development and deployment of ATM standards; UNI 3.0 was the first version of their standard for ATM signalling.

UNI 3.0 and UNI 3.1 signalling may co-exist on the same network.

Both UNI signalling protocols provide similar functionality, so SVA managers can provide the same service regardless of which version is being used. SVA managers, which are applications from the network's point of view, implement both versions.

Deciding which protocol to use is based on the command line arguments given to the manager when run. It is not possible to dynamically switch between UNI 3.0 and UNI 3.1 at run time.

8.2.1 Manager Status

An SVA manager may be in one of three states:

Up The manager has contacted the device and configured it. The manager is ready to accept requests for device specific services.

Down The manager is not in contact with the device. A variety of problems can be the cause of this state, including, device powered down, no device, network down, etc. A less common cause is that an `Up` and a `Standby` manager are already running against the unit(s).

Standby A manager process, if it detects that a manager is already running against the device, enters the `Standby` state. If the `Up` manager fails, then the `Standby` manager will take over and enter the `Up` state. Client applications detect the switchover and re-bind. If the original manager recovers / restarts, it enters the `Standby` state.

The current manager state is always registered with the trader. The **`mgrls`** and **`svc-rtds`** SVA components are both able to report the current status of managers in a trader(s) database. By default, **`svc-rtds`** only shows managers which are in the `Up` state. This may be altered using the `Show Managers` button in the `AVA/ATV Manager Browser`. See Chapter 9 for a detailed discussion of **`svc-rtds`**.

The `Standby` manager function only works when SPVCs are used to contact the remote device(s).

8.2.2 Switched Virtual Circuits (SVCs)

An important function of managers is the dynamic creation of Switched Virtual Circuits (SVCs) between the device they manage and other SVA components such as other SVA devices and client applications including **`svc-rtds`**.

Managers make use of multicast SVCs to optimize the use of network resources. That is, if more than one application requests the same video or audio stream, the manager creates a single multicast SVC to carry the data to all interested applications. The use of multicast SVCs ensures that the same data is not sent multiple times over the same shared network link.

Consider a video stream being generated by an AVA-300 which is being received by three workstations. The network configuration is such that the workstations are connected to the same ATM switch, but there is a second switch between the AVA-300 and the workstation switch. Figure 8.3 illustrates this configuration.

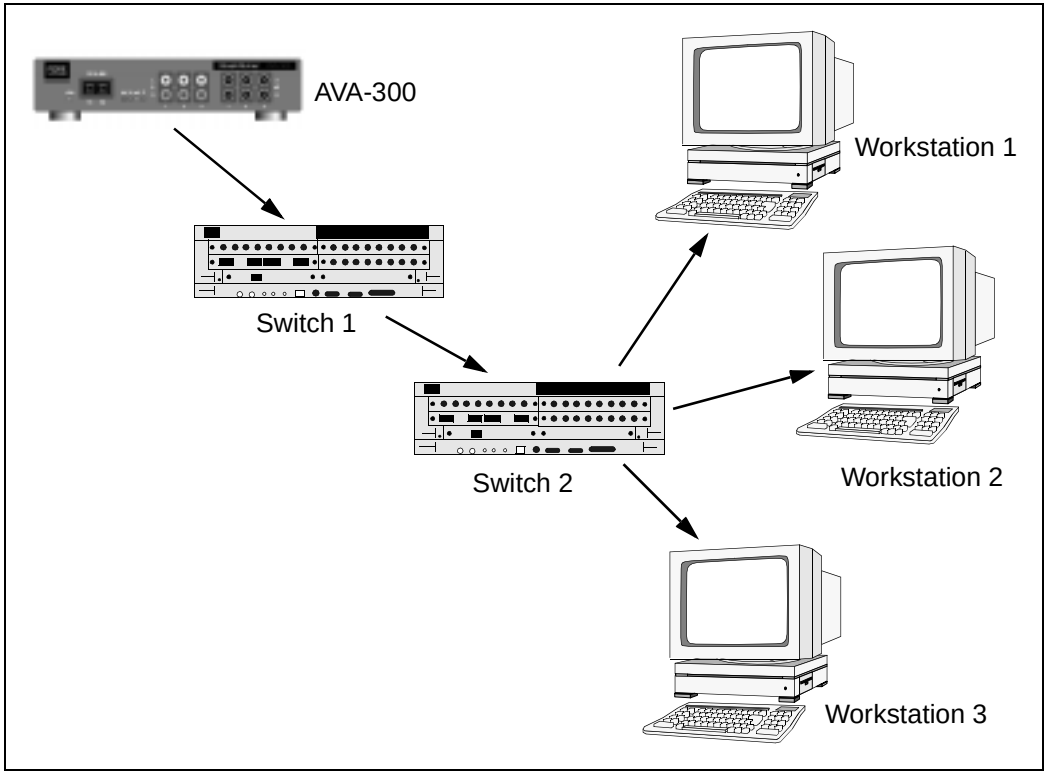

Figure 8.3 - Video and Audio Multicast

Multicasting means that only a single video stream is required between the AVA-300 and the switch to which it is directly connected. The switch that the workstations are connected to creates or copies a separate video stream for each workstation receiving the video. This reduces the load on the network (i.e., only a single video stream between switches) and also on the AVA-300 since it can generate a single, high-quality video stream which can be received by multiple workstations.

Although SVCs are the preferred means of carrying video and audio data, there are certain circumstances in which their use is not possible. For example, you may encounter an ATM switch that does not support SVCs or you may wish to send video and audio streams to a non-SVA-compatible device or software application that does not fully support SVCs.

To address these situations, the SVA software allows the use of Permanent Virtual Circuits (PVCs) to carry video and audio streams from an AVA-300 to a client application, ATV-300, or any other device or application.

A single AVA-300 may source SVC and PVC streams simultaneously.

8.3 CellChain™

The CellChain™ is a mechanism that allows a number of ATM devices to share the facilities of a single ATM switch port. Each device sharing the switch port is linked to the others by a uni-directional ATM transmission link. The high bandwidth available on a single ATM switch port and the low data rates that many ATM devices require make it attractive for a number of devices to share the same switch port.

An ATM switch port consists of a transmit and receive interface. Each ATM device that connects to the switch also has a transmit and receive interface. In a CellChain system, the transmit interface from the ATM switch port is connected to the receive interface of the head device in the CellChain. The transmit interface from the head device is then connected to the receive interface of the second device in the CellChain. This process continues until the transmit interface from the final device on the CellChain is connected back to the receive interface on the switch port to which the head device is connected.

Figure 8.4 illustrates an ATM device CellChain consisting of three AVA-300s. Cells coming from the ATM network for `Unit 2` must be forwarded on by `Unit 0` and `Unit 1`. Similarly, cells destined for the ATM network that originate on `Unit 0` must be forwarded by `Unit 1` and `Unit 2`. Devices are either positioned “upstream” or “downstream” on a CellChain. For example, in Figure 8.4, `Unit 0` is upstream of `Unit 1` and `Unit 2` is downstream of `Unit 1`.

Each device only has a single, standard ATM interface.

CellChain configuration is not supported on AVA-300s and ATV-300s that do not have fiber optic physical interfaces.

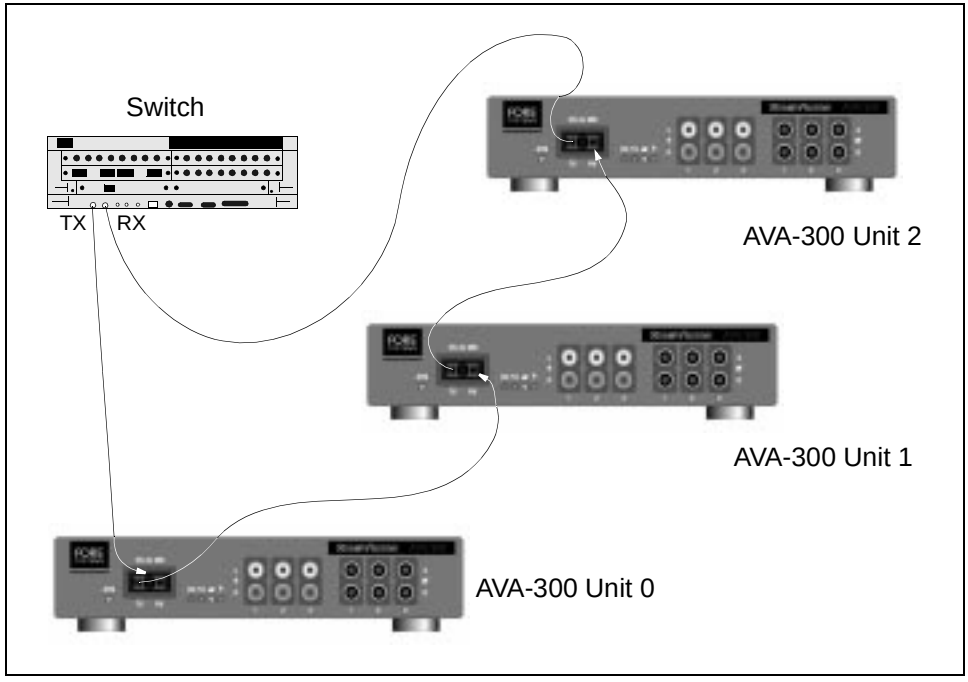

Figure 8.4 - ATM Device CellChain

Since the interconnect between the devices uses standard ATM technology, the inter-device distance is constrained only by the limitations of the particular ATM physical layer employed. The ATM Forum standard for framing ATM cells over SONET OC3c (155 Mbps) includes multimode or single mode fiber. In a case, for example, where multimode fiber is used to link the devices, each unit could be separated by up to 2000m with no intervening regenerator plant.

8.3.1 Topology Discovery

To control the device CellChain function, the manager process must know the type and position of all the devices on the CellChain. This is achieved by **`svamgr`** sending a topology discovery packet to the head device on the CellChain. The head device writes its own identifier into the packet before forwarding it to the succeeding device on the CellChain. When the packet finally exits the CellChain, all the devices will have written their identifiers into it.

8.3.2 Supported CellChain Configurations

The CellChain mechanism relies on the ability of the devices in the CellChain to forward cells which are not destined for themselves to the next device in the CellChain at high speed.

Only a single ATV-300 should be connected in a device CellChain and, if present, it must be the head device.

The SVA software will issue a warning if an invalid configuration is attempted.

The limit on the length of a CellChain configuration is 4 units.

If a CellChain is configured to send more than 90 Mbps of traffic, loss of quality may be observed.

An ATV-300 running AMF software may not operate as part of a CellChain.

8.3.3 CellChain Addressing

The SVA software does not support the naming of individual units on a CellChain. Instead, the entire CellChain is assigned a single name. An individual unit on the CellChain is addressed by unit number. The head device on the CellChain is designated as `Unit 0`. The second device on the CellChain is designated as `Unit 1`, and so on.

When processing its stream configuration startup file the **`svamgr`** process will, if no specific unit is specified for the stream, choose the first device on the CellChain which is capable of supporting the stream definition supplied.

It is possible to use **`svc-rtds`** to edit a stream definition so that the unit number is changed. The SVA software can move an active multicast call from one unit to another on the CellChain without breaking any of the connections.

8.3.4 Intra-CellChain Communication

It is not generally possible for devices on the same CellChain to exchange information. For example, it is not possible for an ATV-300 on a CellChain to receive and display a video stream from an AVA-300 on the same CellChain. This would require the switch port to loop back cells it receives directly back out onto the same port, rather than out to a different port on the same switch. This kind of functionality is unusual for ATM switches and therefore cannot be relied upon.

The ability of a downstream device to receive data from an upstream device on the same CellChain, while technically possible regardless of which switch implementation the CellChain is connected to, is not currently supported in the SVA software distribution.

A CellChain is only able to terminate a a single leaf of a multicast call. It is not possible to multicast an AVA serial source stream to be terminated on a multi-AVA destination CellChain.

8.3.5 Creating a CellChain Setup

To create a CellChain comprising three AVA-300s as illustrated in Figure 7.4, do the following:

1. Connect one end of a fiber optic cable to the transmit port (`Tx`) on the front panel of the switch. Connect the other end of the fiber optic cable to the receive port (`Rx`) on the front panel of `Unit 0`.

To implement CellChain, you must use AVA-300 firmware version 4.3 or greater and ATV-300 firmware version 300.13 or greater.

This example assumes that port `1A1` on switch `orion` is being used to create the CellChain configuration.

2. Connect one end of a fiber optic cable to the transmit port(`Tx`) on the front panel of `Unit 0`. Connect the other end of the fiber optic cable to the receive port (`Rx`) on the front panel of `Unit 1`.
3. Connect one end of a fiber optic cable to the transmit port(`Tx`)on the front panel of `Unit 1`. Connect the other end of the fiber optic cable to the receive port (`Rx`) on the front panel of `Unit 2`.
4. Connect one end of a fiber optic cable to the transmit port (`Tx`)on the front panel of `Unit 2`. Connect the other end of the fiber optic cable to the receive port (`Rx`) on the front panel of the switch.
5. Verify the physical CellChain setup by typing:

   `svarun listchain -device orion:1A1`

   The system displays the following information:

   `listchain: 3 devices (AVA AVA AVA)`
6. Start a manager using the method that is appropriate to your signalling protocol. Refer to Section 4.6.2.
7. Verify that the **`svamgr`** process is functioning correctly by accessing it with **`svc-rtds`**.

8.4 Video Streams

The AVA-300 system digitizes analog video signals and encodes them for transmission onto the ATM network. The encoded streams may either be compressed or uncompressed video. The ATV-300 system is able to decompress a compressed video stream and create an analog video output signal based on the information received. ATM Adaptation Layer 5 (AAL5) is used for transmission of all video streams across the ATM network.

Regardless of the video format selected, each video field is broken down into tiles, each of which is 8x8 pixels, prior to transmission over the ATM network. Tiles are transmitted in left-to-right, top-to-bottom order; that is, the top left-hand corner is transmitted first, the bottom right-hand last. The available video formats are either compressed or uncompressed.

8.4.1 Video Standards

The two principal broadcast TV video standards supported by the AVA-300, ATV-300, and SVA software distribution are as follows:

PAL (50Hz) Used primarily in Europe. 768x576 resolution at 25 frames / second.

NTSC (60Hz) Used primarily in the U.S. and Japan. 640x480 resolution at 30 frames / second.

A frame consists of 576 or 480 numbered scan-lines of video pixels. Each video frame is transmitted as two fields each of half the vertical resolution of the frame. The fields are named “Odd Field” and “Even Field” since one consists of all the odd numbered scan-lines in the frame and the other of all the even numbered scan-lines. For 50Hz PAL, each field has a resolution of 768x288 and there are 50 fields / second; for 60Hz NTSC there are 60 640x240 fields / second. Each field is captured once every 1 / 50 or 1 / 60 of a second (for PAL and NTSC, respectively) and, therefore, each reflects the image at a different point in time as well as space. A TV receives each field in turn and displays them in their corresponding position on the screen. Because two fields are displayed simultaneously, this technique is called interlacing.

AVA-300s can be configured to transmit either interlaced or non-interlaced video streams. All video streams are transmitted onto the ATM network as a sequence of fields.

8.4.2 Peak Cell Rate

Video streams can generate very large amounts of data which can easily overload a single link in an ATM network or any receiving workstation. Even at lower frame rates, resolutions, and image quality, it is possible for the instantaneous data rate to be very high. The instantaneous data rate is the amount of data seen over a very short period of time (such as 1 millisecond). A data rate of 1Mbits/second, if transmitted in its entirety in 0.01 seconds, would give an instantaneous rate of 100Mbits/second.

All AVA-300 video stream formats require a Peak Cell Rate (PCR) definition, which limits the amount of ATM network bandwidth that the video stream consumes. You do not need to specify a PCR for audio streams since they are inherently constant bandwidth sources.

8.4.3 Uncompressed Video

The main uncompressed formats are follows:

8-bit Monochrome	Each pixel is sent as 8 bits of luminance.
16-bit RGB	Each pixel is sent as 5 bits of Red, 5 bits of Green, and 5 bits of Blue, with a pad bit to round up to 16.
24-bit RGB	Each pixel is sent as 8 bits of Red, Green, and Blue.

These formats offer a trade-off between quality and bandwidth. For example, 24-bit RGB gives the best quality, but requires the most bandwidth. 8-bit monochrome provides lower quality, but requires less bandwidth.

8.4.4 Compressed Video

Motion-JPEG (M-JPEG) compression is used to reduce the data rates required for high-quality (close to 24-bit RGB) video.

M-JPEG gives variable amounts of compression depending on the image being compressed. A complex image (such as a tree) will not compress as well as a simpler image (like a single color studio background). Typical data rates fall in the range of 4-20Mbits/second for 25 frames (i.e., interlaced) video at PAL resolution (768x576). However, it is possible for an M-JPEG compressed image to burst at a much higher rate than this average (e.g. 70Mbit/s). If the compressed data rate exceeds the Peak Cell Rate (see Section 8.4.2), then the AVA-300 will automatically slow down the frame rate to avoid exceeding the currently set peak rate. This simple facility ensures that the AVA-300 will always meet Quality of Service (QoS) contracts set for it.

The quality of the compressed video (the amount of information lost by the compression process) can be controlled via the Q-Factor parameter. The lower the Q-Factor, the less information is lost and the better the video quality, which means a higher data rate. Q-Factor 20 gives near 24-bit RGB video quality. Q-Factor 32 gives slightly lower quality, but will be largely indistinguishable from Q-Factor 20 for most video scenes. Higher Q-Factors give progressively lower quality video.

Where information is lost, visual artifacts are introduced by the compression process. Such artifacts are generally most apparent around sharp edges such as caption lettering or straight lines (fence wiring, for example). The edges of the letters may appear blurred and the lines jagged. For most video clips, the artifacts will not be readily visible.

8.4.5 Variable Q-Factor

Later versions of the AVA-300 firmware (4.3 and above) support dynamic Q-Factor adaption. This facility allows the AVA-300 to adjust the Q-Factor dynamically on a frame-by-frame basis. When using Variable Q-Factor, in addition to the Peak Cell Rate control, the AVA-300 is also configured with a target compressed field size. If the AVA-300 detects that the current transmitted image sequence is requiring less data than the target field size, it will attempt to decrease the Q-Factor (thereby increasing the compressed field size and quality). Similarly, if the transmitted image sequence is requiring more data than the target field size, the adjustment will work in the opposite direction.

The benefit of Variable Q-Factor is that it allows the AVA-300 to be configured to send the best possible quality video image within the constraints of the QoS parameter associated with the ATM circuit used to transmit the encoded stream.

Consider the example of a remote lecture in which the speaker is using pre-recorded video clips at certain points in the presentation. It is likely that the pre-recorded material will generate larger compressed images than the simpler image of the lecturer. The ATM circuit used for the video stream may be configured with a QoS that is optimal for the lecturer. When the lecturer switches over to the pre-recorded material, the AVA-300 adjusts the Q-Factor accordingly so the highest quality image is produced while still maintaining the QoS objectives of the circuit.

It is strongly recommended that Variable Q-Factor is used over Fixed Q-Factor on AVA-300s that support it.

A single AVA-300 cannot simultaneously produce both Variable Q-Factor and Fixed Q-Factor streams.

The SCR of a Variable Q-Factor stream is constrained to being at most 2/3 of the value of PCR.

The SCR field of a video stream definition is independent of frame rate, size, etc. It xxx to the number of cells per second that the ATV-300 attempts to limit the stream.

8.4.6 Video Scaling

Video scaling allows you to specify different resolutions for the video sampling region and for the video display region. The AVA-300 supports video scaling of the input prior to transmission over the ATM network. The sampling region represents the source video image to be scaled and the display region represents the resulting scaled image. If the display region is smaller than the sampling region, the video is scaled down. Figure 8.5 illustrates the various scaling parameters and their use.

NOTE

The AVA-300 can only scale down video. It cannot increase the size of a video region.

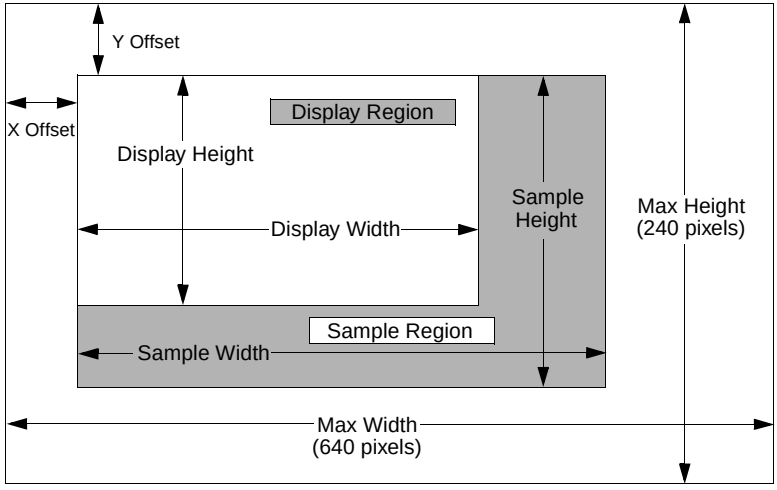

Figure 8.5 - Video Scaling Parameters (NTSC Example)

The parameters are as follows:

X & Y Offset	Represents the position of the top left of the sample region in the original frame.
Sample Resolution	Represents the size of the sample region.
Display Resolution	Represents the size of the display region.
Maximum Resolution	Represents either 768x288 (PAL) or 640x240 (NTSC).

8.4.7 Video Schedule

The AVA-300 allows the connection of multiple analog video inputs. The SVA software allows the creation of multiple video streams which are concurrently active from a single device. However, the AVA-300 only has a single video digitizer chip on-board, so it is not possible to encode multiple inputs each at full frame rate; rather the frame rate must be shared between all active inputs.

Each AVA-300 implements a schedule which comprises a sequence of slots, each of which indexes a video stream definition. A schedule is defined to last for one second; there is a slot for each video field in that time. An NTSC AVA-300 video schedule comprises 60 entries, as shown in Figure 8.6; a PAL schedule would comprise 50 entries.

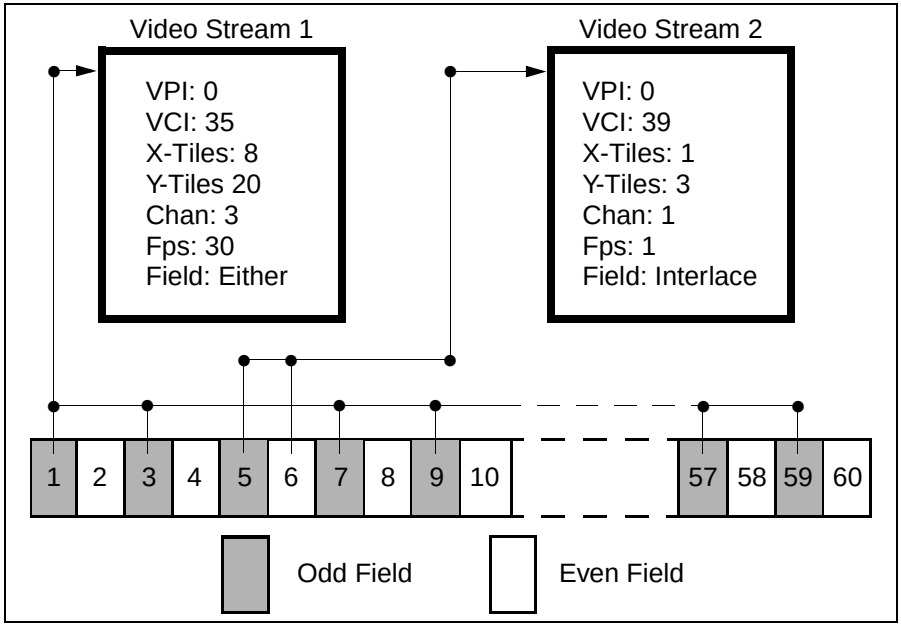

Figure 8.6 - NTSC AVA-300 Video Schedule

Each slot entry indexes a description of the characteristics of the video frame which is to be captured and sent over the network in the current schedule time. Different definitions may be referenced in successive field times. If an interlaced video stream is required for transmission, both the Odd and Even fields for a particular frame are digitized.

The video schedule is computed by the SVA software based on the currently-defined video streams. Once computed, the schedule is downloaded to the remote AVA-300. It is possible to request a video stream configuration for which it is impossible to calculate a schedule. For example, two interlaced video streams at full-frame cannot be supported. In this case, the SVA software tries to allocate the available resources fairly between the conflicting video stream definitions.

8.4.8 Video Synchronization

The AVA-300 allows the connection of up to 3 S-Video and 6 composite video inputs. If multiple video inputs are connected and they are "gen-locked," they may be used simultaneously. If the video inputs are gen-locked, the AVA-300 may digitize one field from one input, the next field from another input, and so on. In this way, the AVA-300 may generate multiple video streams, each of which is coming from a different video input. A common configuration is to assign all odd fields to input 1 and all even fields to input 2 to give two full-rate, non-interlaced video streams.

A gen-locked system is typically achieved by driving a set of video sources from a common sync signal. To accomplish this, each video source should have a "SYNC IN" input which is usually not standard on most devices. Alternatively, a "gen-lock" box, which takes multiple, non-synchronized video inputs and synchronizes them, can be used.

If the video inputs are not gen-locked, the AVA-300 can take up to eight fields to synchronize to a new input. This is similar to changing channels on a TV; the resulting video will appear to flash or be briefly skewed as the AVA-300 tries to lock onto the new input. This is not a problem if you are switching the input for a single stream; however, if you are trying to generate multiple video streams from several inputs which are not gen-locked, some or all of the resultant streams may lose synchronization.

If your video devices are gen-locked, the AVA-300 can generate multiple video streams from any combination of the inputs.

If your video devices are not gen-locked, the AVA-300 can generate multiple video streams, but they should all use the same input.

8.5 Audio Streams

The AVA-300 supports the following major audio formats:

A-Law 8-bit companded audio as developed for the United Kingdom and European telephone system.

μ-Law 8-bit companded audio as developed for the US telephone system.

16-bit linear PCM 16-bit linearly encoded audio used for CDs.

Each of these formats may be sampled at a variety of rates, the primary ones being:

8KHz For standard telephone quality

44.1KHz For CD quality

48KHz For DAT quality

Both mono and stereo is supported for each format. However, the 8-bit modes sampled at 8KHz are generally only configured as mono for compatibility with older workstation audio playback hardware.

The data rates required for audio depend on the format chosen, the sampling rate, and whether the stream is configured as mono or stereo.

The low data rates for the 8-bit modes sampled at 8KHz have an important implication for packing factors. An MTU of 4K bytes (32Kbits) contains half a second's worth of 8-bit mono audio samples. This leads to unacceptable delay and noticeably poorer audio quality. Consequently, a smaller MTU (of 1Kbytes) is better suited to these modes.

8.6 Serial Streams

The AVA-300 has a bi-directional serial line (RS-232) interface which may be used to transmit and receive serial data over the ATM network.

The ATV-300 also has a serial line interface, but it is not used at this time.

The SVA architecture defines both serial stream sources and serial stream sinks in a manner similar to that used for video and audio traffic. The AVA-300 can act as both a serial stream source and a serial stream sink.

Serial data is transmitted on the ATM network in single cell AAL5 packets.The format of the 40-byte data bytes in an AVA-300 serial packet are as follows:

sequence number	4 bytes (not used)
opcode	1 byte set to 0x10
length	1 byte: number of valid serial bytes below
data	32 bytes of serial characters
pad	2 bytes set to zero

The AVA-300 may be configured to transmit serial characters on to the ATM network in a variety of configurations. The main parameters that may be configured are:

Baud Rate The AVA-300 serial hardware supports a variety of baud rates: `300`, `600`, `1200`, `2400`, `4800`, and `9600` baud. The default baud rate is `9600`.

Count The AVA-300 can be configured to buffer a certain number of serial characters internally prior to transmission on to the ATM network. The maximum (and default) count is `32` characters (see packet format above).

Delay The AVA-300 can be configured to buffer serial data for a certain amount of time prior to transmission on to the ATM network. The maximum delay that can be set is `4000` milliseconds. The default serial input delay is `80` milliseconds.

NOTE

See the online `AvaSerialAttrParseArgs` manual page for a full description of all the parameters that can be associated with serial source and sink streams.

NOTE

The AVA-300 is not capable of supporting independent baud rates in the input and output direction.

8.6.1 Serial Data SVCs

Serial source streams may be defined in SVA manager configuration files in a manner similar to those used for video and audio streams. The default manager configuration file `svadefaults` contains a definition for a single serial source stream which is called `serial`. This stream has the default characteristics for serial input streams described in Chapter 13. The stream is listed in the AVA/ATV `Manager Window` as illustrated in Figure 4.4.

NOTE

`svc-rtds` does not allow serial data to be received via the GUI, nor does it allow serial stream definitions to be created / edited.

`svapatch` may be used to transmit the serial source data from one AVA-300 to be sent over an SVC to a second AVA-300 where it is output on the serial port of that unit. This is illustrated in the following example:

```
svarun svapatch -from ava1 -to ava2 serial
```

A single serial input may be multicast so that it is output via many AVA-300s located on different switch ports in the ATM network.

NOTE

It is not possible for a CellChain system to terminate the same incoming serial multicast SVC on separate AVA-300s in the chain.

8.6.2 Serial Data PVCs

This section discusses creating PVC serial streams in non-managed and managed AVA-300s.

8.6.2.1 Non-Managed Serial PVCs

The **avaconfig** command may be used to configure both PVC serial source and sink operation for an AVA-300. To demonstrate the operation of a single AVA-300 transmitting and receiving serial data, a *ForeRunner* switch may be used to loop back transmitted cells and send them back to the originating AVA-300.

To configure a non-managed PVC, do the following:

1. Connect an ASCII terminal to the switch serial port or open a telnet session.
2. Login to the switch.
3. At the host prompt, type **config** to get to the configuration submenu.
4. At the configuration prompt, type **vcc** to get to the vcc submenu.
5. Type the following at the prompt:

```
new 1A1 0 190 1A1 0 191
```

6. To transmit and receive serial data, configure the AVA-300 with the following two stream definitions:

```
svarun avaconfig -device orion:1A1 -serialin vci 190 -serialout vci
191
```

This configures the AVA-300 to transmit serial data cells using VCI 190 to the ATM switch, which then translates the VCI to 191 and sends the cells back to the AVA-300. Since the AVA-300 has been configured to receive serial data cells from the ATM network on VCI 191 and output them on its serial port, typing any characters at the AVA-300 serial port will cause them to be echoed.

By using multiple AVA-300 devices, you can set up serial stream connections across the ATM network. You can also use software on workstations or PCs to transmit and receive serial data from AVA-300 devices. This requires you to use a native ATM API such as XTI on UNIX, or Winsock2 on Windows platforms. In both cases, the native ATM PVC interface is used and the programmer exchanges packets in the AVA-300 serial data format with the remote device.

8.6.2.2 Managed Serial PVCs

It is possible to create PVC serial streams in a managed AVA-300 device. In order to do this, you must edit the manager configuration files.

The manager process should not be running while its configuration file is being edited.

To create the PVC configuration detailed in Section 13.1.1, add the following to the manager configuration file:

```
serialin
{
name serialinputpvc
vpi 0
vci 190
}
serialout
{
name serialoutputpvc
vpi 0
vci 191
}
```

The format of the manager configuration file is further detailed in the online **`svadefaults`** manual page.

8.7 Quality of Service (QoS)

When a connection is created across an ATM network, it is possible to specify a Quality of Service (QoS) that describes the requirements of the traffic being transmitted. Through a variety of traffic management techniques, it is possible for the ATM network to guarantee different levels of service depending upon the requested QoS, for different connections. There are three basic QoS classes that are supported by the SVA software:

Unspecified Bit Rate (UBR) The system provides no bandwidth guarantees; the connection must use the bandwidth available at that point in time. A "best effort" service class, UBR is recommended for traffic that is not time-sensitive, such as e-mail. When using a UBR definition, the SVC will not be refused admission into the ATM network because of a lack of bandwidth resources. It may, however, be refused because of lack of other resources, such as VPI/VCI space, on a congested link.

Constant Bit Rate (CBR) A dedicated Peak Cell Rate (PCR) is specified when the connection is made. The system guarantees the bandwidth allocation for the duration of the connection. CBR is recommended for time-sensitive traffic such as audio. A CBR connection request may be required due to a lack of bandwidth/buffering resources in the ATM network.

Variable Bit Rate (VBR) A dedicated PCR, Sustainable Cell Rate (SCR), and Maximum Burst Size (MBS) are specified when the connection is made. The system guarantees a sustained bandwidth and peak maximum for the duration of the connection. VBR is recommended for compressed video traffic. A VBR connection request may be required due to a lack of bandwidth/buffering resources in the ATM network.

8.7.1 CBR Specification

The CBR contract selected by the SVA software specifies PCR conformance testing of the CLP=0 and CLP=0+1 cell streams by the network. The network typically uses dual leaky bucket hardware in order to achieve this. By default, the SVA software enables cell tagging in the CBR contract. Cell tagging may be disabled on a per-device basis by setting the SVA_TAG_ENABLE environment variable to zero prior to starting the device manager process.

The network uses the first leaky bucket to assess conformance to PCR of the CLP=0 cells. It uses the second leaky bucket to assess the conformance to PCR of the aggregate of the CLP=0 and CLP=1 cells. If cell tagging is enabled, the cells which fail the PCR CLP=0 test are tagged as CLP=1 and passed on to the second leaky bucket to be tested for PCR CLP=0+1 conformance. Cells that fail the PCR test on CLP=0+1 are discarded. If cell tagging is not enabled, cells which fail the PCR CLP=0 test are discarded and cells which fail the PCR test on CLP=0+1 are discarded.

8.7.2 VBR Specification

The VBR contract selected by the SVA software specifies PCR conformance testing of the CLP=0+1 cell stream and MBS and SCR conformance of the CLP=0 cell stream by the network. The network typically uses dual leaky bucket hardware in order to achieve this. By default, the SVA software enables cell tagging in the VBR contract. Cell tagging may be disabled on a per-device basis by setting the SVA_TAG_ENABLE environment variable to zero prior to starting the device manager process.

The network uses the first leaky bucket to assess conformance to PCR of the aggregate of the CLP=0 and CLP=1 cells. Cells that fail this test are discarded. The network uses the second leaky bucket to assess the conformance to SCR and MBS of the CLP=0 cells. If cell tagging is enabled, the cells which fail this test are tagged as CLP=1. If cell tagging is disabled, the cells which fail this test are discarded.

8.7.3 Multimedia Stream QoS

The simplest way of using QoS with AVA-300s and ATV-300s requires that the devices be used under the control of a manager process. When a manager process receives a request to join to a stream, it uses the stream QoS policy and stream attributes to compute the detailed QoS specification to implement in the ATM connection establishment request. The QoS policy associated with a stream may be altered using the appropriate **svc-rtds** edit command. The **svc-rtds** application is fully described in Chapter 9.

8.7.3.1 Serial Stream QoS

The serial data streams generated by the AVA-300 do not consume a great deal of bandwidth. In addition, since the serial data cells are sent out at evenly-spaced intervals, they are able to easily conform to a CBR traffic definition. If you are required to transfer an AVA-300 serial stream across the ATM network with a high guarantee of success, then it is recommended that you configure the serial stream with CBR QoS.

8.7.3.2 Audio Stream QoS

The audio streams generated by the AVA-300 are not compressed; i.e., the amount of data generated is not dependent on the audio sample values. Since audio is continually sampled and AAL5 PDUs are not buffered prior to transmission, an AVA-300 audio stream consists of a regular sequence of evenly-spaced cells. If you are required to transfer an AVA-300 audio stream across the ATM network with a high guarantee of success, then it is recommended that you configure the audio stream with CBR QoS.

8.7.3.3 Uncompressed Video Stream QoS

Uncompressed AVA-300 video is typically used when sending to a workstation or PC device. In this instance, you would typically use non-interlaced video and limited frame rates. Each video field is sent at a constant rate that is bounded by the PCR associated with the SVA video stream definition. If you are required to transfer an AVA-300 uncompressed video stream across the ATM network with a high guarantee of success, then it is recommended that you configure the video stream with VBR QoS.

In some instances you may wish to use a CBR video stream QoS definition if you need to ensure that the guaranteed bandwidth is allocated for the stream in the face of VBR overbooking (see Section 8.7.6).

8.7.3.4 Compressed Video Stream QoS

There are two categories of compressed video streams: fixed Q-Factor and variable Q-Factor. Since it is not advisable to implement fixed Q-Factor streams, little effort has been made in developing QoS profiles for this category. If you desire to use QoS and a fixed Q-Factor video stream, then it is recommended that you configure the video stream with CBR QoS.

The variable Q-Factor mechanism is ideal for translating into a VBR QoS specification. The variable Q-Factor stream definition comprises a peak cell rate and a sustained data rate parameter. These translate readily on to the PCR and SCR definitions required for the VBR QoS contract. By default, the SCR value allocated by the SVA software is 10% greater than that specified in the stream definition to allow for overshoot as the AVA-300 adapts the Q-Factor in extreme cases. This value can be altered on a per-device basis by setting the `VARQ_SCR_SCALE` environment variable prior to starting the device manager process. The default value is `110`.

By default, the MBS value is set at 50% the size of a target video field or frame (depending on whether the video stream is non-interlaced or interlaced, respectively). This value may be altered on a per-device basis by setting the VARQ_MBS_SCALE environment variable prior to starting the device manager process. The default value is 50.

8.7.4 Control Circuit QoS

In addition to allowing QoS protection for the multimedia streams produced by an AVA-300, the SVA software also supports QoS protection of the device manager control streams:

- Device control circuit
- UNI proxy circuit
- ILMI proxy circuit
- Manager (ATM) downlink circuit to SVA clients.

QoS protection for these streams must be provided end-to-end, that is, all components in the circuit path must support QoS.

Specifically:

The ATM adapter in the host computer running the SVA manager software must be able to shape outgoing traffic on a per-VC basis. FORE Systems HE- and LE-series adapter cards provide this functionality.

The remote device under control must be able to shape outgoing management traffic on a per-VC basis.

By default, control streams between a device and its associated manager are carried over UBR SVCs. The following options are available to enable you to turn on control circuit QoS:

- Enable default QoS on all control circuits by typing a command similar to:

```
svarun -device orion/1a1 -qos
```

- Enable default QoS on specific control circuits by typing commands similar to:

```
svarun -device orion/1a1 -uni_qos -ilmi_qos

svarun -device orion/1a1 -ctl_qos
```

- Enable user-specified QoS on specific control circuits by typing a command similar to:

```
svarun -device orion/1a1 -uni_qos cbr 20000
```

- A composite of the above:

```
svarun -device orion/1a1 -qos -uni_qos cbr 20000
```

For a more detailed discussion of the configuration that are possible, please refer to the online **svamgr** and **qos** manual pages as well as the online documentation.

8.7.5 IP Traffic Protection

In addition to the ATM circuits used for device control and multimedia stream transmission, the SVA system requires that Internet Protocol (IP) connectivity exists between the various SVA components, including traders, managers, and applications.

If this connectivity is interrupted for prolonged periods of time, then system operation may be affected. The most common causes of connectivity loss include network link failure or saturation.

Using *ForeThought* software, it is possible to configure a QoS-enabled ELAN. This ensures that IP traffic on the QoS-enabled ELAN is placed in VBR traffic queues on the ATM network and will therefore not be affected by un-policed UBR sources.

An alternative to configuring QoS-enabled ELANs is to run all SVA components on a single server machine and not use the network for IP communication. Another variation is placing the SVA components on a private network segment which is guaranteed not to have errant sources that are capable of network saturation.

8.7.6 VBR Overbooking

By default, a FORE Systems ATM network will not overbook (sometimes referred to as statistically multiplex) VBR circuits. The admission control algorithm calculates an equivalent capacity for the requested QoS which is heavily weighted towards the PCR value that is specified. If the requested equivalent capacity causes the allocated capacity at a point in the network to exceed the link capacity, then the connection will be refused.

Specifying VBR overbooking tells the network to do the admission test against some multiple of the link capacity. To configure VBR overbooking in a FORE Systems ATM network, please refer to the *ForeRunner ATM Switch Configuration Manual.*

8.8 Manager Configuration Database

When the **svamgr** program is executed, it attempts to read a configuration file which describes various parameters for the ATM device(s) being managed. The configuration file is based on the manager name after certain character conversions. Details of the configuration database may be found in the **svadefaults** online manual page.

Manager configurations files should not be edited while the manager is running. Unless you require advanced configuration, it is best to use **svc-rtds -edit**.

8.9 SVA Security

All components of the SVA software distribution come with security features that prevent unwelcome users from accessing streams to which they do not have authorization. These security measures are based on password protection. The security system operates on a per-manager basis.

8.9.1 Setting Up Security Measures

To use the SVA software's security features, you must create a password file containing a list of manager names and their associated passwords.

8.9.1.1 Password File Format

Password files have a simple ASCII format. A line may contain a comment, a password, or be blank. Lines whose first non-blank character is a pound sign (#) are regarded as comments, and, like blank lines, are ignored. Password lines have the following format:

```
<name>:<passwd>[:<comment>]
```

where `name` is the name of the manager, `passwd` is the password assigned to it, and `comment` is an optional comment field that is ignored by the security process. The fields must be separated by colons, tab characters, or a combination of both. Spaces are allowed in manager names and in the middle (but not at the ends) of the password. Valid passwords must be between 6 and 16 characters in length.

8.9.1.2 Password File Location

The default location of the password file `SVAauth` is in your home directory. The SVA software uses the environment variable `$HOME` to determine the location of your home directory. SVA applications use the default password file name and location unless explicitly directed elsewhere by using the **`-passwdfile`** switch which is an argument to the relevant SVA applications.

8.9.1.3 Password File Semantics

The password file performs a dual role:

- It is used by you (or your system administrator) to set the passwords for managers as they are started.
- It is used by others whenever they need to supply a password to gain access to a manager.

Your system administrator is likely to have a single password file for all the managers in the local system. Access to this file should be carefully restricted. As a local user, you maintain a password file in your home directory which only you may access and which contains the passwords for the managers to which you have access.

When you run **svamgr**, it attempts to locate a password file. When it finds one, the program looks for a password line matching its name. If it finds a match, it enables password protection. If it does not find a match, or if it fails to locate a password file, protection is disabled.

When a client program attempts to perform a restricted operation, such as opening a session on a password-protected manager, a password is required.

For interactive programs such as **svc-rtds**, a dialog is displayed asking you to type the password. If your password file contains this password, the password appears automatically in the dialog and does not need to be typed in.

For non-interactive programs such as **svapatch**, you do not have the option to type the password; it is essential that you have a password file containing the required lines.

8.9.2 Controlling Access

For the purposes of SVA security, you may either join or edit a stream. These two methods are available to different categories of users:

- You join a stream when you receive it or patch its video and/or audio (such as with **svapatch** or **svc-rtds** local sinks).
- You edit a stream when you change some or all of its parameters (e.g., using the **svc-rtds** stream editor).

The following three rules describe the stream access control system:

- You may join or edit streams from a manager whose password protection has not been enabled.
- You may join or edit a stream from a manager whose password protection has been enabled, provided the correct password is supplied.
- Anyone may join a public stream at a manager whose password protection is enabled without having to supply a password, unless another user holds a session (see Section 8.9.3) at that manager and has disabled `Public Streams`.

Permission to join and edit a stream is denied if none of the above rules apply.

8.9.3 Sessions

SVA managers support the concept of a user "holding a session" on a device or CellChain. Only one user may hold a session on a given manager at a given time. Sessions are just one of several shared resources which can only be used by one application at a time, other examples include the ATV-300 Menu System and ATV-300 display (see below). The purpose of the session is to act as a lock to ensure that updates to an AVA-300's source stream definitions are not invoked by multiple users simultaneously. Only one user may edit a stream definition at a time.

In order to obtain a session, the client program (such as **`svc-rtds`**) requires the manager's password, if any. If a session is not being held by anyone, requests to obtain one succeed; if one is already being held, any requests fail.

8.9.4 Locking

SVA managers provide certain resources which can only be logically used by one application at a time. A series of locks are provided to ensure that only one application can use such a resource at any given time. There are four types of locks implemented in the SVA 5.1 distribution:

Sessions	Described in the previous section, sessions control updating of source stream definitions.
ATV-300 Menu System	Manages the ATV-300's on-screen menus and free text display.
ATV-300 Display	Controls the video streams being displayed on the ATV-300.
Monitoring	Provides device and AVA video input (VSYNC) status monitoring.

Of these, sessions are the only locks directly visible to you. The other locks restrict what applications can be run simultaneously. For example, it is possible to use **`atvmenu`** to control an ATV-300's menu system while you concurrently use PatchServer to control which video streams are being displayed. It is not possible, however, to run two instances of **`atvmenu`** against the same ATV-300. Similarly, two PatchServers cannot simultaneously send video to the same ATV-300, nor can two PatchServers simultaneously monitor the status of a given device or a given AVA-300's video inputs.

8.9.5 SVA Security Guidelines

SVA security measures rely entirely on the normal UNIX files system access control features and the protection provided is only as strong as the protection afforded your files by the file system. Here are some suggested guidelines to follow concerning SVA security:

- Always keep your password file unreadable to other users. The UNIX mode for such a file is `octal 0600 (-rw-------)`.
- Be aware that certain editors leave behind backup files whose names are similar to the file being edited. These may be publicly readable.
- You should also be aware of other circumstances which may cause the password file to become publicly readable. For example, text editor core files and SVA application core files may contain the password file.
- Changing the access of a stream from public to private, either by using the stream editor or by opening a session, does not cause clients that joined the stream prior to the access change to be disconnected. Only subsequent join requests are denied.
- Many of the security mechanisms require the clients to be compliant, such as by denying users the edit method when they are unable to obtain the session. You should be aware that it is possible to write a client application that ignores the session holder and edits a stream to be public.

CHAPTER 9 svc-rtds

This chapter explains the features and functions of **svc-rtds**, the SVA software distribution's Real-Time Display Software program. **svc-rtds** is a GUI-based program that allows you to create, display, and edit video and audio streams on your workstation or PC. This chapter assumes that you have completed the tasks outlined in Chapter 4 or Chapter 5 and resumes the explanation of **svc-rtds** where the Basic Setup procedures left off.

9.1 AVA/ATV Manager Browser

Once your trader and manager are running, you can access the **svc-rtds** application by typing:

```
svc-rtds -edit
```

You must include the **-edit** argument to be able to create and edit video and audio streams; without specifying **-edit**, you would only be able to view or listen to preconfigured video and/or audio streams.

On Windows NT/95/98, you can start **svc-rtds** by clicking on Start, then on Programs, then on ForeThought SVA-5.1, and finally on svc-rtds. This may differ, however, if you choose any non-default options during installation.

The AVA/ATV Manager Browser, shown in Figure 9.1, is displayed.

Figure 9.1 - AVA / ATV Manager Browser Window

The AVA/ATV Manager Browser contains a list of managers it receives by querying the specified trader or traders. Any time a manager is started, it exports its registration information to a set of specified traders.

The AVA/ATV Manager Browser contains three radio buttons in the Show Manager field that allow you to select which manager states you wish to be listed. These states are Up, Down, and Standby. Please refer to Section 8.2.1 for a description of manager states. By default, only managers in an Up state are listed.

In addition to listing the available managers, the AVA/ATV Manager Browser includes the following buttons:

Access Manager — Allows you to access the AVA/ATV Manager Window which displays a list of all video and audio streams configured in the specified manager.

Describe — Allows you to access the Manager Description Window which provides a full description of the selected manager.

Traders — Allows you to access the Traders Window which displays a list of all the traders that **svc-rtds** is configured to query.

Exit — Allows you to exit the **svc-rtds** application.

Each window and its functionality is described in this chapter.

9.2 Accessing the AVA/ATV Manager Window

Pressing the Access Manager button or double-clicking on the manager name in the AVA/ATV Manager Browser allows you to access the AVA/ATV Manager Window, shown in Figure 9.2.

NOTE

Only managers that are in an Up state can be accessed in this manner.

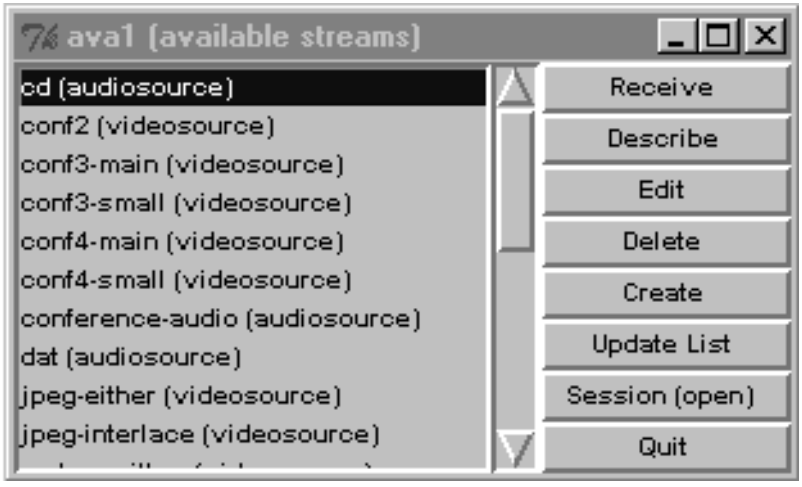

Figure 9.2 - AVA / ATV Manager Window

This window displays the audio and video streams configured in designated manager ava1. In addition, it displays the following buttons:

Receive Activates the highlighted video or audio stream and displays the Video or Audio Stream Window which allow you to view or listen to the selected video or audio stream.

Describe Displays either a Video or Audio Description Window which allows you to obtain a complete description of the selected stream.

Edit Displays either a `Video` or `Audio Edit Window` which allows you to edit the selected stream.

Delete Allows you to delete a highlighted stream.

Create Allows you to create a new video or audio stream.

Update List Allows you to update the `AVA/ATV Manager Window` with any additional stream information, much like a typical Refresh command.

Session (open/closed) Allows you to open and close sessions, displaying a dialog if the manager is Password-Protected.

Quit Allows you to exit the `AVA/ATV Manager Window` and any associated description or edit window.

If an asterisk (*) appears before a stream name, it means someone is already joined to that stream.

9.2.1 Accessing a Video Stream Window

To access a `Video Stream Window`, highlight the video stream you wish to access and click on `Receive`, or double-click on the stream name in the `AVA/ATV Manager Window`. The video stream is displayed within the `Video Stream Window`, as shown in Figure 9.3.

NOTE

If more than one video sink is available for displaying the stream, you will first be asked to select one. Please refer to the *StreamRunner AVA/ATV Release Notes* for details about available sinks.

Click on the window to access the control buttons which are displayed at the bottom of Figure 9.3.

Figure 9.3 - Video Stream Window

9.2.1.1 Modifying Video Sink Controls

You can modify certain local aspects of the video sink from the `Video Stream Window` by clicking on `Sink Controls`. The `Video Sink Control Window`, shown in Figure 9.4, is displayed.

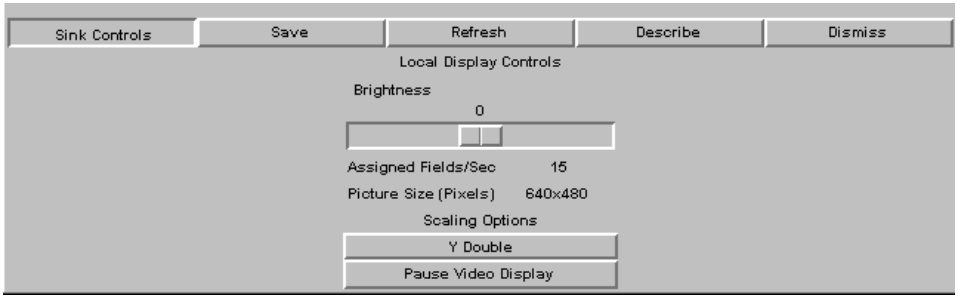

Figure 9.4 - Video Sink Control Window

From the `Video Sink Control Window`, you can modify the video stream's brightness and scaling options as follows:

Brightness — Allows you to vary the relative intensity of the video image between very dim and very bright.

Scaling Options — Allows you to adjust the video scaling vertically and horizontally. The options are `Small`, `Y Double`, and `X&Y Double`.

Pause/Resume Video Display — Allows you to pause, and then resume, the video display.

NOTE Local sink control modifications cannot be saved; they only apply to a current viewing session and are lost when you exit.

NOTE Not all sinks support the `Brightness` control.

9.2.1.2 Saving Video Data

To save a single video frame or a sequence of frames to disk, click `Save`. The `Video Save Control Window`, shown in Figure 9.5, is displayed.

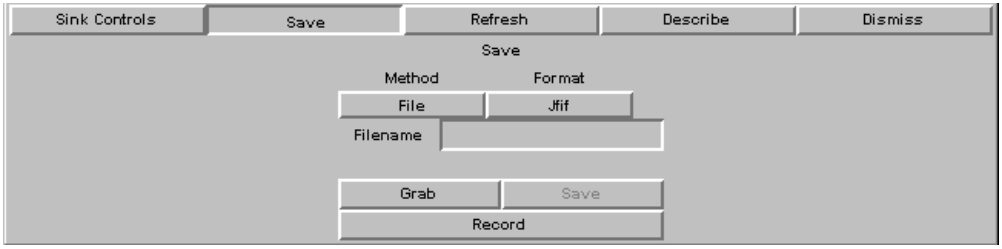

Figure 9.5 - Video Save Control Window

The save buttons on the `Video Save Control Window` have the following functions:

Method Allows you to access a pull-down menu that displays a set of methods you can use to save the video stream data. `File` lets you save the stream data to the file you name in the `Filename` field on disk.

Format Allows you to save video stream updates in either `Jfif` (for JPEG streams), `Pbm` (for uncompressed streams), or `Raw` or `Avi` (for either format).

Grab Allows you to capture a single video frame.

Save Allows you to save a previously-grabbed video frame.

Record Allows you to save all frames until you click on `Record` again. For `Avi` format, all frames a go to a single `Avi` file. For other formats, each frame goes to a separate file whose name consists of the specified file name with an increasing number appended.

NOTE The `Grab` button does not operate if the video is paused (see previous page).

NOTE When recording high-rate video, some frames may be dropped which can cause playback to appear too quick. To minimize dropped frames, you can use a null sink, which will not display the video. See Section 9.6 for more information on null sinks.

9.2.1.3 Refreshing a Video Stream's Configuration Information

To refresh a video stream's configuration information, highlight the appropriate stream and click on `Refresh` in the AVA/ATV `Manager Browser`, or click on `Refresh` in any Video Control Window.

Since managers automatically propagate configuration changes to **`svc-rtds`**, you will rarely need to perform a refresh. The refresh feature is provided in the event that automatic propagation is slow due to network congestion.

9.2.1.4 Describing a Video Stream

To show a stream's full parameters, click on `Describe`. This has the same effect as clicking on `Describe` in the AVA/ATV `Manager Window`. See Section 9.2.3.

9.2.1.5 Exiting a Video Stream Window

To exit a Video Stream Window, click on `Dismiss`.

9.2.2 Accessing an Audio Stream Window

To access an Audio Stream Window, highlight the audio stream you wish to access and click on Receive in the AVA/ATV Manager Window. An Audio Sink Control Window, as shown in Figure 9.6, is displayed.

9.2.2.1 Modifying Audio Sink Controls

You can modify certain local aspects of the audio sink from the Audio Sink Control Window which is displayed when you click on Receive in the AVA/ATV Manager Window.

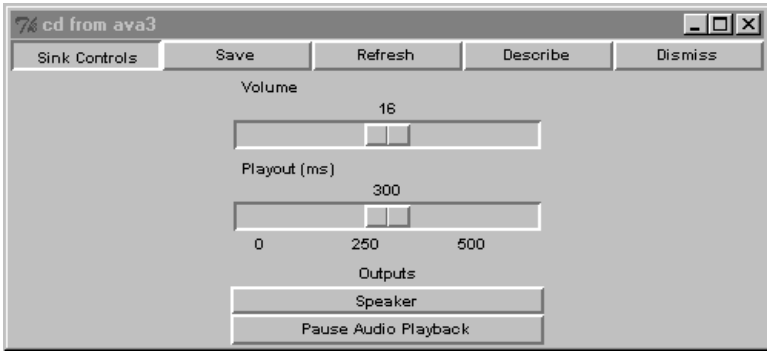

Figure 9.6 - Audio Sink Control Window

From the Audio Sink Control Window, you can modify the audio stream's volume, playout, and output options as follows:

Volume — Allows you to vary the volume of the audio stream between silent and very high.

Playout — Allows you to adjust the audio stream's buffer latency.

Outputs — Allows you to select the audio stream's output source. The options are Speaker, Headphones, and Line Out, depending on the workstation/PC audio output capability.

Pause/Resume Audio Playback — Allows you to pause, and then resume, the audio playback.

NOTE Local sink control modifications cannot be saved; they only apply to a current listening session and are lost when you exit.

NOTE

On Windows NT/95/98, the `Volume` control changes the local volume. You may wish to use the system volume control tool to adjust the "global" volume. See Section 3.10.3 for a description of this feature.

9.2.2.2 Saving Audio Data

To save audio to disk, click `Save`. The `Audio Save Control Window`, shown in Figure 9.7, is displayed.

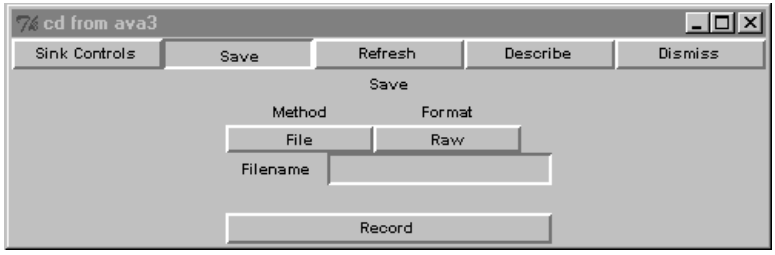

Figure 9.7 - Audio Save Control Window

The save buttons on the `Audio Save Control Window` have the following functions:

Method Allows you to access a pull-down menu that displays a set of methods you can use to save the audio stream data. `File` lets you save the stream data to the file you name in the `Filename` field on disk.

Format Allows you to save audio stream output to `RAW`, `WAV`, `AIFF`, or `SND` file formats.

Record Allows you to record audio output. Clicking on `Record` again stops the recording process.

9.2.2.3 Refreshing an Audio Stream's Configuration Information

To refresh an audio stream's configuration information, highlight the appropriate stream and click on `Refresh` in the AVA/ATV `Manager Browser` or click on `Refresh` in any Audio Control Window.

Since managers automatically propagate configuration changes to **`svc-rtds`**, you will rarely need to perform a refresh. The `Refresh` feature is provided in the event that automatic propagation is slow due to network congestion.

9.2.2.4 Describing an Audio Stream

To show a stream's full parameters, click on `Describe`. This has the same effect as clicking on `Describe` in the AVA/ATV `Manager Window`. See Section 9.2.4.

9.2.2.5 Exiting an Audio Stream Window

To exit an Audio Stream Window, click on `Dismiss`.

9.2.3 Accessing a Video Description Window

The Video Description Window, shown in Figure 9.8, displays current information about a selected video stream.

To access a Video Description Window, highlight the video stream you require information about and click on Describe in the AVA/ATV Manager Window. The Video Description Window is displayed.

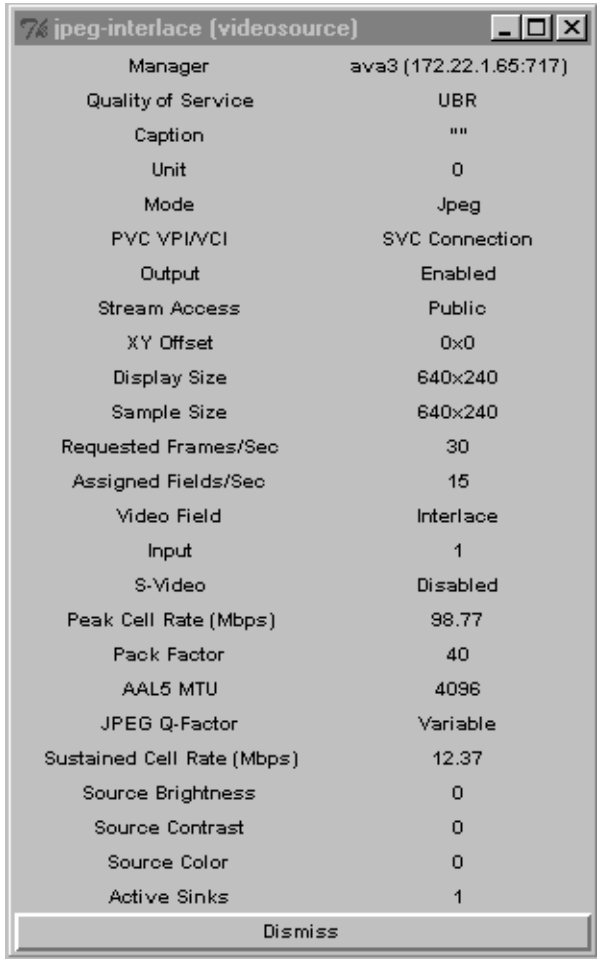

Figure 9.8 - Video Description Window

9.2.4 Accessing an Audio Description Window

The Audio Description Window, shown in Figure 9.9, displays current information about a selected audio stream.

To access an Audio Description Window, highlight the audio stream you require information about and click on Describe in the AVA/ATV Manager Window. The Audio Description Window is displayed.

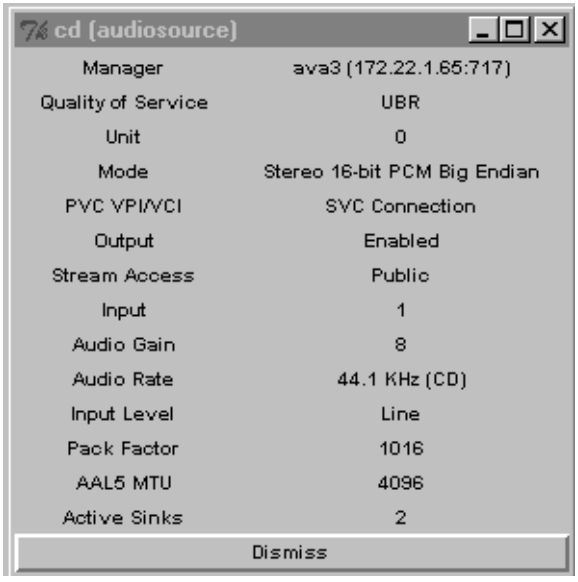

Figure 9.9 - Audio Description Window

9.2.5 Opening a Session

To edit, delete, or create video and audio streams, you must first open a session with the manager. You open a session by clicking on `Session` in the AVA/ATV `Manager Window`. The method you use depends whether or not access to the manager is password-protected.

9.2.5.1 Opening a Session when Manager is not Password-Protected

To open a session when the manager is not password-protected, do the following:

1. Click `Session` on the AVA/ATV `Manager Window`. The session is opened. Clicking on the `Session` button again closes the session.

You are not required to enter a password when the manager is not password-protected, as indicated by the message "No password is set for this manager."

2. Select the session attributes that you desire.
3. Click `Open` to open the session.

9.2.5.2 Opening a Session when Manager is Password-Protected

To open a session when the manager is password-protected, do the following:

1. Click `Session` on the AVA/ATV `Manager Window`. The `Session Window`, shown in Figure 9.10, is displayed.

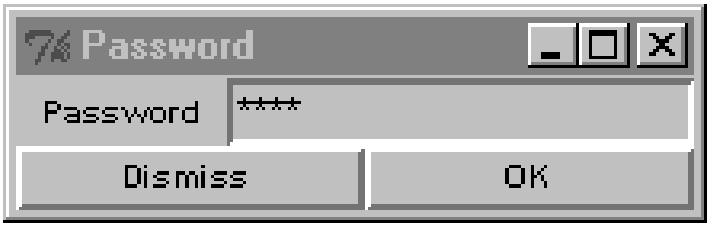

Figure 9.10 - Session Window, Password-Protected

2. Select the session attributes that you desire.
3. Type in your password.

NOTE If the `svc-rtds` password file already contains your password, it will automatically appear in the dialog box.

4. Click `Open` to open the session.

9.2.6 Editing a Video Stream

To edit a video stream, click on `Edit` in the `AVA/ATV Manager Window`. The `Video Edit Window`, shown in Figure 9.11, is displayed.

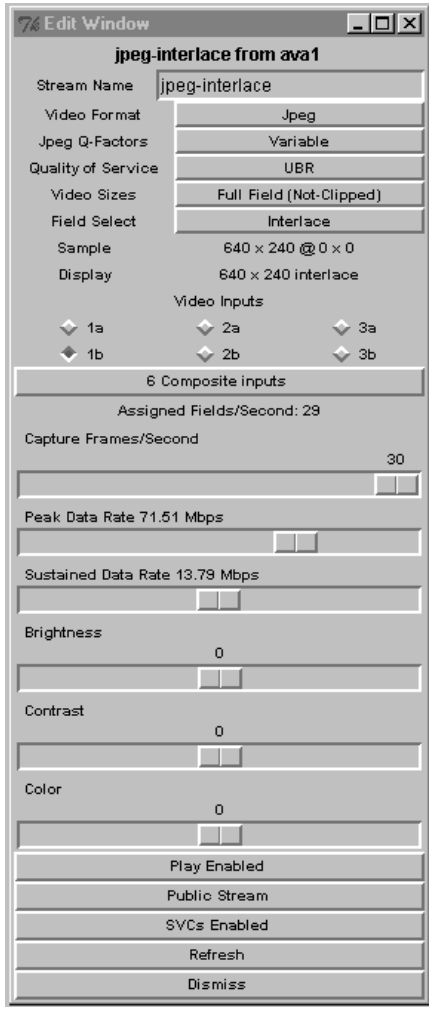

Figure 9.11 - Video Edit Window

Before editing a video stream, you must first open a session.

The `Video Edit Window` has a number of fields you can edit to achieve the video stream quality you require. These include:

Stream Name Allows you to change the name of the video stream you have currently accessed.

Video Format Allows you to select from three compressed and uncompressed formats which include:

```
Mono 8-bit
JPEG
RGB 15-bit Big Endian
RGB 15-bit Little Endian
RGB 24-bit 3-bytes
```

You cannot change the video format while someone is viewing the stream.

Quality of Service Allows you to select the service class best suited to the traffic type. The available settings are:

`ubr` (default)
`cbr` (audio)
`vbr` (video) recommended

You cannot change the QoS of an active stream.

Video Sizes Allows you to scale the video image to fit your requirements. The available video sizes include:

```
Eighth Field
Quarter Field Width
Quarter Field
Half Field Width
Full Field
Full Field (not clipped)
Other
```

Field Select	Allows you to select the video field sampling rate. The available settings are:
	`Interlace`
	`Either`
	`Odd`
	`Even`

Sample	Displays the image's sample region dimensions.
Display	Displays the image's display region dimensions.
Video Inputs	Allows you to select from 6 composite input channels or 3 S-Video input channels. The input channel you select here must match the input used on the device's front panel.
Capture Frames/Second	Allows you to set your video stream rate depending upon your video format.
Peak Data Rate	Allows you to set the instantaneous and average data rates.
Brightness	Allows you to vary the relative intensity of the video image between very dim and very bright.
Contrast	Allows you to vary the range between the video image's white and black outputs.
Color	Allows you to vary the relative intensity of the red, green, and blue outputs.
Play Enabled/Disabled	Allows you to start or stop the video output at the source AVA-300.
Public/Private Stream	Allows you to designate a video stream as accessible (`Public`) or restricted (`Private`).
SVCs/PVCs Enabled	Allows you to specify either an SVC or PVC stream.
Refresh	Allows you to maintain settings that are consistent with the settings at the manager.
Dismiss	Allows you to exit the `Video Edit Window`.

M-JPEG streams also include these edit fields:

Q-Factor	Allows you to control compression and data rate.
Sustained Data Rate	Allows you to set the target data rate generated by the video stream. Appears when Variable Q-Factor is selected.

NOTE

For more information on stream configuration, refer to Section 8.4.

NOTE

Interlaced video is only available for video streams which are configured to use the maximum frame rate (i.e., 30 for NTSC, 25 for PAL).

9.2.7 Editing an Audio Stream

To edit an audio stream, click on `Edit` in the AVA/ATV `Manager Window`. The `Audio Edit Window`, shown in Figure 9.12, is displayed.

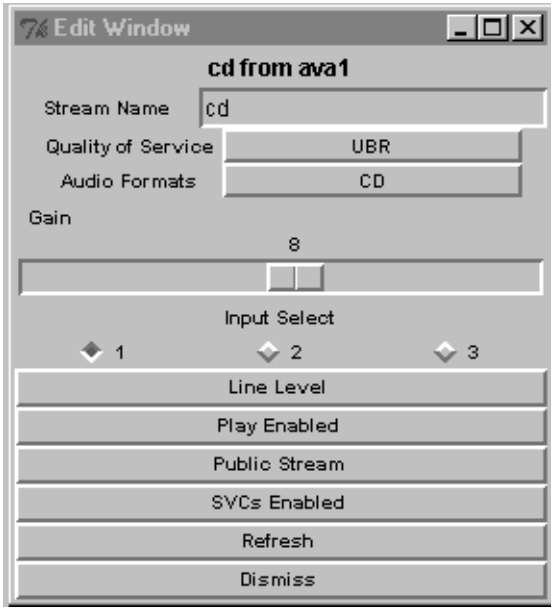

Figure 9.12 - Audio Edit Window

NOTE

Before editing an audio stream, you must first open a session.

The Audio Edit Window has a number of fields you can edit to achieve the audio stream quality you require. These include:

Stream Name — Allows you to change the name of the audio stream you have currently accessed.

Quality of Service — Allows you to select the service class best suited to the traffic type. The available settings are:
ubr (default)
cbr
vbr

Audio Formats — Allows you to select from the following formats:
DAT
CD
A-Law
µ-Law

NOTE — You cannot change the audio format while someone is listening to the stream.

Gain — Allows you adjust the device's volume level.

Input Select — Allows you to select from three stereo audio input channels. The input channel you select here must match the input used on the device's front panel.

Line/Mic Level — Allows you to set the audio input device type as either Mic for microphones that power themselves, or Line for CD player, VCR, etc.

Microphones that are designed to draw power from the equipment to which they are connected cannot be used. In addition, many self-powered microphones produce an output that is too low for use with the AVA-300. It is recommended that you use a microphone preamplifier that is designed for use with your microphone. The output from these preamplifiers is typically at Line level; experiment with both the Line and Mic settings on the AVA-300 for the best results.

Play Enabled/Disabled — Allows you to start or stop the audio output at the source AVA-300.

Public/Private Stream	Allows you to designate an audio stream as accessible (`Public`) or restricted (`Private`).
SVCs/PVCs Enabled	Allows you to specify either an SVC or PVC stream.
Refresh	Allows you to maintain settings that are consistent with the settings at the manager.
Dismiss	Allows you to exit the `Audio Edit Window`.

9.2.8 Deleting a Video or Audio Stream

To delete a video or audio stream, highlight the stream and then click on `Delete` in the AVA/ATV `Manager Window`. The `Delete Stream Window`, shown in Figure 9.13, is displayed.

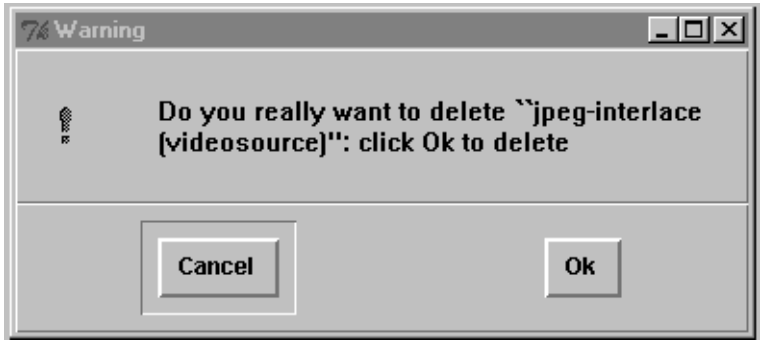

Figure 9.13 - Delete Stream Window

Click `Ok` to delete the stream from the manager or click `Cancel` to abort the process.

NOTE Before deleting a video or audio stream, you must first open a session.

9.2.9 Creating a Video or Audio Stream

To create a new video or audio stream, click on `Create` in the AVA/ATV `Manager Window`. The `Create Stream Window`, shown in Figure 9.14, is displayed.

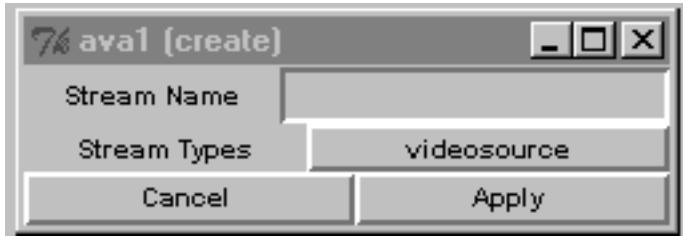

Figure 9.14 - Create Stream Window

1. Name the stream by typing in a meaningful name in the `Stream Name` field.
2. Designate the stream as either a video or an audio stream by selecting the appropriate designation in the `Stream Types` field.
3. Click on `Apply` to add the stream to the manager or `Cancel` to abort the stream create and exit the `Create Stream Window`.

You can apply the appropriate attributes to your newly-created stream by accessing either the `Video Edit Window` or `Audio Edit Window`.

NOTE

If an existing stream of the same type is selected in the AVA/ATV `Manager Window` when the create operation is invoked, the newly-created stream's initial attributes are the same as those of the selected stream.

9.2.10 Updating the AVA/ATV Manager Window

You can update the AVA/ATV `Manager Window` with new stream information by clicking on `Update List`. The list of streams is refreshed.

9.2.11 Exiting the AVA/ATV Manager Window

You can exit the AVA/ATV `Manager Window` by clicking on `Quit`. You are returned to the AVA/ATV `Manager Browser`.

9.3 Accessing the Manager Description Window

The Manager Description Window, shown in Figure 9.15, contains a detailed description of a manager. In addition, the window consists of pull-down lists that enable you to view the available video and audio source modes and rates. For CellChains, the window displays a button to select between units.

To access the Manager Description Window for a particular manager, highlight the manager name in the AVA/ATV Manager Browser and then click on Describe. The Manager Description Window for that manager is displayed.

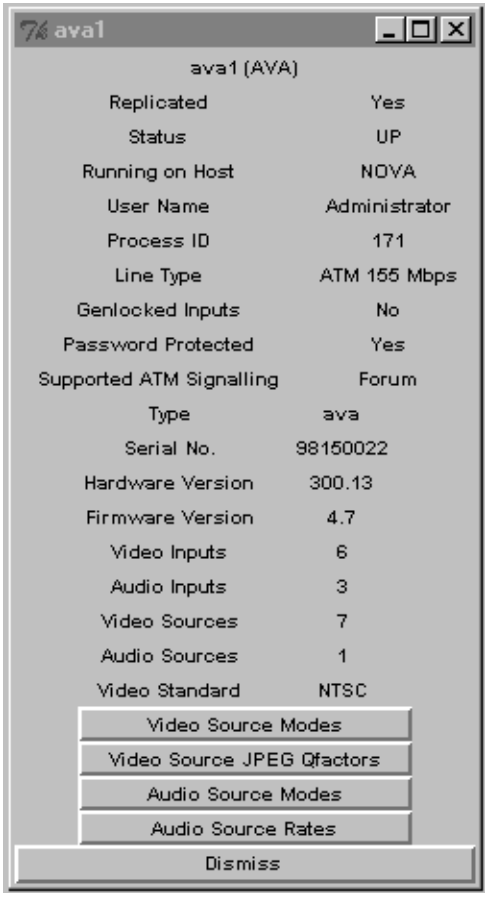

Figure 9.15 - Manager Description Window

9.4 Accessing the Trader Window

The `Trader Window`, shown in Figure 9.16, contains a list of the traders that **`svc-rtds`** is accessing.

Figure 9.16 - Trader Window

NOTE

The list of traders in the `Trader Window` can only be modified by restarting **`svc-rtds`**.

9.5 Exiting svc-rtds

To exit **`svc-rtds`**, click on `Exit` in the AVA/ATV `Manager Browser`.

9.6 Null Sinks

Starting **`svc-rtds`** with the **`-nullsinks`** option gives you the capability to use null sinks to join streams. Null sinks do not display video or play audio, but they are useful for recording streams to files with minimally dropped frames/samples.

CHAPTER 10 World Wide Web Applications

This chapter explains the SVA software distribution's World Wide Web (WWW) application **netpatch**, a plug-in for Netscape Navigator and Microsoft Internet Explorer that allows you to display video streams and listen to audio streams generated by an AVA-300. Also described is how Web publishers can embed video and audio streams in their Web pages.

10.0.1 Plug-in Overview

Plug-ins are platform-dependent shared libraries. Each plug-in registers itself with the browser as being able to handle one or more MIME-types. A MIME-type is a string which identifies the format of a block of data. For example, `text/html` is the MIME-type of an HTML document and `image/jpeg` is the MIME-type of a JPEG image. MIME, which stands for Multipurpose Internet Mail Extensions, was originally designed as a mechanism for embedding non-textual data in Internet mail messages.

AVA-300 streams are embedded within pages of HTML in a manner similar to that of static images, but use the **embed** tag. This tag may contain several attributes, the most important of which is the MIME-type of the object which lets the browser decide which plug-in is to be invoked. Two other attributes are the width and height of the stream window, which are used by the browser to format the surrounding document. See the documentation supplied with your browser for more information on plug-ins.

10.0.2 The netpatch Plug-in

netpatch is a plug-in that provides a wrapper around **svapatch**, allowing the integration of live AVA-300-generated audio and video streams into HTML documents. **netpatch** is compatible with Netscape 3.0 and later, and Internet Explorer 3.0.

It is not necessary for the Web server that provides the HTML files to have ATM connectivity; only the hosts on which the Netscape client is to be run require ATM connectivity.

10.0.3 Installing the Netscape Plug-in in your Netscape Browser

This section describes plug-in installation on UNIX platforms only. On Windows NT/95/98, the SVA installation procedure automatically installs the plug-in if it detects Netscape or Explorer are present. No user setup is required.

To install the Netscape plug-in in your Netscape Browser, you need the following:

- Netscape Navigator 3.0 or Netscape Communicator 4.0, properly installed.
- SVA 5.1, properly installed (for installation instructions, see Chapter 4 or Chapter 5).

To install the Netscape plug-in in your Netscape Browser, do the following:

1. Type the command:

   `prompt$ svarun netscape`

   This sets the `PATH` and `LD_LIBRARY_PATH` variables to make **`svapatch`** available, sets the `NPX_PLUGIN_PATH` variable to make the SVA plug-ins directory known to Navigator or Explorer, and then launches the browser.

2. When the browser appears, open the URL `"about:plugins"`.

`"about:plugins"` is a program in JavaScript (a scripting language built into Navigator) that interrogates all installed plug-ins for their identification strings. You need to enable JavaScript from the `Languages` tab of the `Network Preferences` dialog in the `Options` menu.

3. Make sure the enabled field of the `Installed Plug-ins` table shows `Yes` for MIME-type `application/fore-netpatch`. Otherwise, edit the MIME configuration for `application/fore-netpatch` to show `Plug In: FORE Netpatch`. Use the `Helpers` tab of the `General Preferences` dialog, available from the `Options` menu. Reload the `about:plugins` page when you are done.

   Once the `about:plugins` page verifies that the **`netpatch`** plug-in is enabled for MIME-type `application/fore-netpatch`, the plug-in is installed in your browser.

10.0.4 Opening AVA-300 Media Streams Inside the Netscape Browser

In this section, it is assumed that you have followed the instructions in Chapter 4 or Chapter 5 and have a managed AVA-300 called `ava1` properly configured.

It is strongly recommended that the first time you follow these instructions you use the name `ava1` for your AVA-300 manager since it is used in all of the demonstration files.

The `html` directory in the SVA installation consists of the following set of demonstration files:

examples.html	Top-level examples file for PAL video
examples_ntsc.html	Top-level examples file for NTSC video
mono.html	`mono` video stream (PAL)
mono_ntsc.html	`mono` video stream (NTSC)
vic.html	`vic` video stream (PAL)
vic_ntsc.html	`vic` video stream (NTSC)
either.html	`jpeg-either` video stream (PAL)
either_ntsc.html	`jpeg-either` video stream (NTSC)
vat.html	`vat` audio stream (8KHz 8-bit mono μ-law)
cd.html	`cd` audio stream
vic-vat.html	`vic` video stream and `vat` audio stream (PAL)
vic-vat_ntsc.html	`vic` video stream and `vat` audio stream (NTSC)
cd-either.html	`jpeg-either` video stream and `cd` audio stream (PAL)
cd-either_ntsc.html	`jpeg-either` video stream and `cd` audio stream (NTSC)

Open the `example.html` file as a URL. The browser displays a page containing links to the **`netpatch`** plug-in examples in the distribution. It is a good idea to work through these by starting with the simpler examples.

System resources may limit your ability to display some video streams.

As you open each file, there may be a delay of up to several seconds while **`svapatch`** is loaded. Once **`svapatch`** has started, you will see the video and/or hear the audio from the streams embedded within the page. When you wish to close the connection to the AVA-300, navigate to a different location by clicking the `Back` button or close down the Netscape browser. If you resize the browser while it is displaying a page containing embedded video streams, you will experience a delay as **`svapatch`** is reloaded.

If you specify a non-zero screen area for your embedded object, diagnostic messages appear in the Navigator's status bar whenever you point your mouse within the area. Therefore, it is advisable to allocate a non-zero width and height even for audio plug-ins as this allows you to monitor **`netpatch`**'s progress and diagnose problems more easily.

Status messages will warn you if **`netpatch`** is unable to locate the specified manager, video or audio stream, or if the ATM connection fails. Exceptional conditions that occur after the connection has been successfully established, such as the resetting of the manager, are generally unrecoverable and will be announced with the message `error`. If this occurs repeatedly, you should try invoking **`svapatch`** from the command line to test connectivity and stream/sink configuration (see Chapter 7).

10.0.5 Embedding Video and Audio Streams in HTML Documents

netpatch allows users of the same ATM video network to create documents containing video and audio streams which can be shared on a Web site, sent to each other via e-mail, and bookmarked for later use, using exactly the same techniques as with other media on the Web.

Creating pages with embedded streams is no more difficult than creating pages with static images. The only requirements are that your intended audience must have ATM connectivity to the managed device generating the streams and IP connectivity to the hosts running the trader(s) and manager(s). This section explains the **embed** tag and the attributes that **netpatch** uses. An understanding of HTML and web authoring are assumed.

An HTML `embed` tag takes the following form:

```
<embed arg=value ...>
```

where `arg` is the name of the attribute and `value` is the value assigned to it.

The following general points apply to the **embed** tag:

- To leave an attribute at its default value, omit it altogether.
- To specify an attribute as having the null string value, use `arg=""`.
- You may not specify an attribute without a value, e.g., `arg=`.
- Put quotation marks (“”) around attributes containing spaces.
- All embedded objects must have at least the first three of the attributes listed below (`type`, `width`, and `height`). All other attributes are passed to the plug-in.

The following is an example of the contents of an HTML file that displays a video stream in your Netscape browser:

```
<!DOCTYPE HTML PUBLIC “-//IETF//DTD HTML//EN”>
<html>
<head>
<title>Netpatch: example</title>
</head>
<embed type=application/fore-netpatch
manager=ava1
trader=10.11.3.30
videostream=rgb16
audiostream=cd
width=304
height=224>
</body>
</html>
```

The following attributes can be specified in an embed tag in any page of HTML which is to activate the Netscape plug-in. The first four attributes (type, width, height, hidden=true) are generic embed tag attributes. The remainder are specific to the **`netpatch`** plug-in.

type — Sets the MIME type of the embedded object. The value must be `application/fore-netpatch`.

width
height — Sets the size of the embedded object, thus allowing the browser to format the document properly. If the size you specify is too small for the video stream, the image is clipped to fit. If you specify either of these as zero, the hidden attribute is implicitly specified (see the following entry). Since this can cause problems with Netscape 3.0, give all embedded objects a non-zero width and height.

hidden=true — Specifies that the embedded object occupies no screen area. This tag is only appropriate for audio streams since video streams require window creation in order to be displayed. Since hidden plug-ins are known to cause problems with Netscape 3.0, you should avoid using this attribute.

trader — Specifies a comma-separated list of hosts on which SVA traders are running. The default value is `'localhost'`. This attribute is not case-sensitive since it is the DNS name of an Internet host.

manager — Specifies the managed AVA-300 from where you wish to export a stream. This attribute has no default value and is mandatory.

videostream
audiostream — Specify the names of the video and audio stream(s) that you wish to attach to. If you do not assign either attribute a value, the respective medium (video or audio) is ignored. Neither attribute has a default value.

videosink
audiosink — Specify the names of the video and audio sinks that you wish the plug-in to use. If either attribute has the null string value (default) or the specified sink cannot render the corresponding stream, **`svapatch`** picks the most appropriate sink for the stream type, depending on the workstation's capabilities. It is not recommended that you specify sinks yourself, since all platforms may not be capable of using the specified sink. To obtain a list of sinks supported by the workstation, type:

`svarun svapatch -show_local_sinks`

vwidth
vheight

Specify the actual, unscaled size of the video stream. These are optional, and if both are specified are used in preference to the `width` and `height` attributes when deciding which sink to use (see notes regarding the Matrox JPEG sink below). This allows you to change the width and height of the video window arbitrarily without affecting the choice of sink.

volume

Specifies the initial audio volume. The default value is `15`. The acceptable range is `0-31`. This attribute sets the volume for all browsers. A better solution is to use the standard audio control tool to set the workstation's global audio device volume dynamically. (`apanel(1)` on IRIX, `audiocontrol(1)` on Solaris, `volume control` on NT/95/98).

audioout

Specifies the workstation audio output port to use. Acceptable values are `headphones`, `speaker`, or `lineout`. The default is `headphones`. Some platforms do not support all three values; for example, IRIX ignores the setting. You can use standard workstation or PC tools to control this dynamically.

videoscaling

Instructs the plug-in to double the video vertically or both vertically and horizontally. The default is `small` (no scaling). Possible values include `small`, `double_y`, or `double_xy`. If you specify doubling, you should adjust the `width` and `height` fields (see above) to correspond to the doubled size (but not `vwidth` or `vheight`). Videoscaling is useful for scaling single field video up to full frame size.

rate_match

Sets whether or not audio rate matching is to be enabled. Specify `0` to disable, `1` (default) to enable.

playout_level
playout_max

Specify (in milliseconds) the target and maximum audio playout latencies. The defaults are `400` and `600`, respectively.

If you are using a Sun machine, and the **embed** tag's `videosink` attribute is unspecified, the plug-in will use a videosink setting of `parallax`. This causes the Parallax sink to be used if a Parallax JPEG decompression card is installed. The video will be unscaled (regardless of the value of the `videoscaling` attribute).

If you are using a PC (running Windows NT, 95, or 98) and the **embed** tag's `videosink` attribute is unspecified and, if `vwidth` and `vheight` specify one of the sizes listed below, or if `vwidth` or `vheight` are undefined and `width` and `height` correspond to a scaling (corresponding to the videoscaling attribute) of one of the sizes listed below, then the plug-in will use a videosink setting of `active_jpeg`. This causes the RainbowRunner JPEG sink to be used if a Matrox RainbowRunner MJPEG decompression card is installed. The video stream will be scaled according to the `videoscaling` attribute, up to the limits imposed by the RainbowRunner (which depend on screen mode and depth).

The sizes accepted by the `active_jpeg` sink are a width of `704`, `352`, `176`, or `640`, and a height of `288`, `144`, `240`, or `120`. The first two heights will cause the video output of the RainbowRunner card to produce PAL video, the last two NTSC.

Non-zero `width` and `height` attributes are required for the plug-in to be initialized.

The `audioout` attribute has no effect on IRIX—you must insert / remove headphones into / from the headphone socket as desired.

You need to change the manager and possibly the `audiostream` and `videostream` names to use these examples in your Web pages.

Illegal characters in any of the attributes will cause **`netpatch`** to abort with an error message. This is a security measure designed to prevent HTML that contains embedded objects in which arbitrary shell commands are concealed.

CHAPTER 11 MBone Applications

The Internet community has developed a video and audio distribution system which is implemented over an IP multicast network called the Multicast Backbone (MBone). This network has a wide geographic coverage that allows interaction between many sites world-wide. Public domain tools that are compatible with most workstations are available for video and audio distribution and conferencing on the MBone.

11.1 MBone Tools

This section describes the MBone tools supplied with the SVA software, which consist of modified versions of the public domain tools **vic** and **vat**, originally developed by the Network Research Group at the Lawrence Berkeley National Laboratory (LBNL).

See `http://www-nrg.ee.lbl.gov` for more details on **vic** and **vat**.

vic and **vat** use RTP (Real-time Transport Protocol) to frame the multimedia payload. Using these modified tools, you can route video and audio from AVA-300s onto the MBone. The default AVA-300 streams include **vic** and **vat**, which are suitable formats for these tools.

You need MBone connectivity, which consists of a multicast-capable workstation and a multicast route to the MBone, to participate in conferences or watch events on the MBone. Multicast IP support is available in the base release of many popular workstation operating systems (e.g., Sun Solaris 2.X and Windows NT 4.0) and network router implementations. The tools may also be used on private multicast IP networks or in standard point-to-point IP mode.

11.1.1 vic

vic (Video Conference) is a tool that allows you to participate in video conferences or watch broadcast events. **vic** can operate in one of two modes:

Point-to-point mode Conferencing between two fixed participants.

Multicast mode Conferencing between an arbitrary number of participants.

vic supports a number of video grabber devices which are capable of capturing video from different vendors' workstation video devices (e.g., Parallax, SGI Galileo, or DEC J300). The SVA modifications to **vic** add an AVA-300 grabber module that allows AVA-300 video to be transferred from the SVA application **svapatch** to **vic**, just as if the video was originating from a local video grabber device. See Section 11.2 for issues regarding AVA JPEG and RTP.

The AVA-300 grabber is compatible only with JPEG format video.

11.1.2 Running svapatch for vic

Before setting up a patch for use with **vic**, ensure that the traders and managers can be contacted successfully. Do this by patching AVA-300 video to the workstation or PC display using **-local svapatch**, as in this example:

```
svarun svapatch -from ava1 -to -local -video vic
```

The **vic** video stream from AVA-300 `ava1` is displayed on the workstation / PC.

If you have problems, or if the video stream is not displayed, please refer to Chapter 8 for further information.

Terminate **svapatch** and then start a **vicsink** patch to act as video input to **vic**:

```
svarun svapatch -from ava1 'vicsink vic'
```

The **'vicsink vic'** portion of the command executes a helper script to construct appropriate arguments to **svapatch**.

The following message is displayed at periodic intervals:

```
.... no consumer running
```

This message indicates that **svapatch** is waiting for you to start a **vic** process to which it can send the incoming AVA-300 video.

vicsink is available on Windows NT, but is used differently than in UNIX. On NT, it is used as follows:

```
C:> vicsink vic
C:> svarun svapatch -from ava1 %VICSINK_RESULT%
```

You can use the command **set VICSINK_RESULT** to see the options configured by **vicsink** on Windows NT.

Running **svapatch** for **vic** is not supported on Windows 95/98 because named pipes are not supported.

11.1.3 Transmitting AVA-300 Video with vic

To start a **vic** process to transmit video, do the following:

1. Open a window on the workstation / PC.
2. At the prompt, type:

   svarun vic *<IP address>/<UDP port>*

3. To run in point-to-point mode (recommended for initial testing), enter a standard hostname or IP address and an available User Datagram Protocol (UDP) port:

   svarun vic phoenix/8080

4. To run in multicast mode, enter a class D multicast IP address.

NOTE

Two ports are actually used (*<UDP port>* and *<UDP port>+1*). One port is for data and the other is for control.

The main vic Window, shown in Figure 11.1, is displayed.

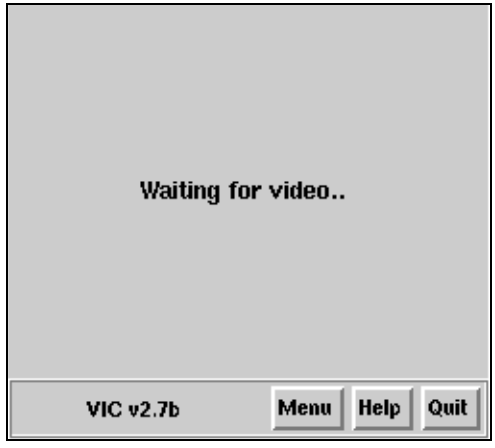

Figure 11.1 - vic Window

5. Click on the Menu button.

   The Transmission Control Window, shown in Figure 11.2, is displayed.

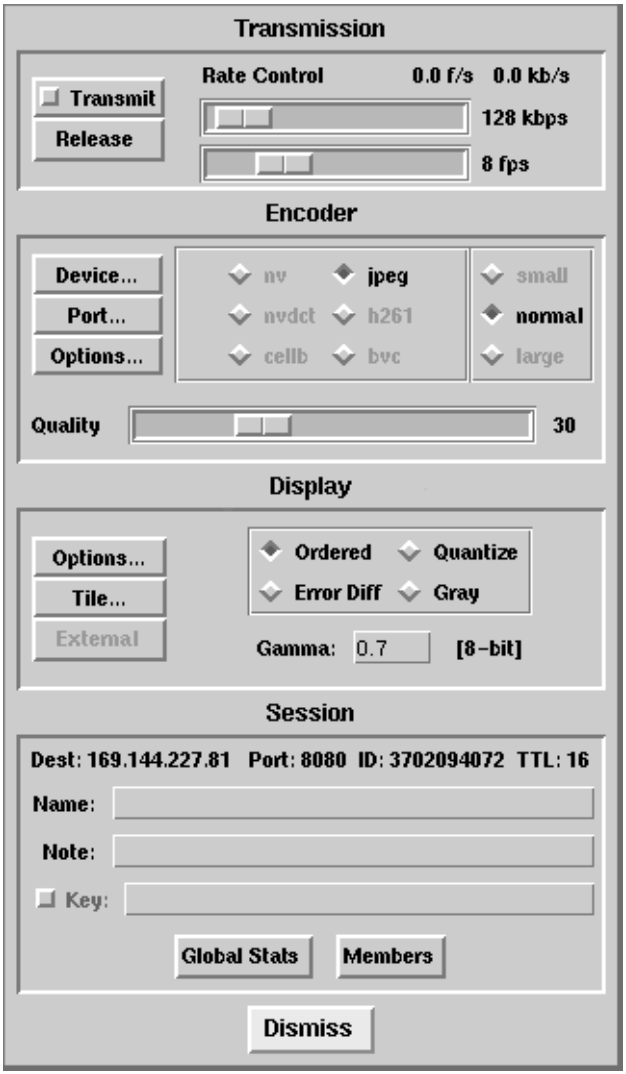

Figure 11.2 - Transmission Control Window

6. Click on the `Device` button.
   A menu containing available grabbers, as shown in Figure 11.3, is displayed.

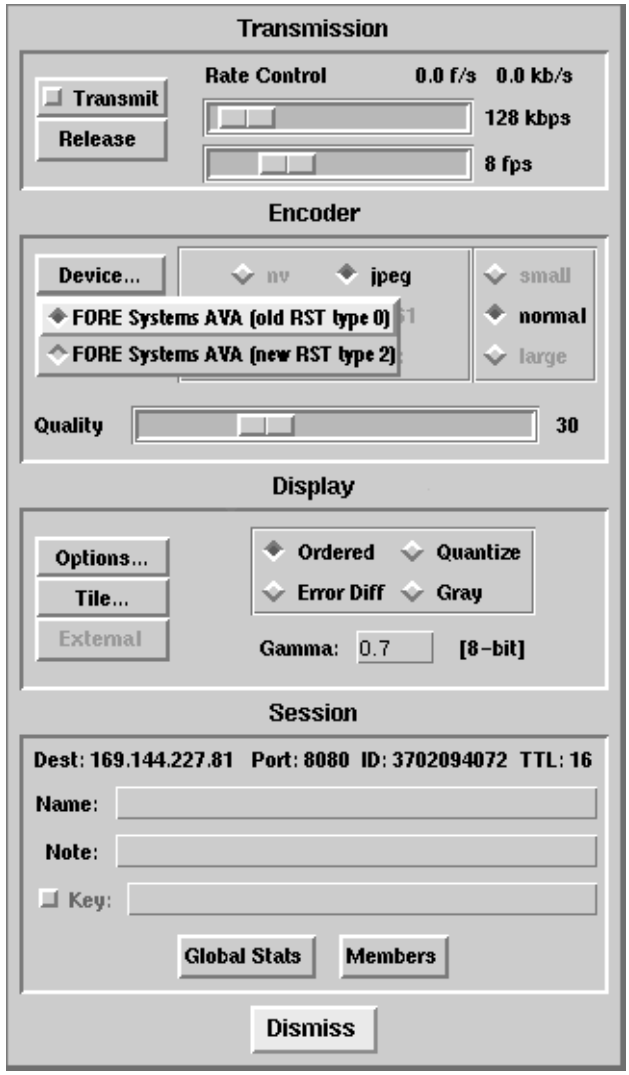

Figure 11.3 - Available Grabbers Menu

In addition to a list of supported video hardware you have on your workstation, you should see `FORE Systems AVA (old RST type 0)` and `FORE Systems AVA (new RST type 2)`. If they are not listed, make sure that you do not have another version of **`vic`** on your path before the SVA version. See Section 11.2 for a discussion of the RST type options.

7. Double-click on `FORE Systems AVA (old RST type 0)` or highlight it with a single click and then click on the `Transmit` button.

   A thumbnail video image is displayed in the first **`vic`** window. The video is being transmitted to the destination workstation or multicast group.

The `Rate Control` slider can be used to limit the amount of data transmitted, and causes **`vic`** to drop frames if it is set lower than the rate coming out of the AVA-300. If you wish to use a low frame rate, you should use a low rate stream from the AVA-300 to avoid overloading the workstation.

If you see continuous `... buffers full ...` messages from the **`svapatch`** process, this is an indication that **`vic`** is unable to consume (or drop) the frames from **`svapatch`** quickly enough. You should use a lower rate AVA-300 stream.

To change the rate from the AVA-300, you can either choose a different stream or edit an existing one with **`svc-rtds`**. Experiment with different sizes, frame rates, and Q-factors, and choose the one most appropriate for your needs. For example, you may require fewer high-quality frames or more lower-quality ones.

Any available supported workstation capture devices can still be used by selecting them from the `Device` menu.

11.1.4 Receiving AVA-300 Video from vic

To receive video from a point-to-point session, type:

svarun vic *<source IP address>/<UDP port>*

Where *<source IP address>* is the IP address of the workstation/PC transmitting the video, and *<UDP port>* corresponds to the port specified by the transmitting **vic**.

In a point-to-point session, the transmitter and receiver must specify the same UDP ports.

While only two parties may participate in a point-to-point video session, both may participate in several such sessions.

To receive video from a multicast session, use the address and port of a currently-available session.

The sd (session directory) tool, available from LBL, can be used to find the multicast addresses of currently-available sessions.

The main `vic Window` is displayed with a thumbnail of the available video stream. Click on the image to see it full-size.

See the online **vic.1** manual page for more details.

11.1.5 vat

vat is similar to **vic**, but sends and receives audio rather than video. The SVA distribution includes a version of **vat** that accepts AVA-300 audio from **svapatch**.

Although the AVA-300 and **vat** support a number of different audio formats, only 8-bit, 8kHz mono µ-Law audio from an AVA-300 may be used with **vat**.

11.1.6 Running svapatch for vat

Before setting up a patch for use with **vat**, you should make sure that the traders and managers can be contacted successfully. You do this by patching AVA-300 audio to your workstation / PC:

```
svarun svapatch -from ava1 -to -local -audio vat -args -speaker\
                    -volume 10 -endargs
```

The **vat** audio stream from AVA-300 `ava1` is played on the workstation / PC.

Terminate **svapatch** and then start a **vatsink** patch to act as audio input to **vat**:

```
svarun svapatch -from ava1 'vatsink vat'
```

The **'vatsink vat'** portion of the command executes a helper script to construct appropriate arguments to **svapatch**.

The following message is displayed at periodic intervals:

```
.... no consumer running
```

This message indicates that `svapatch` is waiting for you to start a **vat** process to which it can send the incoming AVA-300 audio.

vatsink is available on Windows NT, but is used differently than in UNIX. On NT, it is used as follows:

```
C:> vatsink vat
C:> svarun svapatch -from ava1 %VATSINK_RESULT%
```

You can use the command **set VATSINK_RESULT** to see the options configured by **vatsink** on Windows NT.

NOTE

Running **svapatch** for **vat** is not supported on Windows 95/98 because named pipes are not supported.

NOTE

If you wish to use Audio Mixing Firmware (AMF) audio (see Chapter 12) as input to **vat**, it must be converted by **svapatch** from 16kHz stereo to 8kHz mono. You can do this by putting **-save_amf_vat 1** before **-record_start** on the command line. The **vatsink** script does it for you.

11.1.7 Transmitting AVA-300 Audio with vat

To start a **vat** process to transmit audio, do the following:

1. Open a window on the workstation/PC.
2. On UNIX at the prompt, type:

   svarun vat -U /tmp/vat_named *<IP address>/<UDP port>*

   The **-U** argument instructs **vat** to use the named pipe **/tmp/vat_named** as its audio input device. This corresponds to the pipe which is set up by the **svapatch** process.

   On Windows NT, the pipe **//./pipe/vat_named** is used instead.

   The main `vat Window`, shown in Figure 11.4, is displayed.

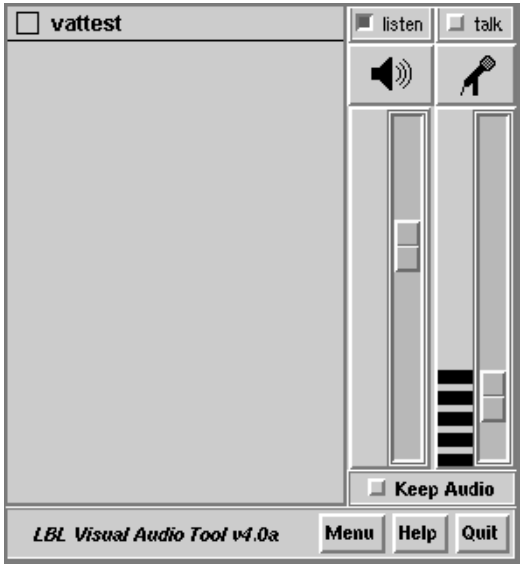

Figure 11.4 - vat Window

3. Click on the `talk` button to start transmitting. The displayed volume meter bar visually represents changes in the transmitted audio level.

11.1.8 Receiving AVA-300 Audio with vat

To receive audio, type:

svarun vat *<source IP address>/<UDP port>*

vat assumes that the same audio device used for output is to be used for input, so you cannot play received audio to the local workstation or PC while transmitting AVA-300 audio.

As with **vic**, two UDP ports are actually required. See Section 11.1.3.

See the online **vat.1** manual page for more details.

11.2 AVA-300 JPEG Over RTP

The Internet Engineering Task Force (IETF) Audio/Video Transport Workinggroup (AVT) (http://ietf.org) has submitted an RFC (RFC 2035), defining the payload format for JPEG compressed video over RTP.

Six types of JPEG payload (0-5) are defined. The odd types differ from the even only in sampling factors. AVA-300 video is 4:2:2 JPEG, corresponding to the even types.

AVA-300 JPEG contains restart markers. The original JPEG payload types (0/1) did not allow for the presence of restart markers, so types 2-4 were added. AVA-300 JPEG should be framed using type 2. However, most existing RTP video tools (such as **vic**) do not yet support types other than 0/1. The SVA distributed **vic** supports all six types.

The SVA modified **vic** can send JPEG either as type 0 or type 2. Type 2 is the legitimate format, but at present the only known tool which can receive it is SVA modified **vic**. It can, however, also send type 0. This is contrary to the payload type, since the JPEG contains restart markers, but the transmitted video is modified in such a way that it can be accepted by the plain LBL distribution of **vic**. Other tools are not likely to accept type 0 with restarts; therefore, type 0 should not be used for transmission onto multicast networks where you cannot guarantee what tools will be used for viewing.

CHAPTER 12 Conferencing

The StreamRunner AVA / ATV system may be used as the foundation of a high-quality video conferencing system. Two main configurations are supported in SVA 5.1:

- A two-site conference (with no observers) may be set up by using the **`svapatch`** command.
- A multi-site (up to four locations) conference may be set up with audio mixing for all participants by using the **`svaconfer`** command. In this configuration, there is no limit on the number of observer sites able to listen to the full conference mix (and observe the video).

This chapter assumes familiarity with the following SVA components and concepts:

- Traders
- Managers
- CellChain
- **`svc-rtds`**
- Use of SPVCs
- Stream QoS

This chapter begins with an introduction to basic concepts that are useful for configuring both two-site and multi-site conferences.

12.1 General Conferencing Concepts and Requirements

Useful whether you are configuring a two-site and/or multi-site conference, this section introduces some general audio conferencing concepts for working with the AVA-300 and ATV-300, as well as other audio equipment.

12.1.1 Hardware Requirements

You will need the following equipment at each of the video conference sites to complete a bidirectional teleconference configuration:

- Sturdy table or desk to set the equipment on
- Heavy, shock-absorbent microphone stand
- CellChain (consisting of one ATV-300 and one AVA-300)
- Color TV with video and stereo audio inputs.
- Microphone
- Video camera
- Mixer with microphone pre-amp
- Fiber optic cables
- Optional graphic EQ unit with feedback eliminators (required at *only one end* of the teleconference, for higher-quality audio).

12.1.2 Acoustic Feedback

In the simplest scenario, acoustic feedback occurs when sound leaving a loudspeaker enters the microphone that is driving the loudspeaker, causing the sound to circulate through the system many times. Figure 12.1 illustrates simple feedback.

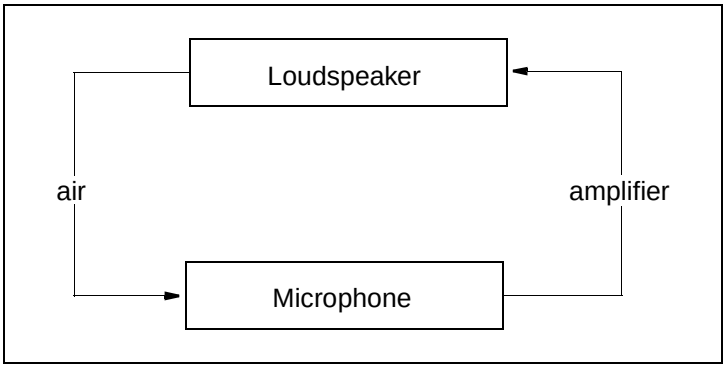

Figure 12.1 - Simple Feedback

In a bidirectional, two-point teleconference, the setup is more complicated since the loudspeakers do not leak into microphones that drive them, but into the microphones driving the loudspeakers at the remote end. In this case, the circuit involves acoustic feedback at both air gaps. It follows that preventing acoustic feedback across either one of the air gaps will stop the system from experiencing feedback. Figure 12.2 illustrates the feedback path in a two-point teleconference carried over ATM.

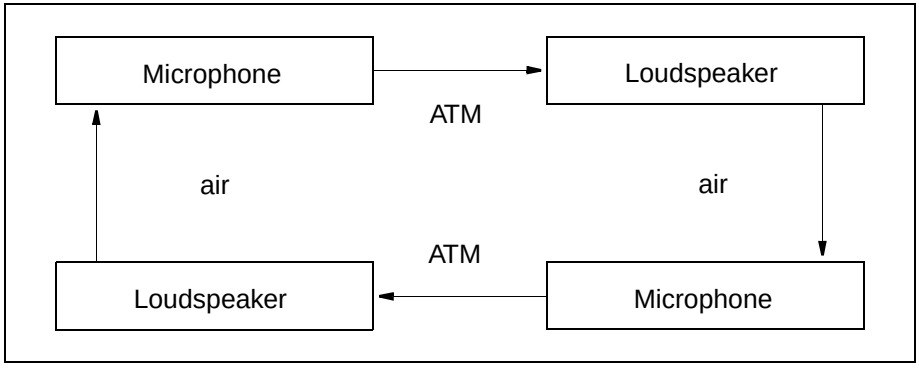

Figure 12.2 - Feedback Path in a Two-Point Teleconference

Feedback presents itself to the listener in two forms, *howlround* and *reverberation*. These characteristics, as well as *echo*, are discussed in the following sections.

12.1.2.1 Howlround

Howlround occurs when the circuit gain for a frequency or range of frequencies is greater than one. Speaking into the microphone produces a noise of rising amplitude that eventually becomes just a single tone. Without intervention, it quickly reaches deafening amplitudes and may damage audio equipment.

12.1.2.2 Reverberation

Simply ensuring that the circuit gain be less than one is not enough to avoid feedback. If the circuit gain is close to, but less than, one, certain frequencies will reverberate. Reverberation is heard as a “muddy” echo that takes several seconds to dissipate once the subject has stopped speaking. Although this feedback goes away on its own, it makes communication difficult.

12.1.2.3 Echo

If the circuit gain is reduced sufficiently, each listener will be able to hear the sound of their own voice in their loudspeaker. In this situation, the cycle of feedback has been broken as the signal may only cross the air gap at the far end before it is silenced. In certain situations, such an echo may be useful (as in the public telephone system), since it gives each user the sensation that they are being heard at the other end. But if it is too loud or the delay is too long, it may become a distraction. Since two-point teleconferencing includes visual as well as audible cues to both users, echo is not necessary and is best eliminated.

12.1.3 Avoiding Feedback

To set up a successful two-point teleconference, the gain must be set low enough to avoid both howlround and reverberation, yet high enough to allow both users to hear each other at a reasonable volume. Since avoiding feedback requires a reduction of circuit gain, a limit is essentially placed on the sum of the volume controls at each side. This means that if user A decides to turn his or her volume up high to make listening easier, user B finds it difficult to use high volumes without feedback and must therefore strain to hear at a low volume. Collaboration between remote sites to achieve ideal volume settings is an important part of establishing a successful conference.

There are additional ways to reduce feedback. An equalizer, or EQ unit, can de-emphasize those frequencies that are not present in speech, preventing feedback at those frequencies. Typically, speech occupies the 250Hz - 8KHz band of the audio spectrum, but best results are obtained by progressively attenuating all frequencies outside the 800Hz - 1.6Hz range, with maximum attenuation (-16dB) applied outside the 250Hz - 8KHz band, as shown in Figure 12.3.

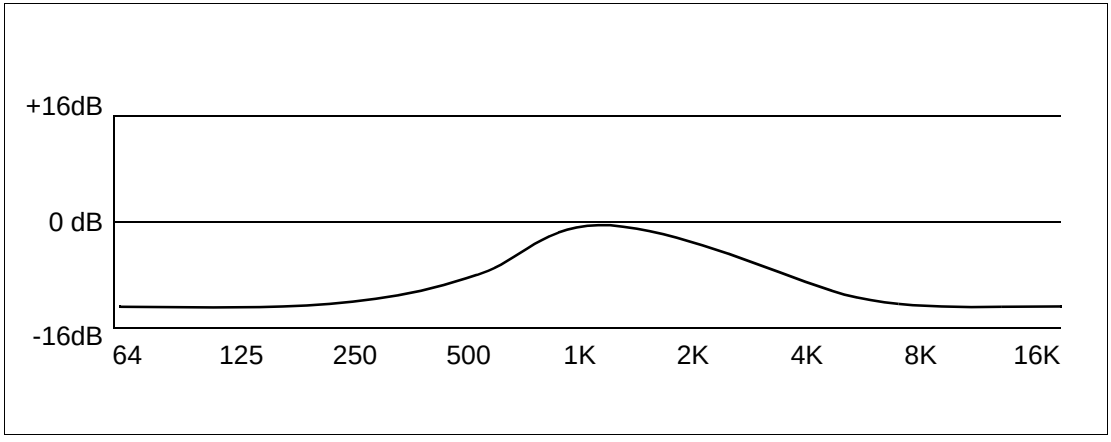

Figure 12.3 - Typical EQ Curve for Feedback Reduction

Many EQ units provide feedback eliminators. These signal processors constantly analyze the incoming signal for signs of feedback and quickly apply a narrow-band attenuating filter over the suspect frequencies whenever feedback is detected.

12.1.4 Choosing Microphones

Choosing a quality microphone can greatly aid in reducing feedback. The two main criteria for choosing a microphone are the frequency response and the directional response characteristic.

Budget microphones tend not to be very consistent in their sensitivity and may reproduce sounds at some frequencies at much greater levels than others. At such frequencies, the microphone can be prone to feedback even though the gain over the frequencies is not be very high.

More expensive microphones tend to have a much flatter response, allowing the gain to be turned up across the whole audio spectrum without any peaks of extremely high gain to initiate feedback.

Professional microphones designed for relatively low levels of sound are much more sensitive and have much greater clarity than less expensive, robust microphones designed to tolerate sound levels ranging from quiet conversation to loud, live music.

Many microphones are of the *cardioid* (heart-shaped) variety, so named because their directional response characteristic looks like an inverted heart. For optimum results, the loudspeaker should be placed directly behind the microphone where its sensitivity is least; this corresponds to the dip in the “heart”. This can be difficult to achieve, since the loudspeaker placement may not fall within the null zone.

Other microphones have highly directional characteristics, making their response to sounds originating from behind the plane of the diaphragm relatively smaller. These *hypercardioid* microphones are well suited to a single stationary user.

Figure 12.4 shows how the sensitivity varies with the angle between the source and the front of cardioid and hypercardioid microphones. The top of each graph represents the front tip of the microphone and the bottom represents the handle.

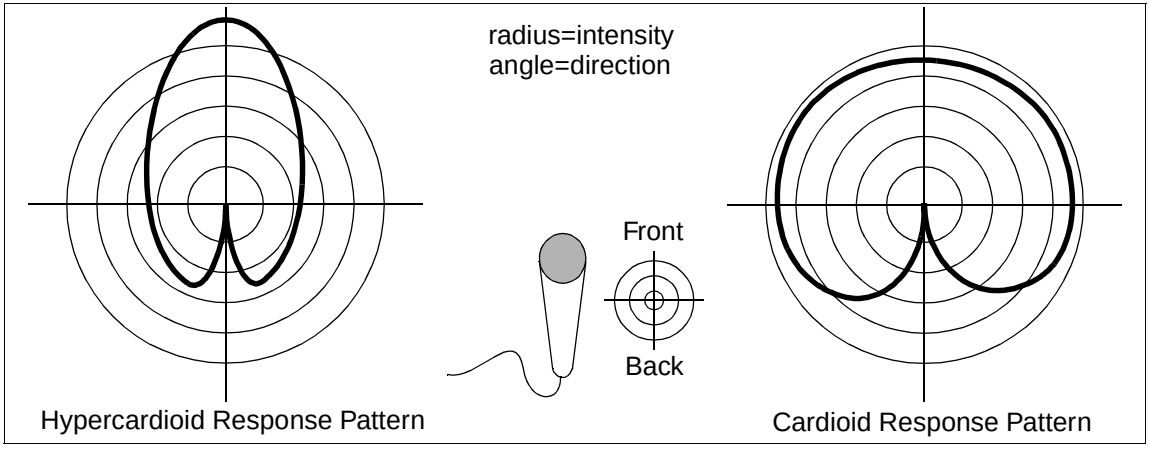

Figure 12.4 - Microphone Sensitivity Response Graphs

12.1.5 Choosing Loudspeakers

Choosing loudspeakers is also a very important part of establishing a successful audio conference. After testing a number of TVs and a domestic stereo amplifier with a pair of hi-fi loudspeakers, the best results were obtained from a high-quality large-screen Sony television. Its loudspeakers point to the side and slightly back, and although high volume settings must be used, the clarity was good and the noise level low. The integrated speakers are especially convenient, doing away with a more complex set up requiring a separate amp and speakers. Smaller television loudspeakers seem slightly inadequate, creating distortion at higher volumes.

12.1.6 Other Equipment Placement Issues

12.1.6.1 Multiple Users per Microphone

Strategically arranging two or three users around a single cardioid or hypercardioid microphone is easy with a little trial-and-error. Participants closest to the microphone generally come across louder, while those farther away or at oblique angles tend to be quieter.

12.1.6.2 Multiple Microphones per Endpoint

It is possible to mix several microphones at each end to provide the audio feed for the remote site. Consult your mixer manufacturer's user's manual for proper microphone mixing, as well as the information in the following sections:

12.1.6.2.1 Stereo

You can create true stereo effect by arranging two microphones in a triangle with the apex at the user(s). Place the microphones two to four feet apart depending on the number of users. If you have multiple users at the remote site, it is easy to create the illusion of spatiality with each of the users' voices seeming to come from a different direction. Figure 12.5 illustrates how spatiality relates to speaker positioning.

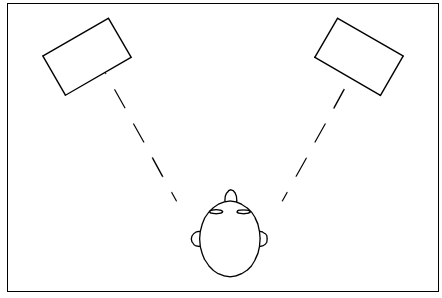

Figure 12.5 - Positioning Loudspeakers for Illusion of Spatiality

12.1.6.2.2 Large Conferences

Two or more microphones arranged around a table with groups of users sharing a microphone is an easily-configured solution for large conferences. The only limits include the number of microphone inputs to the mixer and the maximum number of people that can comfortably share each one.

12.1.7 Other Audio Conferencing Tips

12.1.7.1 Walls

Be careful when placing users and microphones close to walls. Walls tend to reflect sound and can cause or accentuate feedback. Experiment with your speaker and microphone placements, and factor in the effect any walls that are close to your equipment may have on your conference's outcome.

12.1.7.2 Low Background Noise

An environment with low background noise is preferable to one with computers or other electronic hardware creating a constant hum. Such vibrations can be a particular nuisance if they are conducted through solids to the microphone; for this reason, well-insulated microphone stands are highly recommended if you attempt to conference in such an environment.

12.2 Two-Site Conferencing

This section provides an introduction to configuring an audio set-up for a high-quality bi-directional teleconference. While setting up a basic audio conference is fairly straightforward, achieving optimum results with the equipment and environment at your disposal usually requires some experimentation; it is impossible to test every possible setup and there are parameters which cannot be prescribed in this section, such as the exact models of audio components, the acoustics of the room, the background noise level, and the number and seating arrangements of participants. Please refer to the previous section which introduces basic concepts that can be applied to your choice of equipment and setting.

12.2.1 Configuring the Hardware

This section details the procedure for setting up your audio equipment for a bidirectional teleconference. To set up your audio equipment, do the following:

1. Set up a CellChain at each site, connect it to the network and attach the TV and video camera.

Refer to Chapter 4 or Chapter 5 for procedures that detail hardware connections, and Section 8.3 which discusses CellChains.

2. Run two `svapatch` programs to connect the two CellChains together, using the `cd audio` stream and the `jpeg-interlace` video stream, as in the following:

```
svapatch -from cellchain1 -to cellchain2 -video jpeg-interlace -audio
                                    cd

svapatch -from cellchain2 -to cellchain1 -video jpeg-interlace -audio
                                    cd
```

Using S-video Ⓢ instead of composite video ▤ will give a better picture.

3. Place the TV on a table or desk, with the user facing it and seated comfortably about 3 or 4 feet away.
4. Place the microphone on the table approximately 12 to 18 inches between the user and the TV.

5. Connect the microphone cable to the mixer, and the mixer into the AVA-300's audio input.

NOTE

Consult the mixer manufacturer's instructions for full details on inputs and controls.

6. If you are using an EQ-unit, connect this on the audio path between the mixer and the AVA-300.
7. Place the video camera between the TV and the microphone, facing the user.

NOTE

The view of you that will be received at the remote end comes from this point, but your eyes will be looking at the center of the TV screen. Therefore, to give the best approximation of eye contact with the other party, you should place the camera as close as possible to your line of sight. To achieve this, mount the camera on top of the TV, or, if it's small enough, place it slightly in front of the TV. The less obtrusive the camera is, the closer it can be placed to your line of sight without obscuring important regions of the TV picture. As an example, the Canon VC-C1 camera has small dimensions and remotely controllable pan, tilt, zoom, and focus. Figure 12.6 illustrates proper equipment positioning.

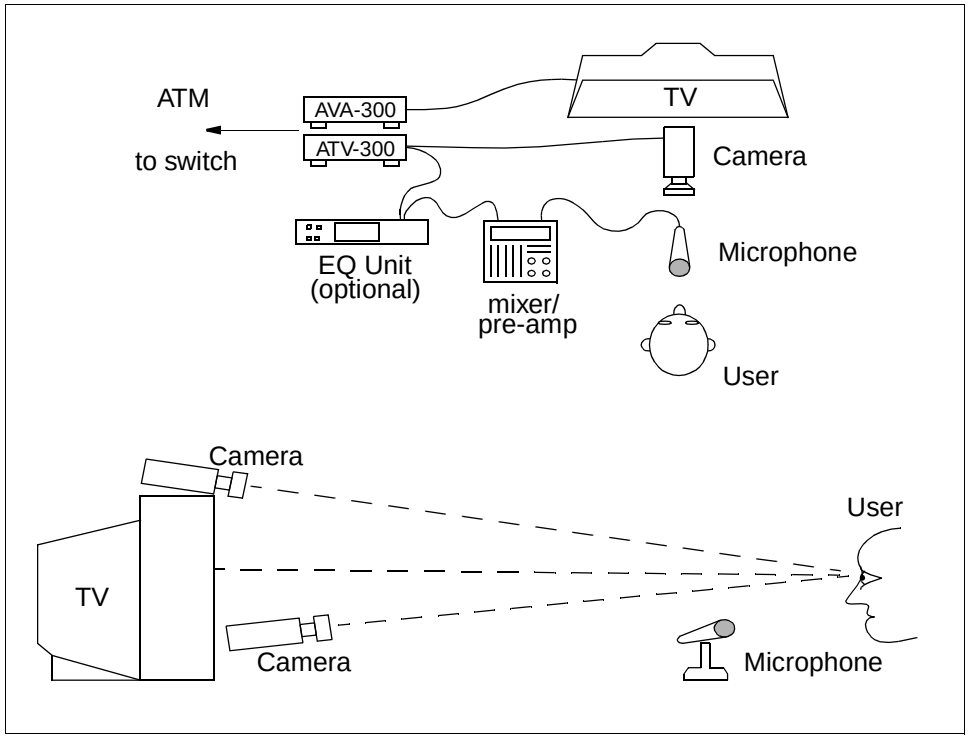

Figure 12.6 - Audio/Video Equipment Placement

12.2.2 Setting the Volume

There are two ways to determine the optimal audio levels for your conference. The first is to adjust them manually by listening and fine tuning accordingly. The second is to use the **`vat`** audio tool to measure the volume.

12.2.2.1 Manually Setting the Volume

Setting the proper volumes between two audio conferencing sites is an essential step to guaranteeing a successful and useful audio connection. The following procedure assumes two remote sites, called A and B. To set the proper audio volumes, do the following:

1. Turn the sound completely down on A's TV.
2. With user A speaking naturally into his or her microphone, increase the volume on A's pre-amp and B's TV until A can be clearly heard by B at a normal conversational volume.

NOTE

User B will have to gesture over the video channel to indicate whether the volume is too high or too low (i.e., “thumbs up” and/or “thumbs down”).

3. If user B finds there is too much noise in the output, he or she should try increasing the pre-amp gain while user B decreases the volume on his or her TV.

NOTE

Noise is introduced into the signal when its amplitude is low, so amplifying the signal as early as possible increases the signal-to-noise ratio. If the signal is clipped and distorted (like the sound from an inexpensive stereo system being played too loud,) the pre-amp gain is too high and the AVA-300 is being overloaded. Lower the pre-amp gain to rectify the problem.

You should leave the AVA-300 audio gain at its default value of 8; this setting is adequate for most purposes.

4. Take note of the current settings corresponding to the path from site A to site B, turn the sound completely down on B’s TV, and repeat steps 1 through 3 for the path from site B to site A.
5. Turn the sound back up on B’s TV to its previous volume.

   At this point in principle, user A and user B can hear each other clearly. However, once both audio channels are enabled simultaneously, the system becomes more complex because of acoustic feedback, discussed in the next section.

12.2.2.2 Using vat to Set the Volume

Since **`vat`** cannot process cd-quality audio, the **`svapatch`** commands outlined in Section 12.2.1 cannot be used while determining audio levels. You must terminate these commands, set the audio levels, then rerun the commands.

To set the proper audio volumes for each site, do the following:

NOTE

The following procedure assumes that trader and CellChain managers are already configured and running.

1. On UNIX platforms, open two windows, and type the following (one in each window):

   `$ svapatch -from cellchain1 'vatsink vat'`

   `$ vat -U /tmp/vat_named localhost/54321`

   On Windows NT platforms, open two windows, type the following in the first window:

   `C:> vatsink vat`

   `svapatch -from cellchain1 %VATSINK_RESULT%`

   and the following in the second window:

   `C:> vat -U //./pipe/vat_named localhost/54321`

   NOTE — **`localhost 54321`** is a convenient dummy IP address for **`vat`**. Refer to the online **`vat`** documentation for details.

   The main `vat window` is displayed.

2. Click on the `talk` button. While speaking in a normal, conversational tone into the microphone, adjust the microphone pre-amp until the **`vat`** signal level bars peak just below the top and drops two-thirds of the way down. Refer to Figure 12.7.

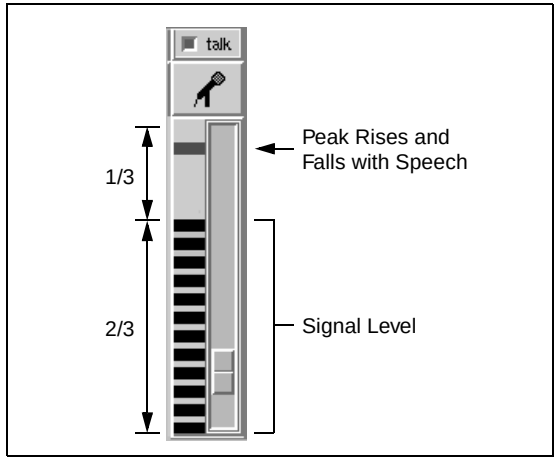

Figure 12.7 - vat Audio Slider Bar

12.3 Multi-Site Conferencing

To support conferences with more than two participants, it is necessary to mix the audio contributions of the various sites. This is achieved with dedicated Audio Mixing Firmware (AMF) running in a stock ATV-300 unit. All contributing audio streams in the conference are directed to the AMF unit which outputs a variety of mixes to participants and observers. Video is multicast directly between the sites and does not transit the AMF unit. An AMF unit is not capable of decoding and displaying video or playing out audio.

12.3.1 Equipment Requirements

To establish a multi-site conference using AMF, the following equipment is required:

- Minimum of one ATM-equipped workstation / PC to run the SVA server software.
- Each contributing site configured with hardware as described in Section 12.1.1.
- One additional ATV-300 running AMF to mix the audio contributions of up to four contributing sites.
- One ATV-300 at any observer sites.

12.3.2 svaconfer and psconfer

You configure a multi-site conference using the **`svaconfer`** command. It is supplied both as an ordinary executable and as a Perl script with the same command-line interface. The executable can be used whether or not Perl is installed on your platform. The Perl script is for information only and can be used as a basis for your own customization.

The general form of the **`svaconfer`** command is as follows:

`svaconfer -format` *<fmt> <mixer> <chain1> <chain2> <chain3>* **`...`**

The **`-format`** *<fmt>* option defines the number of contributing sites and specifies the layout for the corresponding video streams on all site ATV-300s in the conference. It can be omitted, and if it is left out, the format used is determined by the number of sites given in the rest of the command line. The supported formats are described below.

The *<mixer>* argument gives the name of the SVA manager in charge of the ATV-300 running the AMF firmware. It must be the first SVA manager mentioned on the **`svaconfer`** command line.

The *<chain1> <chain2> <chain3>* **`...`** arguments give the names of the SVA managers for the AVA-300s and ATV-300s at the contributing and audience sites. The contributing sites are given first; any additional manager names above the number defined by the conference format specify audience sites. Audience sites only need an ATV-300.

If a site has an AVA-300 and an ATV-300 which are arranged on separate switch ports with separate SVA managers instead of on a CellChain with a single SVA manager, it can be specified as *<ava1>,<atv1>* instead of *<chain1>*.

The **svapatch** processes forked by **svaconfer** are of three kinds:

- one to the mixer, bringing in the audio from each of the contributors
- one to each contributor, giving them their custom audio mix from the mixer and video from all the contributors (including themselves)
- one to all the audience's ATV-300s, giving the complete audio mix and video from all the contributors

It is also possible to configure conferences using the PatchServer. You do this by using the **psconfer** command in place of **svaconfer**. Although functionally identical to **svaconfer**, **psconfer** offers better performance and site captions.

12.3.3 Three-Way Conference

Figure 12.8 illustrates a three site configuration with two audience sites. For simplicity all components are connected to switch `orion`, but in a typical configuration the components will be more widely-distributed.

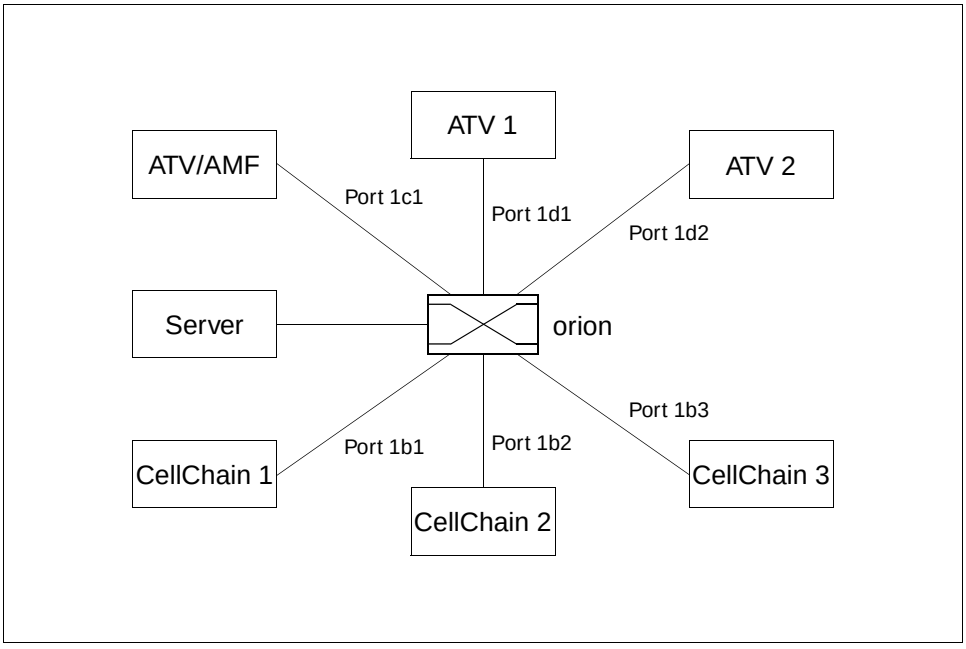

Figure 12.8 - AMF Sample Configuration

To bring up the conference, do the following:

1. Start a trader by typing the following:

```
svarun trader
```

2. Start normal SVA manager processes for the non-AMF SVA devices by typing:

```
svarun -device orion/1b1
svarun -device orion/1b2
svarun -device orion/1b3
svarun -device orion/1d1
svarun -device orion/1d2
```

3. Start an AMF manager process for the ATV-300 selected to be the audio mixing unit by typing:

```
svarun -device orion/1c1 -f amf
```

where **amf** is the name of the amf firmware file (found in `sva-5.1.0/firmware`).

If **svc-rtds** is used to query the trader running on the server computer, a display similar to Figure 12.9 is shown.

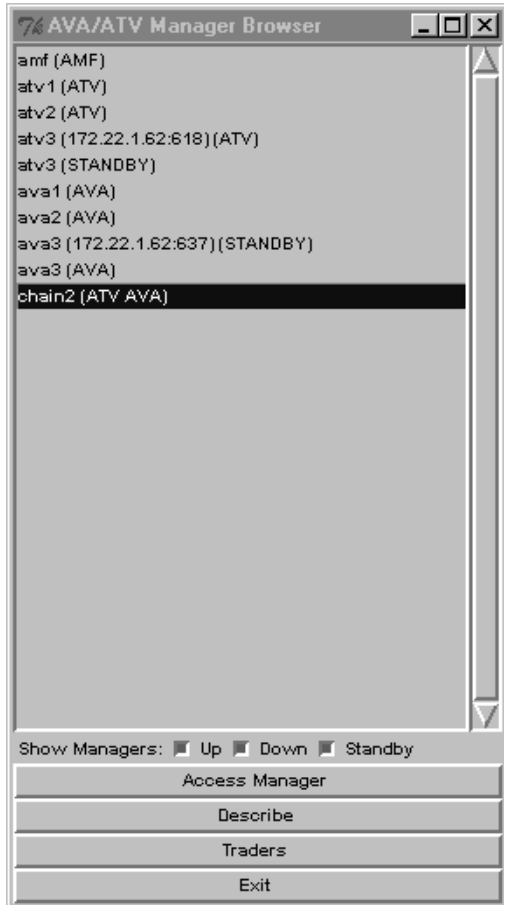

Figure 12.9 - AMF Example Manager Configuration

The default manager configuration file shipped with the SVA software contains a number of stream templates which are used by the conferencing software. At a minimum, the following streams should be present in each manager for all possible conferencing configurations to function:

```
conference-audio (audiosource)
conf2 (videosource)
conf3-main (videosource)
conf3-small (videosource)
conf4-main (videosource)
conf4-small (videosource)
```

4. To start the conference between the three participant and two observer sites, type the following:

`svarun svaconfer -format conf3 orion/1c1 orion/1b1 orion/1b2 \`

`orion/1b3 orion/1d1 orion/1d2`

At this point, all five ATV-300 systems are receiving three video streams and one mixed audio stream. Figure 12.10 illustrates the logical SVC audio configuration that is created.

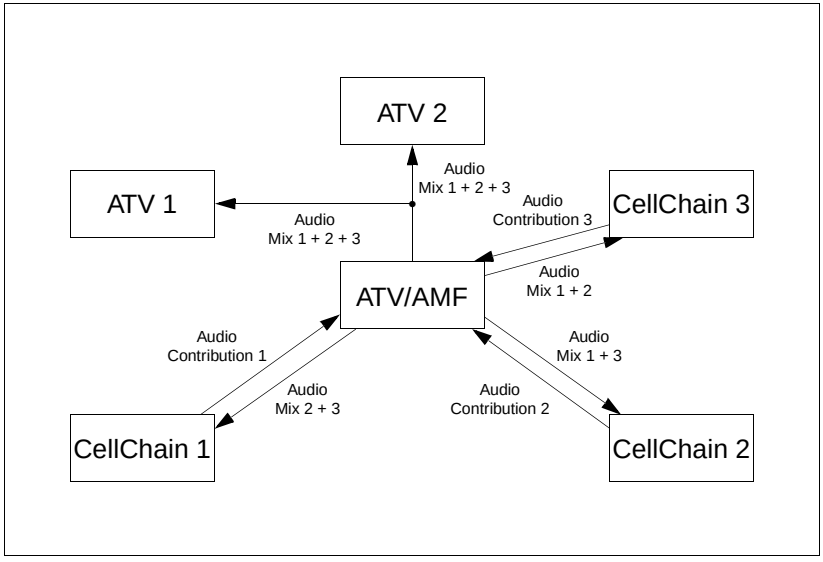

Figure 12.10 - AMF Audio SVC Configuration

Figure 12.11 illustrates the logical SVC video configuration that is created by showing the video display at each site.

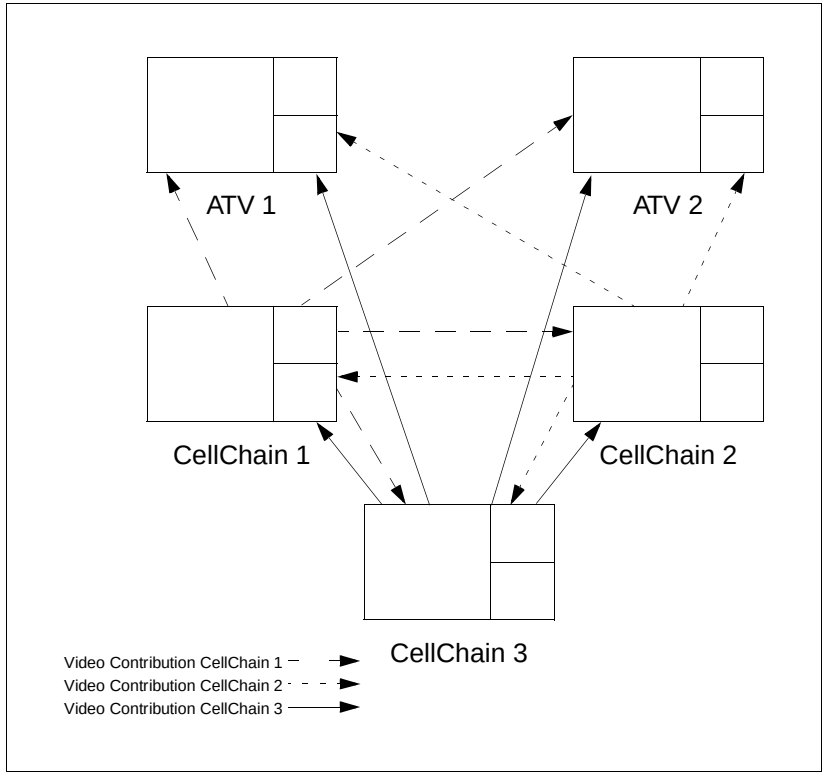

Figure 12.11 - AMF Video Configuration

NOTE

Each window that is named more than once is part of the same multicast SVC from the indicated source.

12.3.4 Configuration on Windows NT

On Windows NT, **svaconfer** can be started either at a DOS prompt or through SVA Control. This section describes using SVA Control.

NOTE

This section assumes a working knowledge of SVA Control. Refer to Chapter 6 for information on starting traders and managers and how to establish SVCs between devices.

1. Access SVA Control.
2. Start a trader.
3. Register the device / chain managers. For the three-way conference, you must start three CellChains (named `chain1`, `chain2`, and `chain3`) and one ATV-300 (`mixer`).

NOTE

Running **svc-rtds** provides verification that your managers are running; they appear one-by-one in the AVA/ATV `Manager Browser` as you start them.

4. Click on the `Video Conference` button.

   The `Video Conference` icon is illuminated.
5. Click on the `Add` button.

   The "plus" icon is displayed on the left of the icon tree.
6. Double-click on the `Video Conference` icon and then click on the `Unassigned` icon.
7. In the illuminated `Properties` dialog, type in the appropriate data in the `Mixer` and `Site #` fields.
8. Click on the `Enter` button and then the `Start` button.

You have completed a three-way conference.

NOTE

The conference will not be saved when you close SVA Control. You must save the entire SVA Control configuration file for later use.

12.3.5 Setting the Volume

Setting the audio levels in a multi-site conference is essentially the same as setting them for a two-site conference, as described in Section 12.2.2, except that it must be done in stages. In a four-site conference (with the sites designated A, B, C, and D), you must first set up the audio for sites A and B while C and D are muted. Then, using A as a reference, configure A and C (with B and D muted), and repeat for A and D. Finally, run all four sites and adjust the volumes if necessary.

12.3.6 Conference Audio QoS

The audio stream used is called `conference-audio`; it defines a mono line-level signal on input `1L` of the AVA-300.

For mono streams, the AVA-300 only samples the signal on the left channel of a stereo input pair. Therefore, a site's audio source should be connected to the left channel on its AVA-300, not the right channel.

The unit, input channel, QoS, and gain level can be changed with **`svc-rtds`** or by editing the `svadefaults` file, but the sample rate, sampling mode, and packing factor must remain unchanged in order for the mixer to work.

By default, the conferencing software uses a CBR QoS for all audio streams in the conference. The QoS of the audio streams from the contributing sites to the AMF may be altered by using **`svc-rtds`** or editing the `svadefaults` files. The mixed audio streams that are produced by the AMF can be changed to UBR SVCs by using the **`-amf_no_qos`** option, as in the following:

```
svarun -device orion/1c1 -f amf -amf_no_qos
```

12.3.7 AMF and svc-rtds

The AMF manager process may be accessed in a similar way to normal SVA device managers. For example, if **`svc-rtds`** is used to access the AMF manager, a display similar to Figure 12.12 is shown.

Figure 12.12 - AMF Manager Window

You may join to the various audio source streams that are defined in order to listen to a variety of mixes produced by the AMF unit.

12.3.8 Supported Screen Formats

The screen layouts supported by the **`svaconfer -format`** option are the same as those supported by the underlying **`svapatch`** command. They are as follows:

12.3.8.1 conf3 Format

Expects three contributing sites. It divides the screen into a large, roughly square window occupying two-thirds of the screen, and two smaller windows arranged in a vertical column to the right. The large window shows *<chain1>*, while the top- and bottom-right windows show *<chain2>* and *<chain3>* respectively, as illustrated in Figure 12.13.

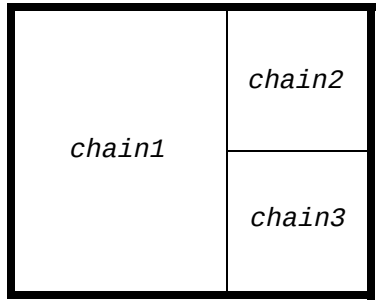

Figure 12.13 - conf3 Screen Format

12.3.8.2 conf4 Format

Similar to `conf3`, but there are three windows in the vertical column, and four contributing sites are expected, as illustrated in Figure 12.14.

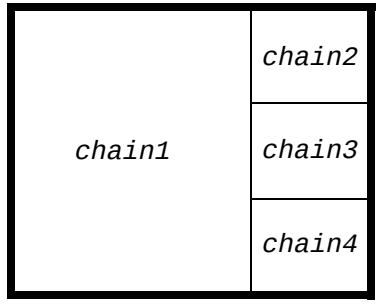

Figure 12.14 - conf4 Screen Format

12.3.8.3 4up Format

Divides the screen in half both horizontally and vertically and also expects four contributing sites. The top-left, top-right, bottom-left and bottom-right windows show *<chain1>, <chain2>, <chain3>* and *<chain4>* respectively, as illustrated in Figure 12.15.

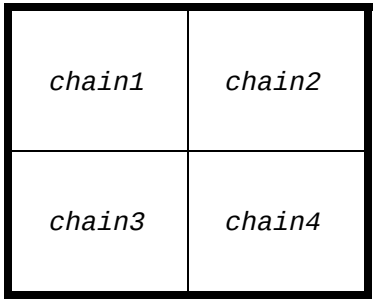

Figure 12.15 - 4up Screen Format

12.3.8.4 2up Format

Divides the screen in half vertically and expects two contributing sites. The left- and right-hand windows show *<chain1>* and *<chain2>* respectively, as illustrated in Figure 12.16:

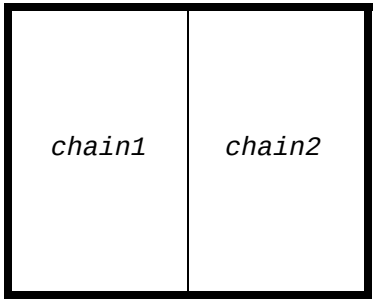

Figure 12.16 - 2up Screen Format

If no *audience* sites are specified, this two-way configuration does not need any audio mixing. It can be managed by one **svapatch** in each direction. There is no need to use **svaconfer** and a mixer unless you want to allow audio sites to connect at a later time.

12.3.8.5 1up Format

Gives the entire screen to one site. It is only useful in order to check that **svapatch** connections can be successfully established to and from the audio mixer from a single site. When such patches are connected, the single site is able to see itself, but not to hear itself; signals going into the audio input 1L of the site AVA-300 should not come out of the site ATV-300's audio output. This indicates that the site audio signal is being correctly removed from its custom audio mix.

CHAPTER 13 PVC Applications

Although SVCs are the preferred means of carrying video and audio data, there are certain circumstances when their use is not possible nor desired. For example, certain ATM switches do not yet support SVCs, or you may wish to direct video and audio streams to a non-SVA-compatible device or software application which does not fully support SVCs. To address these situations, the SVA software allows you to use PVCs to carry video and audio streams from an AVA-300 to a client application, ATV-300, or any other application or device.

All of the examples used in this section assume that the physical configuration described in Chapter 4 or Chapter 5 is used:

- The AVA-300 is attached to port `1A1` on switch `orion`.
- The ATV-300 is attached to port `1B1` on switch `orion`.

In order to work through the examples described in this chapter, a number of PVCs must be created. These PVCs are used to transport video and audio from the AVA-300 to the ATV-300.

To configure the video and audio PVCs, do the following:

1. Connect an ASCII terminal to the switch serial port or open a telnet session.
2. Login to the switch.
3. At the host prompt, type **`config`** to get to the `configuration` submenu.
4. At the configuration prompt, type **`vcc`** to get to the `vcc` submenu.
5. Configure the audio and video PVCs from the AVA-300 to the ATV-300, as follows:

```
new 1A1 0 150 1B1 0 150

new 1A1 0 151 1B1 0 151
```

The PVCs are unidirectional since the data needs only to flow from the AVA-300 to the ATV-300.

13.1 PVC Streams: avaconfig and atvconfig

The SVA utilities **avaconfig** and **atvconfig** are used to configure the AVA-300 and ATV-300 respectively to send and receive video and audio streams over PVCs. The AVA-300 may also be configured to send and receive serial streams.

avaconfig and **atvconfig** do not function if the referenced device is being managed.

avaconfig and **atvconfig** do not function in a CellChain environment. In order to control CellChain systems, the **svamgr** program must be used.

The AVA-300 and ATV-300 do not remember **avaconfig** or **atvconfig** configurations if power-cycled or reset. To create permanent PVC configurations, you must either use an External Configuration Module (see Section 13.2 or use managed PVC stream definitions in Section 13.3).

The example in the following section configures the AVA-300 to send one video and one audio stream on the PVCs created in the beginning of this chapter through to the ATV-300.

13.1.1 avaconfig

To configure the AVA-300 to send both a video and audio stream on the PVCs created, type the following:

```
svarun avaconfig -device orion:1A1 -video source atv vci 150 \
                 -audio source atv vci 151
```

The AVA-300 transmits a video stream on VCI 150 and an audio stream on VCI 151, which are the PVCs configured through to the ATV-300. The ATV-300 does not output analog video and audio at this point since it has not been configured with the details of the incoming streams.

The video and audio streams are assigned separate VCIs. Failing to do so causes the cells for different AAL5 PDUs to become interleaved and create reception errors at the ATV-300.

13.1.2 Serial Stream PVCs

The **avaconfig** command may be used to configure both PVC serial source and sink operation for an AVA-300. To demonstrate the operation of a single AVA-300 transmitting and receiving serial data, a *ForeRunner* switch may be used to loop back transmitted cells and send them back to the originating AVA-300.

To configure a non-managed PVC, do the following:

1. Connect an ASCII terminal to the switch serial port or open a telnet session.
2. Login to the switch.
3. At the host prompt, type **config** to get to the configuration submenu.
4. At the configuration prompt, type **vcc** to get to the vcc submenu.
5. Type the following at the prompt:

```
new 1A1 0 190 1A1 0 191
```

6. To transmit and receive serial data, configure the AVA-300 with the following two stream definitions:

```
svarun avaconfig -device orion:1A1 -serialin vci 190 -serialout vci 191
```

This configures the AVA-300 to transmit serial data cells using VCI 190 to the ATM switch, which then translates the VCI to 191 and sends the cells back to the AVA-300. Since the AVA-300 has been configured to receive serial data cells from the ATM network on VCI 191 and output them on its serial port, typing any characters at the AVA-300 serial port will cause them to be echoed.

By using multiple AVA-300 devices, you can set up serial stream connections across the ATM network. You can also use software on workstations or PCs to transmit and receive serial data from AVA-300 devices. This requires you to use a native ATM API such as XTI on UNIX or Winsock2 on Windows platforms. In both cases, the native ATM PVC interface is used and the programmer exchanges packets in the AVA-300 serial data format with the remote device.

Additional video and audio transmission/processing options are described in the online AvaVideoAttrParseArgs and AvaAudioAttrParseArgs manual pages.

13.1.3 atvconfig

To configure the ATV-300 to receive and process the video and audio streams from the AVA-300, type the following:

```
svarun atvconfig -device orion:1B1 -video source atv vci 150 \
                 -audio source atv vci 151
```

Additional video and audio reception/processing options are described in the online `AtvVideoAttrParseArgs` and `AtvAudioAttrParseArgs` manual pages.

13.2 External Configuration Modules

External Configuration Modules (ECMs) are used to store pre-canned PVC stream configurations. An AVA-300 or ATV-300 with an active ECM plugged in takes its configuration from the ECM when it is powered on. ECMs may be programmed remotely over the ATM network or additionally, in the case of the ATV-300, by using the GUI. See Section 13.4.5.

The ECM configurations detailed in this section assume the PVC configuration outlined in the beginning of this chapter.

13.2.1 Installing ECMs in the AVA-300 and ATV-300

To install ECMs in the AVA-300 and ATV-300, do the following:

1. Power-down the AVA-300 and ATV-300.
1. Plug an ECM into the AUX DIN Connector on the rear panel of the AVA-300.
2. Plug an ECM into the AUX DIN Connector on the rear panel of the ATV-300.
3. Power-up the AVA-300 and the ATV-300.
4. Reset the AVA-300 and ATV-300:

```
svarun avareset -device orion:1A1

svarun atvreset -device orion:1B1
```

In addition to the firmware version information, you will receive verification that the ECMs are installed.

5. Configure the ECMs by typing:

```
svarun avaconfig -ecm -device orion:1A1 -video source atv vci 150\
                  -audio source atv vci 151

svarun atvconfig -ecm -device orion:1B1 -video source atv vci 150\
                  -audio source atv vci 151
```

Resetting the AVA-300 and ATV-300 over the network results in their performing as though the ECMs are not present.

6. To cause the AVA-300 and ATV-300 to begin executing their ECM configurations, type the following:

```
svarun avareset -ecm -device orion:1A1

svarun atvreset -ecm -device orion:1B1
```

A variety of configurations may be used to configure stream definitions. Refer to the online **avaconfig** and **atvconfig** manual pages for additional information.

13.3 PVC Streams: Manager Configuration

It is possible to create PVC stream definitions in managed AVA-300 and ATV-300 devices. The advantage of doing so over using **avaconfig** and **atvconfig** is that the manager is able to maintain the AVA-300 and ATV-300 configuration across device reset conditions. Also, managed devices are capable of handling PVC and SVC streams concurrently.

If an AVA-300 is currently being managed, then it is possible to use **svc-rtds** to create/edit PVC audio and video streams. Chapter 9 describes how to create and edit SVC streams. The SVCs/PVCs Enabled button on the Video Edit Window and Audio Edit Window (see Section 9.2.6 and Section 9.2.7) may be toggled to PVCs Enabled to create a PVC stream.

An alternative to using **svc-rtds** is to directly edit the manager configuration file to define PVC streams. This must be done for ATV-300 systems since **svc-rtds** does not have the facility to create and edit sink stream definitions, nor is it able to edit serial source stream definitions.

The manager process should not be running while its configuration file is being edited.

To create the PVC configuration detailed in Section 13.1.1, add the following to the AVA-300 manager configuration file:

```
video
{
name videoinputpvc
source atv
vci 150
}
audio
{
name audioinputpvc
source atv
vci 151
}
```

To create the PVC configuration detailed in Section 13.1.3, add the following to the ATV-300 manager configuration file:

```
video
{
name videooutputpvc
source atv
```

```
vci 150
}
audio
{
name audiooutputpvc
source atv
vci 151
}
```

Streams in managed devices must be assigned per-device unique names.

The format of the manager configuration file is further detailed in the online **svadefaults** manual page.

When the AVA-300 and ATV-300 device managers are re-started, the above PVC configurations are activated. The ATV-300 receives and processes the audio and video PVC streams from the AVA-300.

To create the PVC configuration detailed in Section 13.1.1, add the following to the manager configuration file:

```
serialin
{
name serialinputpvc
vpi 0
vci 190
}
serialout
{
name serialoutputpvc
vpi 0
vci 191
}
```

The format of the manager configuration file is further detailed in the online **svadefaults** manual page.

13.4 ATV-300 Single-Stream Mode

`Single-stream mode` is provided as a simple method of creating one JPEG video stream and one audio stream from a specified AVA-300 to an ATV-300. Once you have established a connection, you may alter video stream characteristics such as the AVA-300 input channel being used, JPEG Q-factor, and frame rate.

Two varieties of single-stream mode are supported by the ATV-300:

Master mode Provides you with full control over the stream characteristics and causes reconfiguration of the AVA-300 when necessary.

Slave mode Assumes that another ATV-300 in master mode has configured the AVA-300 to send the video and audio streams over multicast PVCs, and simply configures the ATV-300 to receive those streams. The ATV-300 then dynamically adapts to changes in the stream characteristics caused by the master ATV-300.

Only one ATV-300 should be running in master mode against an AVA-300 at any one time. The number of slave mode ATV-300s which can receive the resulting streams is limited only by the number of multicast PVCs available.

13.4.1 Single-Stream Mode Initialization

To initialize Single-stream mode, do the following:

1. Select `Single-Stream Mode` from the ATV-300 `Main Menu`.
2. Specify the video standard being used at the AVA-300 inputs.

This need not be the same as the current ATV-300 video output mode.

Selecting `PAL` or `NTSC` causes `master mode` to be selected. You also have the option to select `Slave mode only`.

3. If in master mode, specify the VCIs for the control, video, and audio streams between the remote AVA-300 and the ATV-300, all of which must be distinct.

If you press the menu button at any point before the audio VCI is confirmed, the operation is abandoned and you are returned to the ATV-300 Main Menu.

When you select master single-stream mode, the specified control channel must be bidirectional, though the video and audio channels may only be from the AVA-300 to the ATV-300. Additionally, the VCIs for all three streams must be symmetrical between the ATV-300 and the AVA-300, that is, they must not be re-mapped to different values by the ATM network, and the PVCs' VPIs must all be 0.

In slave mode, the VCIs given for the video and audio streams specify two PVCs onto which the video and audio streams from the AVA-300 are being multicast (usually by a switch in the ATM network) to arrive at the ATV-300. The only restriction on those PVCs is that their VPIs must again be equal to 0.

13.4.2 Master Mode Initialization

If master mode is being used, a menu showing the default AVA-300 configuration is displayed, along with options to change the video and audio input configurations (between composite and S-Video and between mic and line level, respectively), to set the audio gain, and to adjust the peak data rate control on the video stream. The AVA-300 version and network interface type are noted to determine which video inputs are configurable and the maximum available data rate from the unit.

Only audio input 1 may be switched between mic and line level. Inputs 2 and 3 expect line level signals only.

When the correct configuration has been set up, selecting the first menu item sends it to the remote AVA-300. The best quality compressed video that the remote AVA-300 supports is used. If supported, this is Variable Q-Factor; if not, it is Q-Factor 20. The video stream is sampled from input 1; the audio stream is also sampled from input 1 at 48KHz.

If the ATV-300 is outputting PAL video and the AVA-300 is sampling NTSC, the video stream is centered on the display. Conversely, if the ATV-300 is outputting NTSC and the AVA-300 is sampling PAL, the AVA-300 is made to scale the stream to fit an NTSC display before sending it to the ATV-300. In either of these cases, the video may jerk every few seconds. This is normal and is due to the differing frame rates at the video source and the ATV-300's output.

13.4.3 Master Mode Operation

Pressing the menu button while in master single-stream mode brings up a different menu from the usual ATV-300 Main Menu, allowing you to change the Q-factor and frame rate of the video stream, and the video and audio channels from which the streams are being sampled. You may also save the current stream settings to an ECM, if one is attached, and the current user configuration, change the VCIs being used in order to communicate with a different AVA300, and exit single-stream mode to return to normal ATV-300 operation. It is not possible to switch directly from master mode to slave mode or vice-versa; in order to do this, you must select the Leave Single-Stream Mode option and then re-enter single-stream mode from the ATV-300 Main Menu.

If an AVA-300 is being used, an option to toggle interlacing on and off on the video stream is provided and a Picture Control option yields a menu allowing you to alter various characteristics of the video stream, including brightness, contrast, color saturation and hue of the video output and the volume of the audio output. The color of the video picture may also be inverted, the stream horizontally reflected, and the state of the text banner at the bottom of the display may be changed. A further option on this menu resets all video output settings and the audio volume to their default levels.

On the Remote, buttons 1-6 may be used to change the video and audio input being sampled. The audio inputs are paired with the video inputs such that selecting video input 1, 2 or 3 selects audio input 1, 2 or 3 respectively. Selecting video input 4, 5, or 6 also selects audio input 1, 2, or 3, respectively. If two AVA-300 video inputs were set up to be used as a single S-Video input at the configuration stage, pressing the higher channel button has no effect; for example, if inputs 2 and 5 are configured as S-Video, pressing button 2 selects that input and pressing button 5 has no effect.

13.4.4 Slave Mode Operation

Slave mode is a more limited form of single-stream mode allowing the ATV-300 to "listen in" to streams being controlled by another ATV-300 running in master mode. While the ATV300 is in slave mode it continuously adapts to changes in the stream configuration caused by the controlling master ATV-300, such as changes in Q-factor, interlace state, and image source type (PAL or NTSC). In the situation in which the slave ATV-300's video output mode is NTSC, the video stream arriving from the AVA-300 is in PAL format, and the master ATV-300 is in PAL mode, the stream is too large for the ATV-300 to display and an error message is displayed.

The slave mode Main Menu is a restricted version of the master mode menu, since it is not possible for you to alter the Q-factor, frame rate, interlace state, or input channel of the incoming streams. Options are provided, however, to adjust the volume level of the audio output, save the current stream settings and configuration, change AVA-300s, display or remove the text banner, and exit single-stream mode.

13.4.5 Installing an ECM to Control a Remote AVA-300

To install an ECM to control a remote AVA-300, do the following:

1. Plug the ECM into the AUX DIN Connector on the rear panel of the ATV-300.
2. Configure the remote AVA-300 (which does not need an ECM) using the Single-stream mode menu option.
3. Save your configuration using the Save Settings menu option.
4. Power-up the ATV-300.

   The ATV-300 reads the stored configuration that was saved, resets the remote AVA-300, and then configures the remote AVA-300 with the settings stored in the ECM.

If the AVA-300 is power-cycled, the ATV-300 automatically reconfigures the AVA-300 when it comes back on-line.

You can only configure one video and one audio stream into a remote AVA-300 using this method. Also, as is the case with single stream mode, both a control (duplex), audio (simplex) and video (simplex) PVC must be open between the AVA-300 and ATV-300. If not, the ATV-300 assumes there is a problem and continually tries to reset the AVA-300.

CHAPTER 14 Troubleshooting

This chapter describes frequently-encountered setbacks and how to resolve them.

14.1 Can a single ATV-300 drive multiple monitors?

The ATV-300 is only able to drive a single S-Video and a single composite signal concurrently. Units which have multiple composite outputs should not be used to drive multiple monitors. A dedicated video amplifier must be used if multiple composite outputs are required.

14.2 Why do I get a poor-quality video signal from my ATV-300?

There are a number of factors you can check. First, look at your video source. If you are using a low-quality video tape as opposed to a laserdisk, overall video quality may suffer. Lower-quality video cameras can have the same affect. Connect your video source directly to your TV to gauge source quality.

Poor quality video cables and connectors can also degrade your video signal.

Finally, check your video stream settings. Q-factor / Variable Q-factor, bandwidth limitations, frame rate, and interlace-enabled can also affect your video signal.

14.3 Why does my ATV-300 audio distort?

Selecting `High` audio gain may cause loud audio signals to “clip” when they are sampled by the AVA-300, resulting in distortion of the audio reproduced at the ATV-300. A lower audio gain setting should be used when this happens.

Earlier versions of the AVA-300 may have different audio chips. If audio signals consistently sound distorted, it may be necessary for you to upgrade your AVA-300 firmware to the latest version. Also, AVA-300s with firmware versions earlier than 4.3 may exhibit consistent audio distortion.

14.4 Why do I get poor-quality workstation video/audio playback?

Different workstations and PCs are limited in their ability to process AVA video and audio. A common mistake is to overload the computer. Check the CPU usage on your machine if you suspect this is the case. Decompression video hardware can alleviate some of the processing overhead. Changing your stream settings may also be required.

14.5 What is an ATV-300 video plane?

The ATV-300 can display overlapping video streams. You can specify which video stream is "on top of" another by specifying a greater video plane number for the "top" (or frontmost) stream. This is commonly referred to as PIP (for picture-in-picture). The smaller picture may cover only 12% of the screen.

14.6 Is my AVA-200 compatible with the ATV-300?

AVA-200 audio is fully compatible. AVA-200 video is only compatible if the AVA-200 unit has the JPEG option fitted. Use the **`avareset`** program to check this. Also, AVA-200 JPEG video is not capable of transmitting interlaced streams which leads to a loss of vertical resolution.

14.7 Why am I having trouble entering Single-Stream Mode?

In the rare situation that the ATV-300's default video mode is changed after saving the single-stream mode settings, the unit detects the change at the next reset or power-up and does not attempt to enter single-stream mode. In this case, however, the ATV-300's stream configuration is still restored from the ECM.

14.8 Why am I losing video stream attributes in Master Single-Stream Mode when using an ECM?

In order to preserve the settings for brightness, contrast, color saturation, hue, and inversion, they must be written to an ECM using `Save Stream Settings`. The volume level and banner state are parameters local to the ATV-300 and are saved under `Save User Preferences`.

14.9 Why does my ATV-300 exit Single-Stream Mode?

While the ATV-300 is in master single-stream mode, it continuously monitors the streams arriving from the AVA-300. If the audio stream stops for longer than approximately 3 seconds, the ATV-300 assumes that the AVA-300 has been reset. It automatically attempts to re-contact the AVA-300, continuing to do so every 3 seconds until it is successful, or you change to another AVA-300, or it exits single-stream mode. A side-effect is that while the ATV-300 is attempting to make contact, the GUI may not respond for a period of about a second.

14.10 Why is my video signal displayed in monochrome from my ATV-300?

Your video jack may be plugged into an S-Video socket rather than a composite socket. Try experimenting with the video jack in different ATV-300 video connectors.

14.11 Why do I receive a blank or scrolling image when I power-up my ATV-300?

You may have a PAL / NTSC configuration error. Power cycle the ATV-300. Wait for 10 seconds. Press ✻ for PAL or # for NTSC on the Remote. The new configuration will be remembered automatically. If your image is blank at this point, check your cable connections.

14.12 How can I check that my AVA-300 is broken?

The easiest way to see whether or not your AVA-300 is broken is to connect it to a known, working ATV-300 and run the AVA-300 in `Single-stream mode`. If the ATV-300 cannot control the AVA-300, chances are that your AVA-300 is not functioning properly.

14.13 How can I check that my ATV-300 is broken?

The `Single-stream mode` test described above is a good indicator. Use a known, working AVA-300.

APPENDIX A User-Directed SPVCs

The SVA-5.1 software includes a feature in which the management code running on the workstation or PC is able to contact a remote AVA-300 or ATV-300 by knowing the IP address of the remote switch and the number of the port that it is connected to. The SVA software uses a *ForeThought* facility known as User-Directed Soft Permanent Virtual Circuits (SPVCs). This facility allows client applications using a native ATM API to establish an SVC to a particular switch port on the network without involving the remote attached device in any signalling interaction.

Many of the SVA commands have a **`-device`** option that specifies the remote AVA-300 or ATV-300. The full syntax allows you to specify the IP address of the destination switch and the port to which the device is attached. The IP address may either be in dot notation form such as `169.144.68.11`, or may be the associated domain name.

The SVA software uses this IP address to query, using SNMP, the NSAP prefix of the remote switch. Therefore, there must be IP connectivity between the client machine and the target switch; in addition, the client must be able to query the remote MIB. The switch port is specified using the standard FORE Systems notation (`1a1`, `1a2`, etc.,) which is detailed in the appropriate *ForeRunner* switch documentation.

In order to use the User-Directed SPVC facility, the switch to which the remote AVA-300 and / or ATV-300 is attached must be running *ForeThought* 4.1.x software or later.

You may use non-FORE Systems switches between the client and the remote *ForeRunner* switch to which the target device is attached, as long as they transparently pass through the SPVC Information Element component of the connection establishment request.

You may still use standard PVC configurations as supported in earlier SVA software versions. For more information, please refer to the appropriate Appendices and the the on-line Manual and Reference pages.

APPENDIX B PVC Control Channels

Many of the tools in the SVA software release require ATM circuits to be open to the remote device in order to function. The User-Directed SPVC facility makes this easy by allowing you to specify the remote device by naming the switch and the port number to which the remote device (or CellChain) is attached. The application then uses the User-Directed SPVC function to automatically create the required ATM circuit(s).

However, the User-Directed SPVC facility currently requires that your network be based primarily on FORE Systems equipment with a suitable software version.

Refer to Appendix A if you are not sure if your network supports User-Directed SPVCs. If this facility is not available, then you must use the application in PVC control channel mode.

The on-line documentation details how each command should be used in PVC mode. In order to illustrate the procedure, an example using the `avareset` program follows below.

The following example assumes that you are using the AVA-300 configuration described in Chapter 4 (UNIX) or Chapter 5 (Windows). It is also assumed that the control workstation or PC is attached to port `1A2` on the same switch.

To use the `avareset` program, a bi-directional control PVC must be established between the AVA-300 and the workstation. Since the channel is bi-directional, you must configure two uni-directional channels on the switch (when using a *ForeRunner* ATM switch).

To configure the AVA-300 control channel on a *ForeRunner* ATM switch, do the following:

1. Connect an ASCII terminal to the switch serial port or open a telnet session.
2. Login to the switch.
3. At the local host prompt, type **`config`** to get to the `configuration` submenu.
4. At the configuration prompt, type **`vcc`** to get to the `vcc` submenu.
5. Configure the control channel in both directions, as in this example:

```
new 1A1 0 130 1A2 0 130

new 1A2 0 130 1A1 0 130
```

where 0 is the VPI and 130 is the VCI.

Do not allocate VCIs 0-31 since these are reserved by the ATM Forum and International Telecommunication Union (ITU).

If you are using a switch from another manufacturer, refer to its accompanying User's Manual to configure PVCs.

6. Once the control channel has been configured, use the **avareset** command to reset the remote AVA-300 as follows:

```
svarun avareset -vci 130
```

If the control channel is configured properly, the system displays version information similar to the following:

```
Hardware:300.6
Firmware:4.3
Serial No:96030045
Interface:ATM 155 Mbps
ECM:Yes
Release:Forethought 5.0.0 (SVA sva50a4)
```

If the control channel is not configured properly, the system displays the following error message:

```
avareset: failed to contact AVA ... retry
```

If you receive this error message, double-check your connections and/or your configuration syntax.

Other SVA device configuration programs operate similarly to `avareset`. AVA/ATV device managers require extra PVCs to be configured. These are detailed in Appendix C and Appendix D.

APPENDIX C svamgr: PVC Control Channels

This appendix describes how to manage AVA-300 and ATV-300 systems using PVC control channels as opposed to User-Directed SPVCs which are described in earlier chapters.

NOTE AVA-300s must have firmware version 4.3 or later in order for the configuration described in this appendix to work.

NOTE ATV-300s must have firmware version 300.14 or later in order for the configuration described in this appendix to work.

NOTE The examples worked through in this appendix are brief. They are intended to be used in conjunction with Chapter 4 and Chapter 5. These chapters describe in greater detail the interaction of device managers with the rest of the SVA software.

NOTE This appendix assumes that the AVA-300 and ATV-300 are attached to ports `1A1` and `1B1` respectively on the same *ForeRunner* switch. Also assumed is that the control workstation/PC is attached to port `1A2` on the same switch.

C.1 Setting Up the AVA-300 Manager

Each AVA-300 manager requires three bi-directional PVCs to be established between it and the remote device. These PVCs are referred to as the control, signalling, and ILMI PVCs.

To configure the PVCs on a *ForeRunner* ATM switch, do the following:

1. Connect an ASCII terminal to the switch serial port or open a telnet session.
2. Login to the switch.
3. At the local host prompt, type **`config`** to get to the `configuration` submenu.
4. At the configuration prompt, type **`vcc`** to get to the `vcc` submenu.
5. Configure the control PVC in both directions, as in this example:

```
new 1A1 0 130 1A2 0 130

new 1A2 0 130 1A1 0 130
```

6. Configure the signalling PVC in both directions, as in this example:

```
new 1A1 0 131 1A2 0 131

new 1A2 0 131 1A1 0 131
```

7. Configure the ILMI PVC in both directions, as in this example:

```
new 1A1 0 132 1A2 0 132

new 1A2 0 132 1A1 0 132
```

The above PVCs use example VCI values. The numbers allocated do not need to be consecutive, but this will simplify the manager command line invocation.

The PVCs must have the same value VCI at each end of the circuit.

Do not allocate VCIs 0-31 since these are reserved by the ATM Forum and International Telecommunication Union (ITU).

To start the AVA-300 manager, type the following at the workstation / PC which is to run the manager:

```
svarun -name ava1 -vci 130 -univci 131 -ilmivci 132
```

Since consecutive VCIs have been allocated in this example setup, the following format is equivalent:

```
svarun -name ava1 -univci 130
```

Please refer to the **svamgr** on-line manual page for more information on the options that are available when running SVA device managers.

The following message lets you know that the **manager** application is running:

```
(Date and time): svamgr: started on host "<hostname>"
```

In addition, a list of available video and audio streams follows the message.

You have started the AVA-300 manager and registered it with the trader.

C.2 Setting Up the ATV-300 Manager

Each ATV-300 manager requires three bi-directional PVCs to be established between it and the remote device. These PVCs are referred to as the control, signalling, and ILMI PVCs.

To configure the PVCs on a *ForeRunner* ATM switch, do the following:

1. Connect an ASCII terminal to the switch serial port or open a telnet session.
2. Login to the switch.
3. At the local host prompt, type **`config`** to get to the `configuration` submenu.
4. At the configuration prompt, type **`vcc`** to get to the `vcc` submenu.
5. Configure the control PVC in both directions, as in this example:

```
new 1B1 0 140 1A2 0 140

new 1A2 0 140 1B1 0 140
```

6. Configure the signalling PVC in both directions, as in this example:

```
new 1B1 0 141 1A2 0 141

new 1A2 0 141 1B1 0 141
```

7. Configure the ILMI PVC in both directions, as in this example:

```
new 1B1 0 142 1A2 0 142

new 1A2 0 142 1B1 0 142
```

The above PVCs use example VCI values. The numbers allocated do not need to be consecutive, but this will simplify the manager command line invocation.

The PVCs must have the same value VCI at each end of the circuit.

Do not allocate VCIs 0-31 since these are reserved by the ATM Forum and International Telecommunication Union (ITU).

To start the ATV-300 manager, type the following at the workstation / PC which is to run the manager:

```
svarun -name atv1 -vci 140 -univci 141 -ilmivci 142
```

Since consecutive VCIs have been allocated in this example setup, the following format is equivalent:

```
svarun -name ava1 -univci 140
```

Please refer to the **svamgr** on-line manual page for more information on the options that are available when running SVA device managers.

The following message lets you know that the **manager** application is running:

```
(Date and time): svamgr: started on host "<hostname>"
```

You have started the ATV-300 manager and registered it with the trader.

APPENDIX D svamgr: Early AVA-300 Units

This appendix describes how to manage early AVA-300 firmware version units.

NOTE AVA-300s with firmware versions less than 4.3 must be managed using the process described in this appendix.

NOTE AVA-200s with firmware version 2.9 may be managed using the process described in this appendix.

NOTE The example worked through in this appendix is brief. It is intended to be used in conjunction with Chapter 4 and Chapter 5. These chapters describe in greater detail the interaction of device managers with the rest of the SVA software.

NOTE This appendix assumes that the AVA and control workstation / PC are attached to ports 1A1 and 1A2 respectively on the same *ForeRunner* switch.

D.1 Setting Up the AVA Manager

Each AVA manager requires three bi-directional PVCs to be established between it and the remote device. These PVCs are referred to as the control, signalling, and ILMI PVCs.

To configure the PVCs on a *ForeRunner* ATM switch, do the following:

1. Connect an ASCII terminal to the switch serial port or open a telnet session.
2. Login to the switch.
3. At the local host prompt, type **`config`** to get to the `configuration` submenu.
4. At the configuration prompt, type **`vcc`** to get to the `vcc` submenu.
5. Configure the control PVC in both directions, as in this example:

```
new 1A1 0 130 1A2 0 130

new 1A2 0 130 1A1 0 130
```

The PVCs must have the same value VCI at each end of the circuit.

Do not allocate VCIs 0-31 since these are reserved by the ATM Forum and International Telecommunication Union (ITU).

6. Configure the signalling PVC in both directions, as in this example:

```
new 1A1 0 37 1A2 0 131

new 1A2 0 131 1A1 0 37
```

The UNI signalling channel must be configured to VCI 37 at the AVA port.

7. Configure the ILMI PVC in both directions, as in this example:

```
new 1A1 0 48 1A2 0 132

new 1A2 0 132 1A1 0 48
```

The ILMI signalling channel must be configured to VCI 48 at the AVA port.

To start the AVA manager, type the following at the workstation/PC which is to run the manager:

```
svarun -avamgr -name ava1 -vci 130 -univci 131 -ilmivci 132
```

Please refer to the **svamgr** on-line manual page for more information on the options that are available when running SVA device managers.

The following message lets you know that the **manager** application is running:

```
(Date and time): avamgr: started on host "<hostname>"
```

In addition, a list of available video and audio streams follows the message.

You have started the AVA manager and registered it with the trader.

APPENDIX E Windows NT/95/98: Manual De-install

If you have followed the software de-installation procedures in Section 5.3 and are unsuccessful, a manual de-installation may be required.

CAUTION

It is extremely important that you be familiar with the Windows NT/95/98 platforms when performing the operations detailed in this appendix. If not, consult your systems administrator for assistance or you risk placing your machine in an unusable state.

To perform a manual de-installation, do the following:

Use `regedit.exe` to remove the following keys from the registry:

In `HKEY_CLASSES_ROOT:`

`.sva` (NT only)

`svactrlfile` (NT only)

In `HKEY_LOCAL_MACHINE:`

`Software/Microsoft/Windows/CurrentVersion/UnInstall/ForeThought SVA-5.1`

`Software/Microsoft/Windows/CurrentVersion/App Paths/svc-rtds.exe`

`Software/FORE Systems, Inc./ForeThought SVA-5.1` (and all subkeys)

In Windows NT only:

Use the `Environment` tab of the `System Properties` box to remove the `NRLTRADERS` variable and remove the SVA directory from the `PATH` variable.

In Windows 95/98 only:

Remove the `NRLTRADERS` line from `autoexec.bat` and the SVA `bin` directory from the `PATH` line.

In Windows Explorer, remove the following files & directories:

The location of these files is subject to the values you specified at install time; the locations shown below are the defaults. If you installed the SVA software or Netscape in another location, you must go to that location.

```
c:/Program Files/FORE/SVA-5.1
%windir%/profiles/*/Start Menu/Programs/ForeThought SVA-5.1
c:/Program Files/Netscape/Communicator/Plugins/npnpatch.dll
c:/Program Files/Netscape/Navigator/Plugins/npnpatch.dll
c:/Program Files/Microsoft Internet/Plugins/npnpatch.dll
c:/Program Files/Plus!/Microsoft Internet/Plugins/npnpatch.dll
```

The * in the second line above is shorthand for all users, e.g., "`administrator`," "`user`," etc.

APPENDIX F Manager Downlink

In addition to the use of ONC RPC to communicate between managers and their clients, managers maintain a downlink to each of their clients. The downlink is used to inform clients of changes in the configuration of video or audio streams. This allows clients to dynamically adjust their presentation of these streams to match the current configuration. This is particularly important when one application is editing a stream which is being received by applications running on other workstations. The edits made by the editing application are immediately propagated to the other applications over the downlink.

The downlink is implemented using the Internet UDP/IP protocol. The manager sends downlink messages to each of its clients using UDP datagrams.

Since this scheme does not scale well to large networks, an alternative ATM multicast SVC downlink implementation is also supported.

The use of a multicast connection means that the manager can support a very large number of clients since it does not have to maintain a separate network connection to each one. In addition, traffic through the network is kept to a minimum.

An environment variable **SVA_ATM_DOWNLINK** can be set to On to force the use of the ATM downlink. If the manager fails to establish a multicast SVC connection for the downlink to a particular client application, it falls back to using the Internet UDP/IP protocol instead. This means that it is possible to run client applications on workstations which are not connected to an ATM network; such applications cannot receive video or audio streams, but can manage AVA-300s and ATV-300s, and edit stream definitions.

Both native ATM and UDP downlinks can be serviced concurrently by a single manager. The UDP downlink is also used when SVCs are not supported, such as in a PVC-only ATM network.

Glossary

AAL (ATM Adaptation Layer) - the AAL divides the user information into segments suitable for packaging into a series of ATM cells. There are several types of AALs in use.

ANSI (American National Standards Institute) - a private organization that coordinates setting and approving US standards. It also represents the United States in the International Standards Organization.

ATM (Asynchronous Transfer Mode) - a transfer mode in which the information is organized into cells. It is asynchronous in the sense that the recurrence of cells containing information from an individual user is not necessarily periodic.

ATM Forum - a non-profit international industry consortium whose purpose is to accelerate rapid convergence on interoperability specifications based on international standards and promote industry cooperation.

ATV-300 - a dedicated unit for receiving and decoding the digital streams generated by an AVA-300 or other compatible device. The unit is suitable for situations where high-quality audio and video output signals are required or where it would be unsuitable to place a desktop computer.

AVA-300 - digitizes audio and video signals for direct transmission onto an ATM network. The digital streams generated are capable of being received and processed by workstations and ATV-300s.

Brightness - the amount of white (as compared to the amount of red, green and blue) in a color. On a monitor this translates into the amount of pure light in a color. For light sources and signals that transmit color, the brightness component is also called luminance.

Cell - an ATM Layer protocol data unit (PDU).

Cell Header - ATM Layer protocol control information.

Chrominance - the color component of a composite signal or S-Video signal. Chrominance also refers to the color component of any image, as opposed to its grayscale value or luminance.

Composite - a composite video signal is one that combines the chrominance, luminance and sync signals on a single wire. The device that receives the composite signal must decode the various kinds of information in order to display an image.

Contrast - the ratio between the maximum and minimum luminance (brightness) values of a display.

ECM - the External Configuration Module is an option for the AVA-300 and ATV-300 that allows you to configure a permanent start-up video and audio stream configuration. If power is to the unit is lost and then restored, it will start executing with the configuration stored in its ECM. The ECM contents may be changed over the ATM network.

Frame Buffer - memory used to store an array of graphic image data. Each element of the array corresponds to one or more pixels in a video display.

JPEG - the Joint Photographic Experts Group (JPEG) gives its name to an ISO method for still image compression. The amount of image compression is a function of a chosen quality factor, the amount of high-frequency detail contained in an image, and the viewer's tolerance to the resulting visual loss.

Luminance - a measure of brightness, the monochrome component of a composite or S-Video signal.

MTU (Maximum Transmission Unit) - the largest unit of data that can be sent over a type of physical medium.

NTSC (National Television Systems Committee) - a color-encoding and decoding system for the transmission of video signals, which when square-pixel sampled is 640 pixels wide by 480 pixels high at 60 fields / second or Hz. This system is used in the United States and Japan.

PAL (Phase Alternate Lines) - a color-encoding and decoding system for the transmission of video signals, which when square-pixel sampled is 768 pixels wide by 576 pixels high at 50 fields / second or Hz. This system is used in most European countries.

Pixel - a picture element that is the basic unit of a graphic display. A location on the monitor screen that can be selectively turned on or off.

PVC (Permanent Virtual Circuit (or Channel)) - a circuit or channel through an ATM network provisioned by a carrier between two endpoints; used for dedicated long-term information transport between locations.

Rate-Matching - dynamically adjusting the frequency of a sampled media stream (usually by interpolation or decimation), to correct for slight differences between original sampling rate and playout device rate due to different, unsynchonized clocks.

SECAM (Sequential Color and Memory) - a color-encoding and decoding system for the transmission of video signals. This system is used in France and the former Soviet Republics.

SVA - the control software environment for the AVA-300 and ATV-300 that runs on a range of popular workstations. It is composed of two logical components, **`svc-rtds`** and **`svc-mgr`**, and allows you to manage the display characteristics and interconnections of any number of devices at one time.

svc-rtds - SVC Real-time Display System. Part of the SVA software distribution that allows you to edit and display live, TV-quality, AVA-300-generated video streams on a stock workstation.

S-Video - "Separate" Video is a physical video interface that carries the luminance and chrominance information separately. The S-Video signal is the same as the composite video signal, except that the Y signal (luminance) is on a separate wire from the U-V signal.

UNI (User-Network Interface) - the physical and electrical demarcation point between the user and the public network service provider.

VCI (Virtual Channel Identifier) - the address or label of a virtual channel (VC).

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