grass valley

Acappella
ROUTING SYSTEM

Instruction Manual

SOFTWARE VERSION 3.0

071830005
APRIL 2008

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Including its implementation, meets the requirements of the standard:

ISO 9001:2000

Scope:
The design, manufacture and support of video hardware and software products and related systems.

This Certificate is valid until: June 14, 2009
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Certified for the first time: June 14, 2000

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Grass Valley Web Site

The www.thomsongrassvalley.com web site offers the following:

Online User Documentation — Current versions of product catalogs, brochures, data sheets, ordering guides, planning guides, manuals, and release notes in .pdf format can be downloaded.

FAQ Database — Solutions to problems and troubleshooting efforts can be found by searching our Frequently Asked Questions (FAQ) database.

Software Downloads — Download software updates, drivers, and patches.

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END-OF-LIFE PRODUCT RECYCLING NOTICE

Grass Valley's innovation and excellence in product design also extends to the programs we've established to manage the recycling of our products. Grass Valley has developed a comprehensive end-of-life product take back program for recycle or disposal of end-of-life products. Our program meets the requirements of the European Union's WEEE Directive, the United States Environmental Protection Agency, and U.S. state and local agencies.

Grass Valley's end-of-life product take back program assures proper disposal by use of Best Available Technology. This program accepts any Grass Valley branded equipment. Upon request, a Certificate of Recycling or a Certificate of Destruction, depending on the ultimate disposition of the product, can be sent to the requester.

Grass Valley will be responsible for all costs associated with recycling and disposal, including freight. However, you are responsible for the removal of the equipment from your facility and packing the equipment to make it ready for pickup.

For further information on the Grass Valley product take back system please contact Grass Valley at + 800 80 80 20 20 or +33 1 48 25 20 20 from most other countries. In the U.S. and Canada please call 800-547-8949 or 530-478-4148, and ask to be connected to the EH&S Department. Additional information concerning the program can be found at: www.thomsongrassvalley.com/environment

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Contents

Preface 9

About This Manual 9

Safety Summary

Safety Terms and Symbols 11

Terms in this Manual 11

Terms on the Product 11

Symbols on the Product 12

Warnings 12

Cautions 13

Regulatory Notices

Certifications and Compliances 15

FCC Emission Control 15

Canadian EMC Notice of Compliance 15

EN55103-1/2 Class A Warning 16

Safety Certification 16

Section 1 — System Overview 17

Introduction 17

Features 17

Hardware Description 18

Front Panels 18

Backplanes 21

Video Configuration (Digital and Analog) 21

Digital Audio Configuration 23

Analog Audio Configuration 26

Acappella Router and Remote Panel Variations 27

Section 2 — Installation 29

Acappella Frame Rack Installation 29

Remote Panel Rack Installation 30

Acappella Cabling 31

Analog Audio Pinouts 33

Control Cabling 34

Ethernet Cabling 34

Reference Cabling 35

Remote Panel Cabling 36

Power 36

Digital Frames 36

Analog Frames 37

Defaults for Plug and Play 37

Section 3 — Panel Operation 39

Enable Button 39
Enable Button Action 39
Protect Button 40
Protect Button Action 40
Source Button 41
Single Source Button Action 41
Multiple Source Button Action (Local Panel) 42
Destination Button 42
Single Destination Button Action 42
Multiple Destination Button Action 42
Level Button 43
Single Level Button Action 43
Multi-Level Switching 44

Section 4 — Software and Configuration 45

Network Configuration 45
PC Requirements 45
PC Network Configuration 45
Default System IP Addresses 46
Software 46
Software Installation 46
NetConfig 50
NetConfig Manual 52
Setting IP Addresses 52
Load Software 54
Web Browser Interface 56
Acappella Configuration Pages 57
Router Configuration 57
Router Status Page 57
Router System Configuration Page 58
Router Network Configuration Page 60
Router Video Configuration Page 62
Router AES Configuration Page 63
Router Remote Configuration Page 67
Router Reference Configuration Page 73
Router Factory Defaults Page 75
Acap Router Applications Page 76
Maintenance Page 77
Remote Panel Configuration 78
Panel Description Page 78
Remote Panel System Configuration 79
Remote Panel Network Configuration 81
Saving Settings 82
Remote Panel Factory Defaults 83
Remote Panel Acappella Destination Configuration 84
Remote Panel Router Configuration 85
External System Control of Acappella 86
Serial Control 86
Encore Control 87

Section 5 — Maintenance and Troubleshooting 89
Field Replaceable Units 89
Troubleshooting 89
Check Connections 89
Check Inputs 89
Problems and Solutions 90
Switching Problems 90
Switching Latency 90
SNMP Monitoring 90
SNMP Managers 90
NetCentral SNMP Manager 91
Third Party SNMP Managers 91
Acappella SNMP Agent Licensing 91
Monitored Acappella Matrix Parameters 93
Acappella Matrix Traps 94
Source and Destination Signal Loss Configuration 94

Appendix A — Specifications 99
Mechanical and Power 99
Video Specifications 99
Video Reference 99
SD Digital Video 100
Wideband Digital Video 100
Analog Video 101
Audio Specifications 102
AES Digital Audio 102
Analog Audio 102

Appendix B — Native Protocol 105

Index 107

Preface

About This Manual

This manual provides installation, configuration, operation, safety, and regulatory information for the Acappella small router products.

Safety Summary

Read and follow the important safety information below, noting especially those instructions related to risk of fire, electric shock or injury to persons. Additional specific warnings not listed here may be found throughout the manual.

WARNING Any instructions in this manual that require opening the equipment cover or enclosure are for use by qualified service personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

Safety Terms and Symbols

Terms in this Manual

Safety-related statements may appear in this manual in the following form:

WARNING Warning statements identify conditions or practices that may result in personal injury or loss of life.

CAUTION Caution statements identify conditions or practices that may result in damage to equipment or other property, or which may cause equipment crucial to your business environment to become temporarily non-operational.

Terms on the Product

The following terms may appear on the product:

DANGER — A personal injury hazard is immediately accessible as you read the marking.

WARNING — A personal injury hazard exists but is not immediately accessible as you read the marking.

CAUTION — A hazard to property, product, and other equipment is present.

Symbols on the Product

The following symbols may appear on the product:

Indicates that dangerous high voltage is present within the equipment enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

Indicates that user, operator or service technician should refer to product manual(s) for important operating, maintenance, or service instructions.

This is a prompt to note fuse rating when replacing fuse(s). The fuse referenced in the text must be replaced with one having the ratings indicated.

Identifies a protective grounding terminal which must be connected to earth ground prior to making any other equipment connections.

Identifies an external protective grounding terminal which may be connected to earth ground as a supplement to an internal grounding terminal.

Indicates that static sensitive components are present which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

Warnings

The following warning statements identify conditions or practices that can result in personal injury or loss of life.

Dangerous voltage or current may be present — Disconnect power and remove battery (if applicable) before removing protective panels, soldering, or replacing components.

Do not service alone — Do not internally service this product unless another person capable of rendering first aid and resuscitation is present.

Remove jewelry — Prior to servicing, remove jewelry such as rings, watches, and other metallic objects.

Avoid exposed circuitry — Do not touch exposed connections, components or circuitry when power is present.

Use proper power cord — Use only the power cord supplied or specified for this product.

Ground product — Connect the grounding conductor of the power cord to earth ground.

Operate only with covers and enclosure panels in place — Do not operate this product when covers or enclosure panels are removed.

Use correct fuse — Use only the fuse type and rating specified for this product.

Use only in dry environment — Do not operate in wet or damp conditions.

Use only in non-explosive environment — Do not operate this product in an explosive atmosphere.

High leakage current may be present — Earth connection of product is essential before connecting power.

Dual power supplies may be present — Be certain to plug each power supply cord into a separate branch circuit employing a separate service ground. Disconnect both power supply cords prior to servicing.

Double pole neutral fusing — Disconnect mains power prior to servicing.

Use proper lift points — Do not use door latches to lift or move equipment.

Avoid mechanical hazards — Allow all rotating devices to come to a stop before servicing.

Cautions

The following caution statements identify conditions or practices that can result in damage to equipment or other property

Use correct power source — Do not operate this product from a power source that applies more than the voltage specified for the product.

Use correct voltage setting — If this product lacks auto-ranging power supplies, before applying power ensure that the each power supply is set to match the power source.

Provide proper ventilation — To prevent product overheating, provide equipment ventilation in accordance with installation instructions.

Use anti-static procedures — Static sensitive components are present which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

Do not operate with suspected equipment failure — If you suspect product damage or equipment failure, have the equipment inspected by qualified service personnel.

Ensure mains disconnect — If mains switch is not provided, the power cord(s) of this equipment provide the means of disconnection. The socket outlet must be installed near the equipment and must be easily accessible. Verify that all mains power is disconnected before installing or removing power supplies and/or options.

Route cable properly — Route power cords and other cables so that they ar not likely to be damaged. Properly support heavy cable bundles to avoid connector damage.

Use correct power supply cords — Power cords for this equipment, if provided, meet all North American electrical codes. Operation of this equipment at voltages exceeding 130 VAC requires power supply cords which comply with NEMA configurations. International power cords, if provided, have the approval of the country of use.

Use correct replacement battery — This product may contain batteries. To reduce the risk of explosion, check polarity and replace only with the same or equivalent type recommended by manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Troubleshoot only to board level — Circuit boards in this product are densely populated with surface mount technology (SMT) components and application specific integrated circuits (ASICS). As a result, circuit board repair at the component level is very difficult in the field, if not impossible. For warranty compliance, do not troubleshoot systems beyond the board level.

Regulatory Notices

Certifications and Compliances

FCC Emission Control

This equipment has 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 this 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. Changes or modifications not expressly approved by Grass Valley can affect emission compliance and could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules (E4 environment). Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable operation.

Canadian EMC Notice of Compliance

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

Le présent appareil numérique n'emet pas de bruits radioélectriques dépassant les limites applicables aux appareils numeriques de la classe A préscrites dans le Règlement sur le brouillage radioélectrique édicte par le ministère des Communications du Canada.

EN55103-1/2 Class A Warning

For products that comply with Class A. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

This product has been evaluated for Electromagnetic Compatibility under the EN 55103-1/2 standards for Emissions and Immunity and meets the requirements for E4 environment.

Safety Certification

This product's components have been evaluated and meet the Safety Certification Standards listed in Table 1.

Table 1. Safety Certification Standards

Component	Standard	Designed/Tested for compliance with:
Acappella router Acappella Remote panel	ANSI/UL 60950-1-2002	Safety of Information Technology Equipment, including Electrical Business Equipment (First edition)
	IEC 60950	Safety of Information Technology Equipment, including Electrical Business Equipment (First edition, 2001).
	CAN/CSA C22.2 N0. 60950-1-03 First edition	Safety of Information Technology Equipment, including Electrical Business Equipment.
	BS EN60950-2000	

Section 1

System Overview

Introduction

The Acappella line of small, single- and mixed-format routers is designed for myriad broadcast and production settings, including small studios, sports arenas, and space-constrained environments such as mobile production trucks. The Acappella matrix frame is only 1 RU, and has a 14-inch (34.5 cm) depth for easy in-rack cabling.

The Acappella line supports local and remote control panels, via a built-in Ethernet connection. It also includes many control panel operational modes, such as destination gang, chop, panel enable, and destination protect.

An Acappella router comes ready to operate right out of the box—just plug it in and you can get right to work. It also supports Web browser based configuration for fast, easy customization.

An Acappella router and remote control panels can also be integrated into a Grass Valley Prelude or Encore routing system. This manual covers standalone Acappella systems. Refer to the separate Prelude and/or Encore documentation sets for system integration information.

Features

- Single- or multi-format models, supporting:
  - Wideband HD digital video from 4.0 Mb/s to 1.5 Gb/s
  - SD digital video
  - ASI data
  - AES/EBU digital audio
  - Analog Video (NTSC, PAL)
  - Analog Audio (balanced),
- Many different frames available, ranging from 16 x 16 to 8 x 4,

- Clean synchronous digital audio switching,
- Redundant Power Supplies,
- Integrated Local Panel,
- Many different Remote Panels, ranging from 16 x 16 to 8 x 1,
- Standard Ethernet interface,
- Easy customization via Web browser or Grass Valley NetConfig software,
- Feature-rich digital audio processing, including sum, swap, invert, silence generation,
- Standard RS-422 serial port for computer control, automation interface, and operations with Grass Valley Jupiter and Series 7000 systems,
- Native Protocol support,
- SNMP support, and
- Upgrade path for Ethernet operation with Grass Valley Prelude and Encore systems.

Hardware Description

Front Panels

The front of the Acappella frame and the related remote panels will vary with the configuration of the system. All Acappella frames can be ordered with a local panel installed in the frame. When a local panel is ordered, the front will appear with the button configuration that matches the Acappella frame's Input and Output configuration. Remote panels can be ordered in several configurations and do not have to match the Acappella frame's Input and Output configuration. The panel's appearance is related to how many Sources and Destinations are available, not how many Levels are used.

Any Acappella frame ordered without a Local Panel will appear as shown in Figure 1.

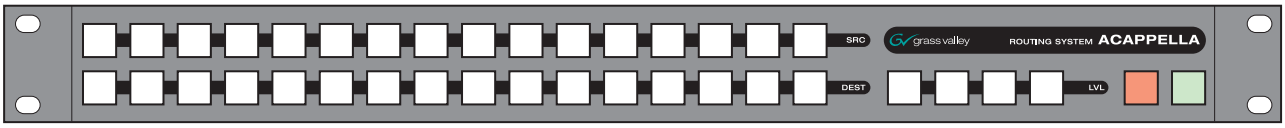
Figure 1. Acappella Front with no Local Panel

8300_00_02r0

All panel fronts (except frames with no Local Panel) will have four Level buttons, a green Enable button, and a red Protect button. The number of Source and Destination buttons will change depending on the frame's configuration for local panels and the desired configuration for remote panels.

Figure 2 is a panel with 16 Sources and 16 Destinations.

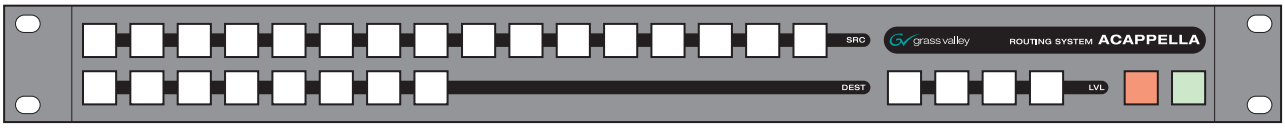
Figure 2. 16x16 Front



8300_00_08r0

Figure 3 is a panel with 16 Sources and 8 Destinations.

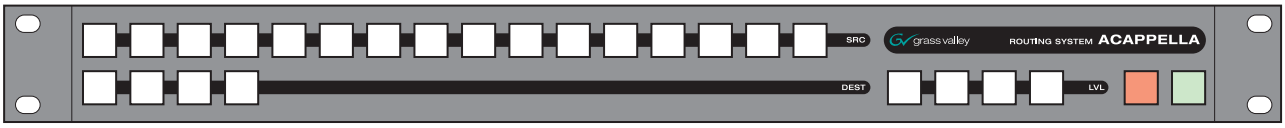
Figure 3. 16x8 Front



8300_00_09r0

Figure 4 is a panel with 16 Sources and 4 Destinations.

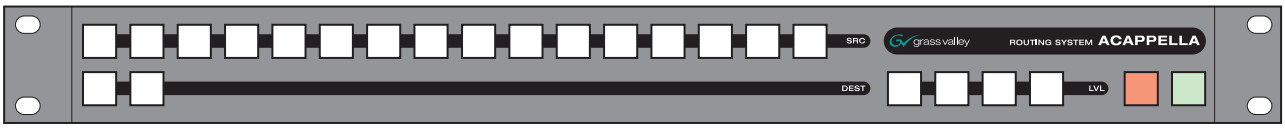
Figure 4. 16x4 Front



8300_00_10r0

Figure 5 is a panel with 16 Sources and 2 Destinations.

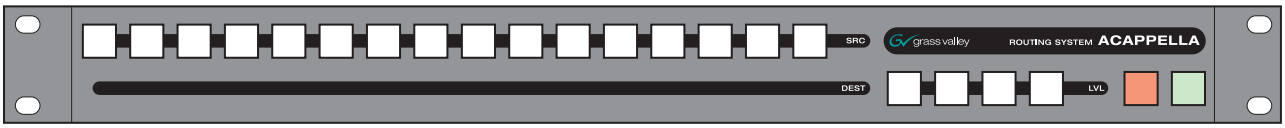
Figure 5. 16x2 Front



8300_00_11r0

Figure 6 is a Remote panel with 16 Sources and 1 Destination.

Figure 6. 16x1 Single Destination Front (Remote Panel Only)



8300_00_12r0

Figure 7 is a panel with 8 Sources and 8 Destinations.

Figure 7. 8x8 Front

8300_00_13r0

Figure 8 is a panel with 8 Sources and 4 Destinations.

Figure 8. 8x4 Front

8300_00_14r0

Figure 9 is a Remote panel with 8 Sources and 1 Destination.

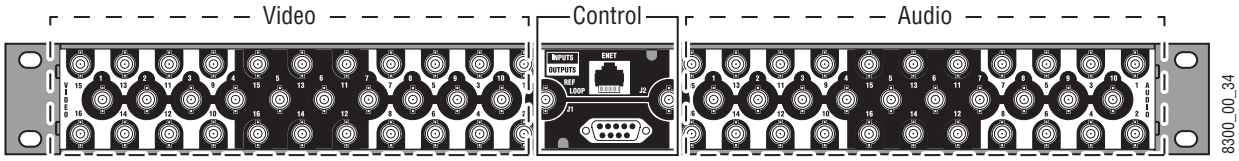
Figure 9. 8x1 Single Destination Front (Remote Panel Only)

8300_00_16r0

Backplanes

When viewed from the rear, the Acappella backplane is divided as shown in Figure 10. The control area in the center will appear on all frames. The Audio section on the right and the Video section on the left will change depending upon the configuration of the frame. Inputs are indicated by white numbers in the black area, are located in the top and bottom row of the black area, and the entire middle row. Outputs are indicated by black numbers in the white areas and are located in the top and bottom rows of the white areas.

Figure 10. Acappella Backplane

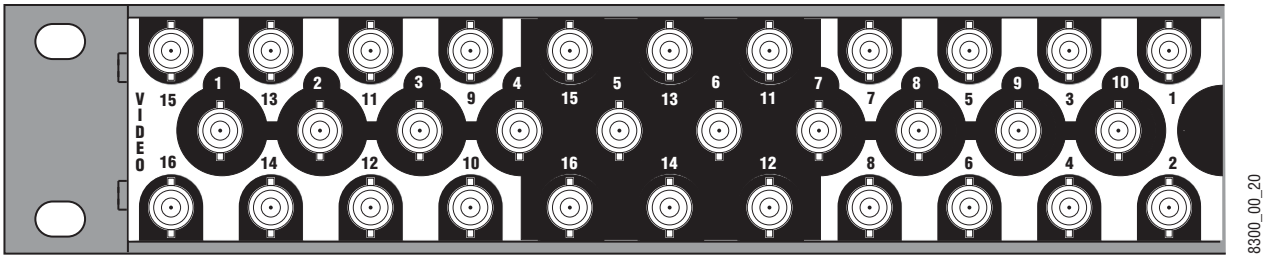


Video Configuration (Digital and Analog)

The video BNC backplanes are used with all signal types including High Definition, Standard Definition, reclocking or non reclocking, and Analog.

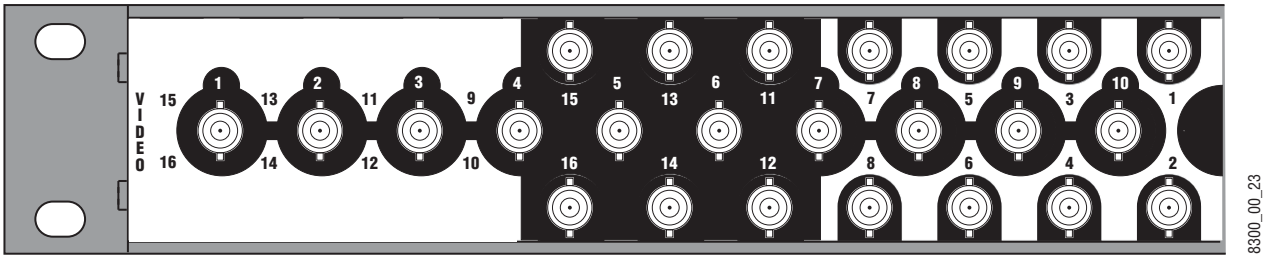
The configuration shown in Figure 11 is 16 Inputs by 16 Outputs.

Figure 11. 16x16 Video BNC Backplane



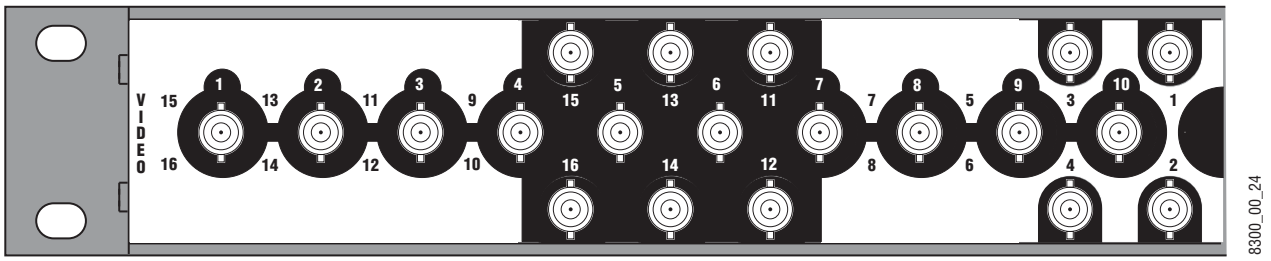
The configuration shown in Figure 12 is 16 Inputs by 8 Outputs.

Figure 12. 16x8 Video BNC Backplane



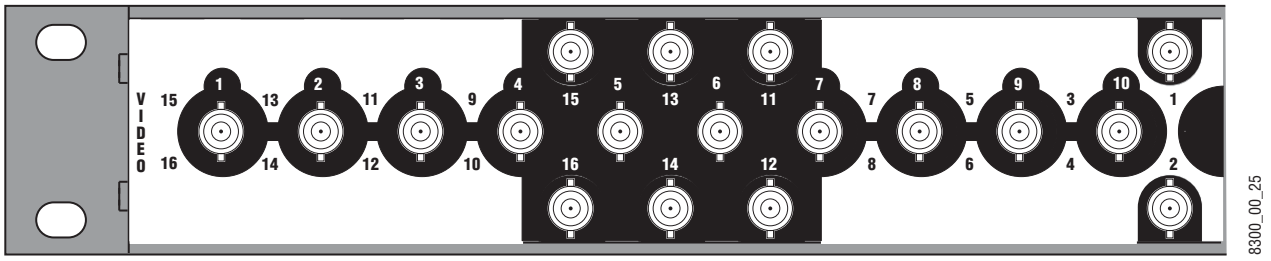
The configuration shown in Figure 13 is 16 Inputs by 4 Outputs.

Figure 13. 16x4 Video BNC Backplane



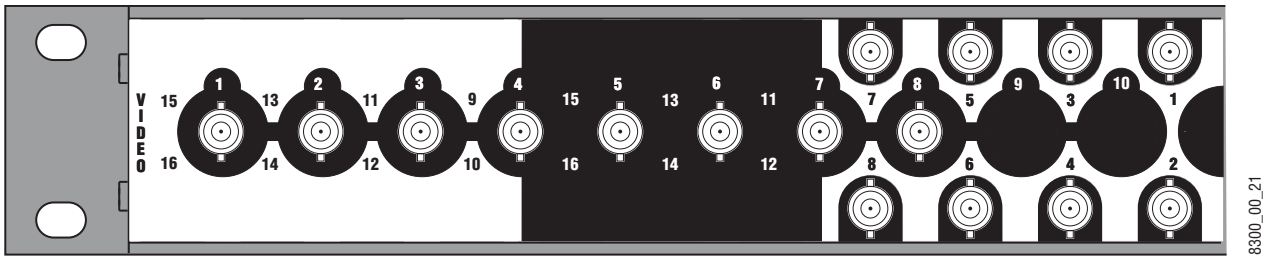
The configuration shown in Figure 14 is 16 Inputs by 2 Outputs.

Figure 14. 16x2 Video BNC Backplane



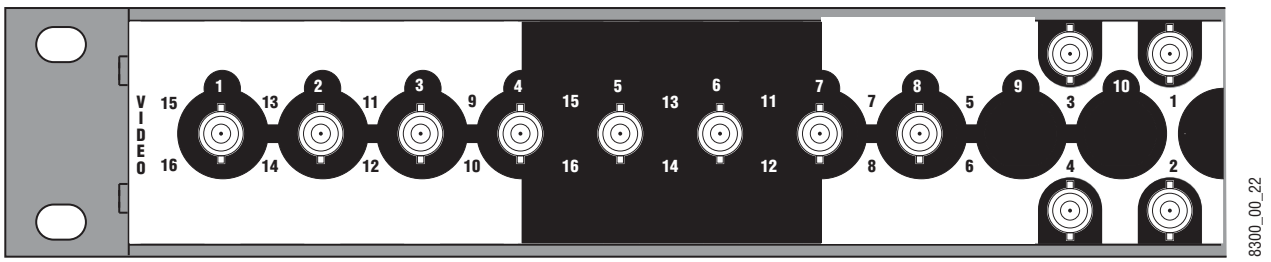
The configuration shown in Figure 15 is 8 Inputs by 8 Outputs.

Figure 15. 8x8 Video BNC Backplane



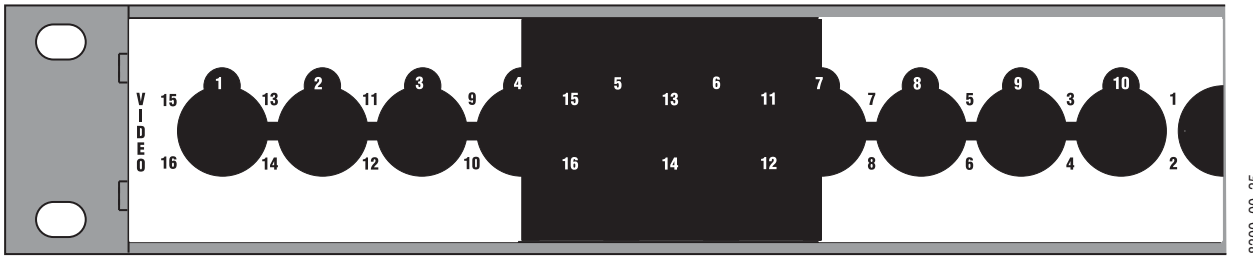
The configuration shown in Figure 16 is 8 Inputs by 4 Outputs.

Figure 16. 8x4 Video BNC Backplane



The empty configuration shown in Figure 17 is used on systems that have audio with no video.

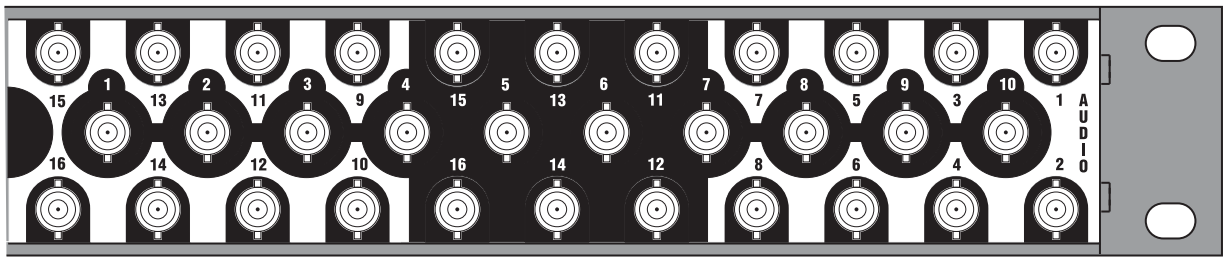
Figure 17. Empty Video Backplane



Digital Audio Configuration

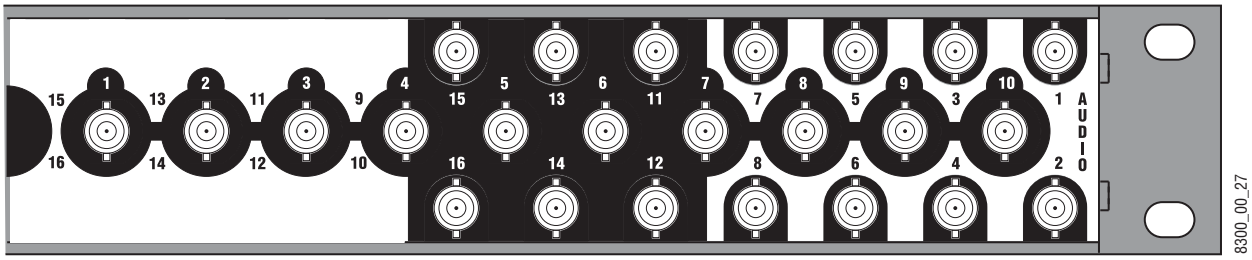
The configuration shown in Figure 18 is 16 Inputs by 16 Outputs of single stream digital (AES) audio.

Figure 18. 16x16 Audio Single Stream BNC Backplane



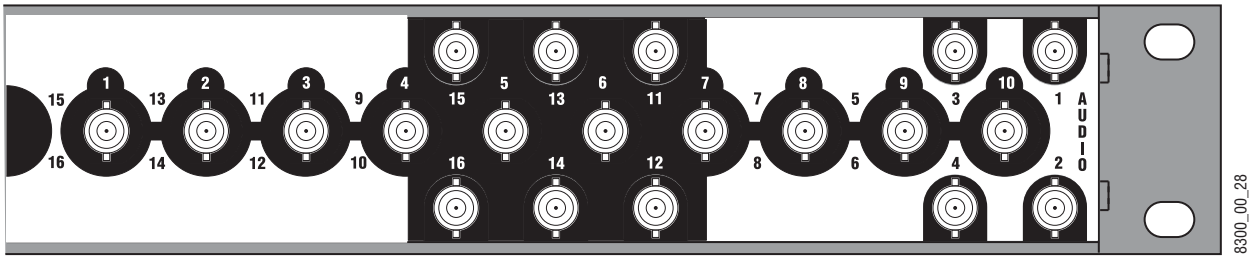
The configuration shown in Figure 19 is 16 Inputs by 8 Outputs of single stream digital (AES) audio.

Figure 19. 16x8 Audio Single Stream BNC Backplane



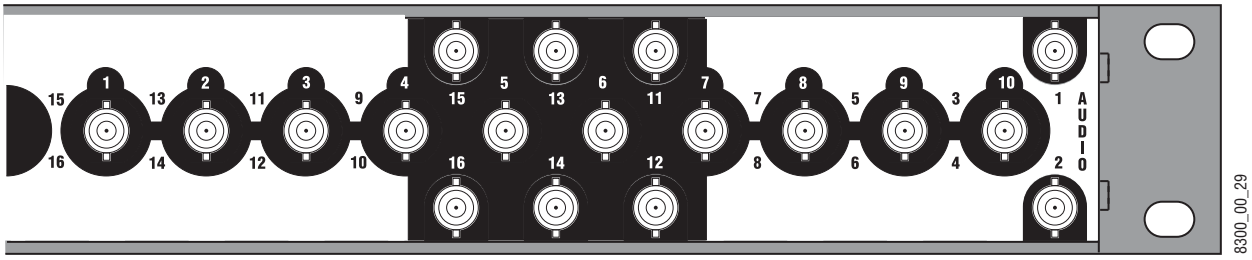
The configuration shown in Figure 20 is 16 Inputs by 4 Outputs of single stream digital (AES) audio.

Figure 20. 16x4 Audio Single Stream BNC Backplane



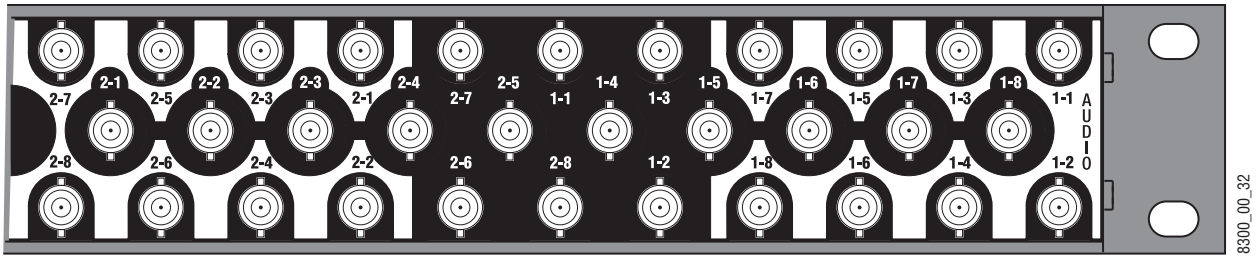
The configuration shown in Figure 21 is 16 Inputs by 2 Outputs of single stream digital (AES) audio.

Figure 21. 16x2 Audio Single Stream BNC Backplane



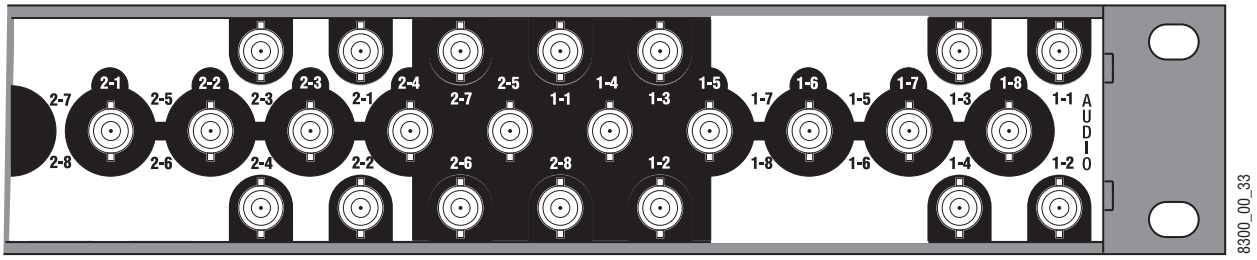
The configuration shown in Figure 22 is 8 Inputs by 8 Outputs of dual stream digital (AES) audio.

Figure 22. 8x8 Audio Dual Stream BNC Backplane



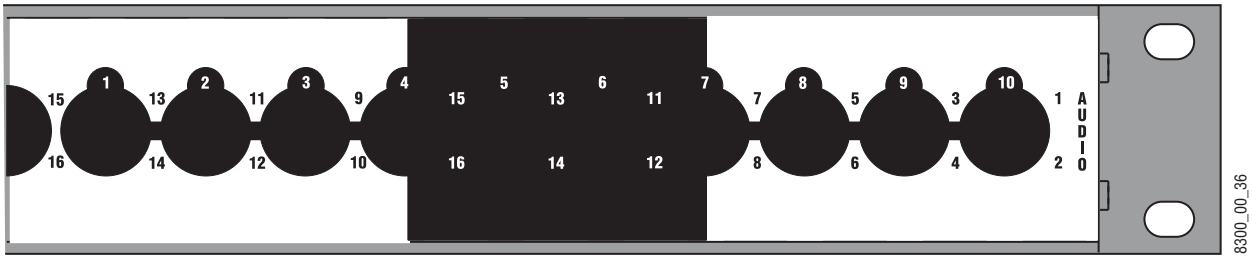
The configuration shown in Figure 23 is 8 Inputs by 4 Outputs of dual stream digital (AES) audio.

Figure 23. 8x4 Audio Dual Stream BNC Backplane



The empty configuration shown in Figure 24 is used on systems that have video with no audio.

Figure 24. Empty Audio Backplane



Analog Audio Configuration

Analog audio backplanes are equipped with Phoenix connectors that each carry two balanced audio channels (typically left and right stereo). Inputs are located on the left, and outputs are located on the right (as viewed from the rear). Representative analog audio backplanes are shown below.

Figure 25. 16 x 16 Analog Audio

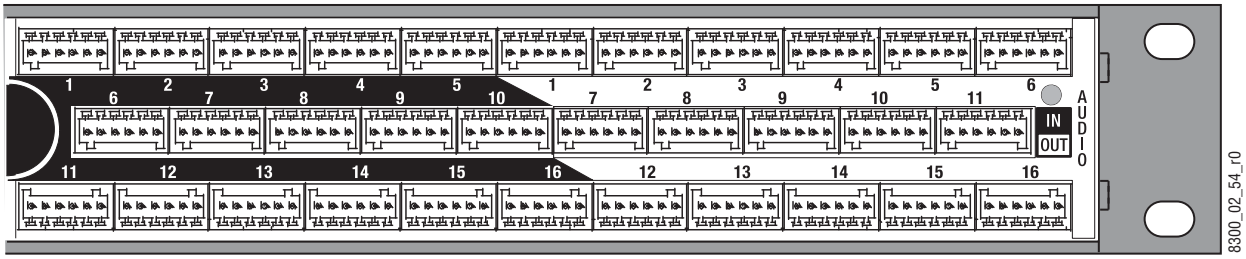
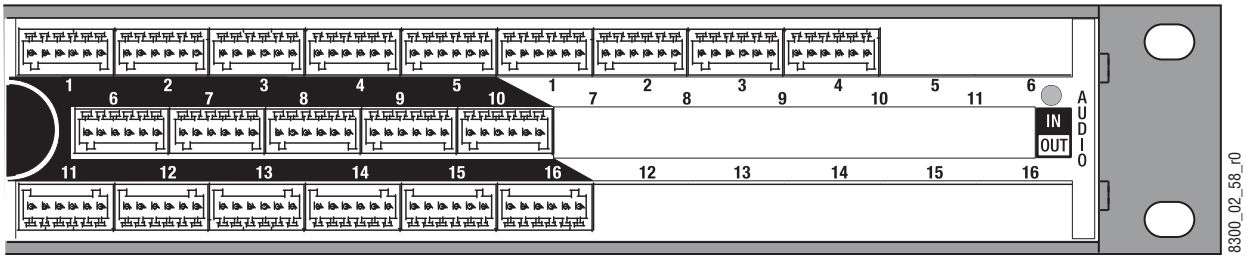


Figure 26. 16 x 4 Analog Audio



Note The bottom row of analog audio connectors are mounted upside down in relation to the top two rows, due to internal board space limitations. The removable connectors are wired the same regardless of row used.

Analog frames also offer a Dual Stereo configuration, which divide the matrix into two groups with independent inputs and outputs. Inputs for one group can only be routed to outputs of the same group, not to outputs of the other group. The inputs and outputs of each group are labeled with a leading number, 1- or 2-. Two Dual Stereo analog configurations are available, one with eight outputs per group Figure 27), and the other with four outputs per group (Figure 28).

Figure 27. 8 x 8 Dual Stereo Analog Audio

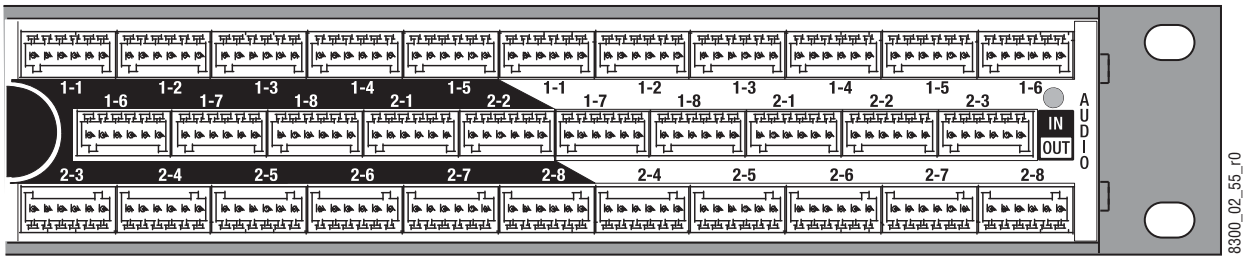
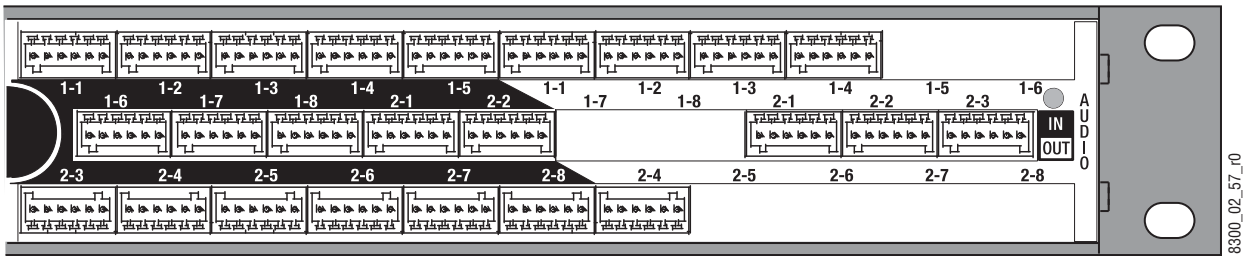


Figure 28. 8 x 4 Dual Stereo Analog Audio



Acappella Router and Remote Panel Variations

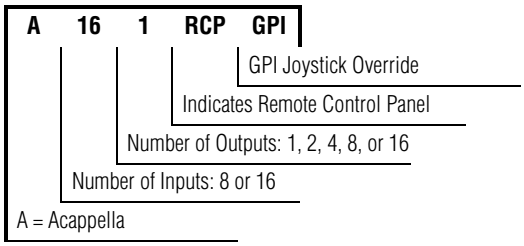
Acappella routers are available in single and dual formats with a variety of inputs and outputs. Options include an integral control panel on the front of the router and redundant power supplies. Table 2 shows how the model number of the Acappella router identifies the configuration of the frame.

Table 2. Acappella Routers Example Model Code

A	16	8	HR-	DU-	L P	
					Chassis Options,	L= Local control panel P = Internal redundant power supply (digital only)
				Secondary Signal Format		V = Analog video S = SD video SR = SD video w/reclocking HR = HD video w/reclocking AU = AES audio, unbalanced 75 Ohm BNC AB = AES audio, balanced 110 Ohm terminals DU = Dual AES audio, balanced, 110 Ohm terminals DBT = AES audio, transformer coupled, 110 Ohm terminals AA = Dual-channel, analog audio, balanced QA = Dual stereo analog audio
			Primary Signal Format			
		Number of Outputs: 2, 4, 8, or 16				
	Number of Inputs: 8 or 16					
A = Acappella						

Acappella Remote Control panels are also available in many different configurations (Table 3).

Table 3. Acappella Remote Control Panels Example Model Code



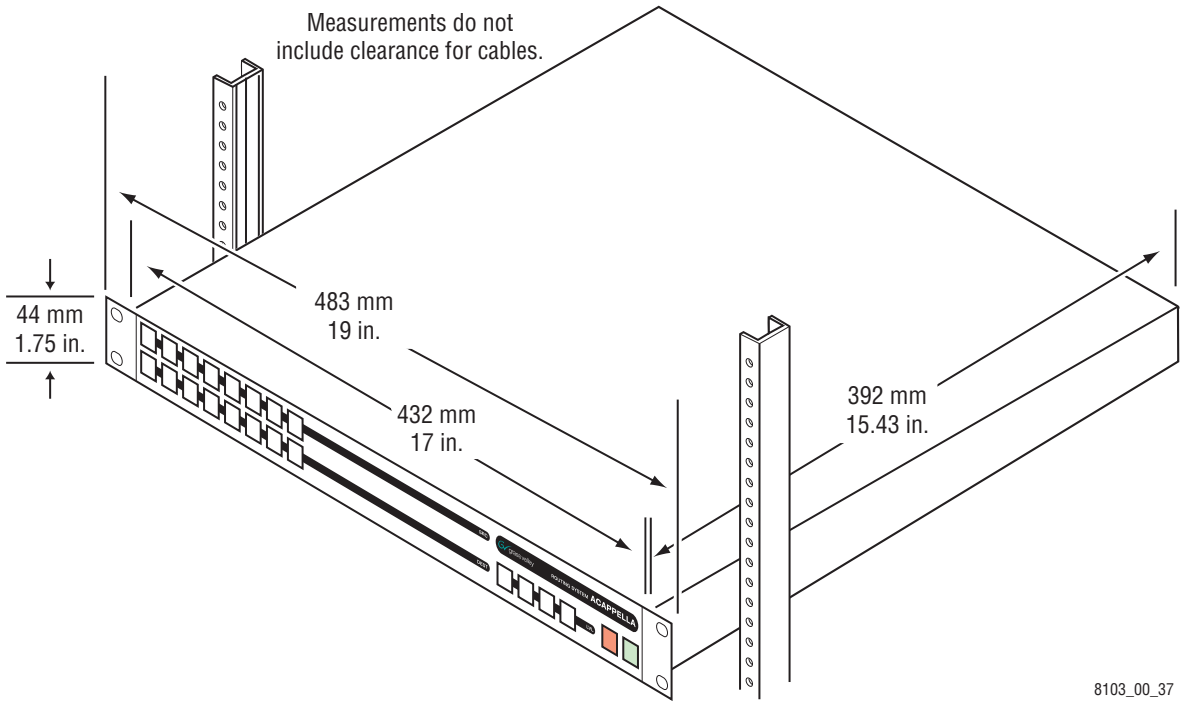
Section 2

Installation

Acappella Frame Rack Installation

The Acappella frame is installed in a standard 483 mm (19 inch) rack. The frame occupies 1 rack unit. Cooling is by horizontal front-to-back airflow. See Figure 29.

Figure 29. Acappella Installation Front View

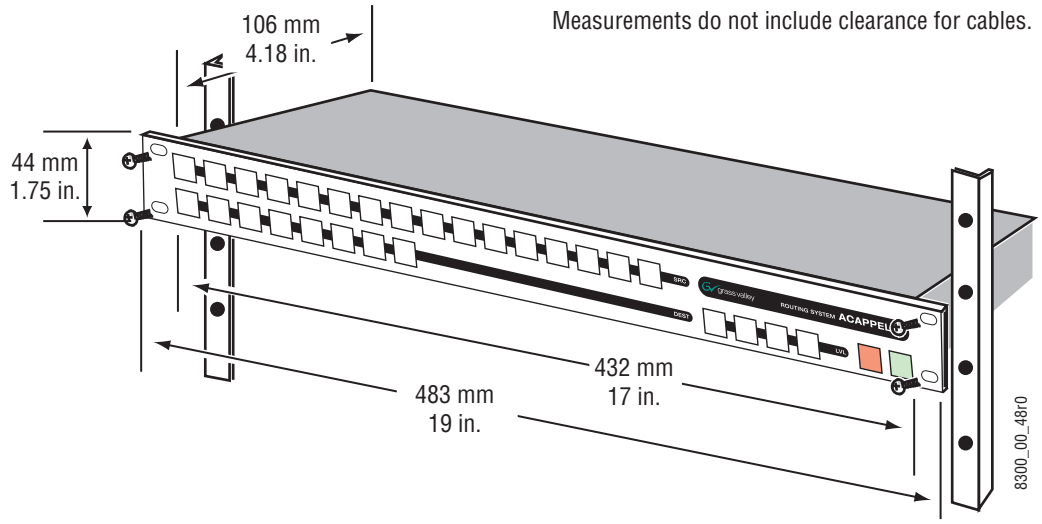


Note The depth shown is for the frame. Additional space is needed for cable clearances.

Remote Panel Rack Installation

Remote panel rack mounting is straightforward and requires no special tools or adaptors. Simply position the Remote Panel in the rack and secure the panel in place. Refer to Figure 30.

Figure 30. Rack Mount Remote Panel Installation



A rear frame support kit is available as an option (ACAP24RACKKIT).

Acappella Cabling

Figure 31 shows all possible cabling for a 16x16 Acappella frame with 16 Video Inputs and Outputs and 16 single stream AES Audio Inputs and Outputs using BNC connectors. The second Power Supply is optional.

Figure 31. 16x16 Cabling

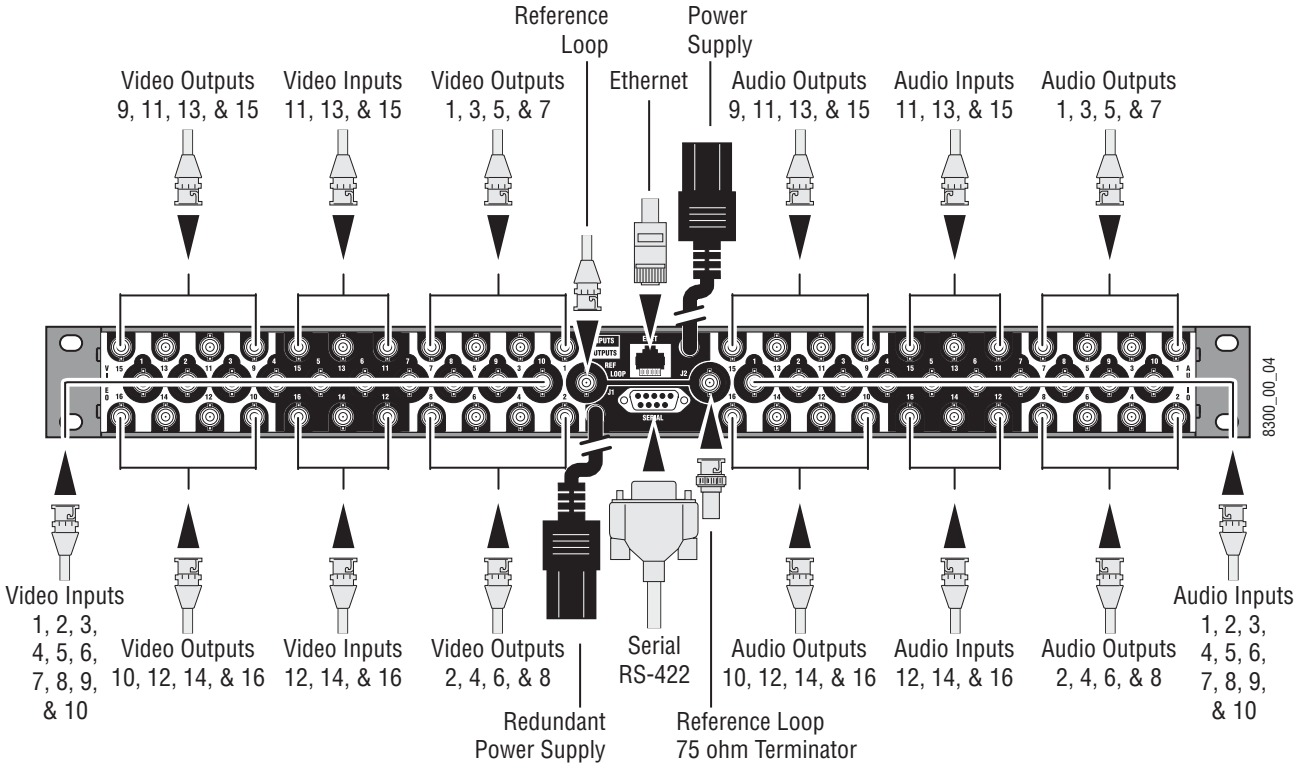
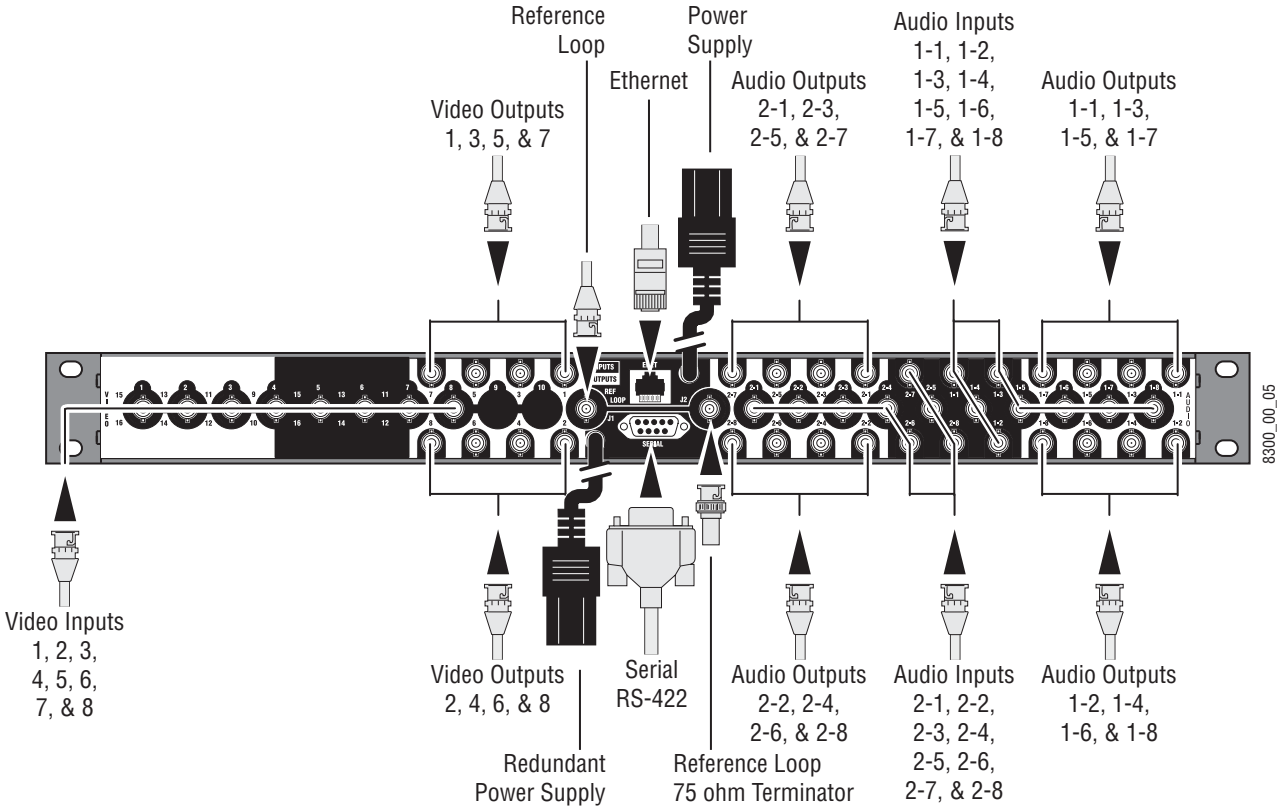


Figure 32 shows all possible cabling for an 8x8 Acappella frame with 8 Video Inputs and Outputs and 8 dual stream AES Audio Inputs and Outputs using BNC connectors. The second Power Supply is optional.

Figure 32. 8x8 Cabling



Analog Audio Pinouts

Phoenix style connectors are used for wiring analog audio. Space limitations required the bottom row of connectors be oriented upside down, but the removable connectors are wired the same regardless of row used.

Figure 33. Analog Audio Backplane

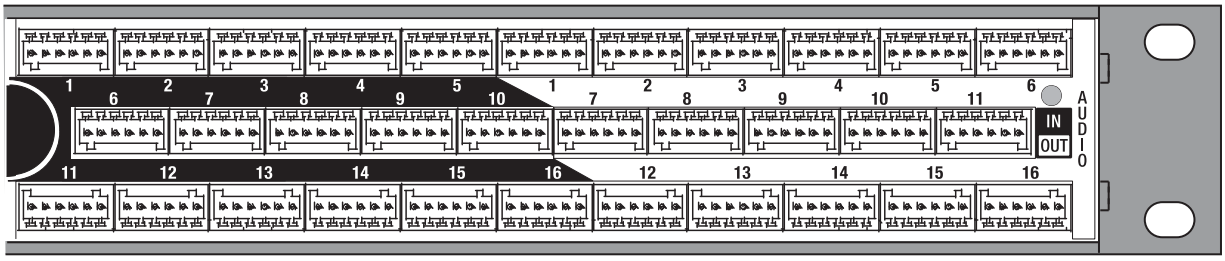
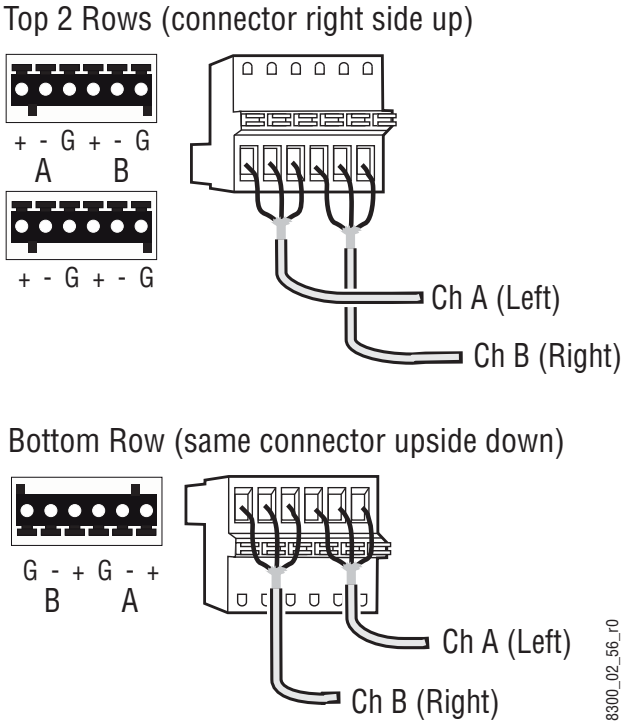


Figure 34. Phoenix Connector Pinouts for Stereo Analog Audio



Control Cabling

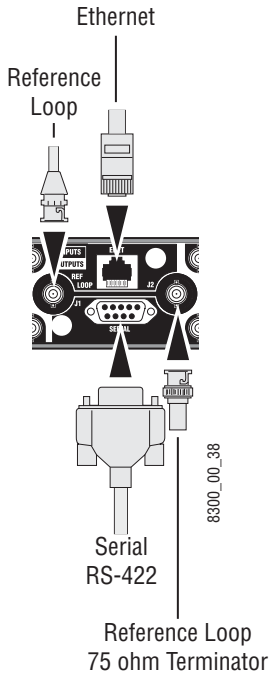


Table 4 shows the connectors in the Control area of the Acappella frame.

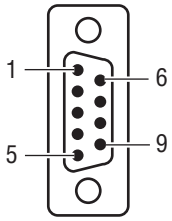
Table 4. Control Cabling

Label	Connector		Details
	Type	Gender	
ENET	RJ-45	Female	Ethernet network communication interface is 100Base-T compatible, use Category 5e cable, 8 conductor twisted pair.
SERIAL	9 pin D	Female	RS-422 interface, use serial cable.
REF LOOP	BNC	Female	Video reference supports Color Black or Tri-Level-Sync, use unbalanced 75 ohm connector, Loop-thru cabling supported.

Serial 9 Pin D Connector Pinout

Table 5 contains pinout information for the Serial RS-422 9 Pin D connector.

Table 5. Serial D Connector Pinouts

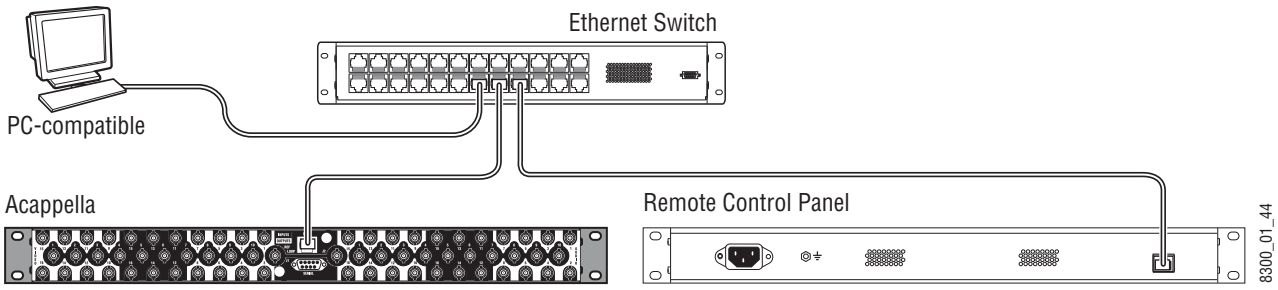
Controlled	Pin	Function	Pin	Function
9 Pin D Female 	1	GND	6	TX Com
	2	TX-	7	TX+
	3	RX+	8	RX-
	4	RX Com	9	GND
	5	NC	-	-

Note Refer to the latest version of the *Routing Products Protocols Manual* for information about the Terminal/Computer Interface (T/CI) Protocol used to control Acappella systems. This manual is available for download on the Grass Valley web site (see page 4).

Ethernet Cabling

The Acappella frame uses Ethernet to communicate. Use standard pin-to-pin (patch) Category 5e cables if you are using switches between the routers, panels, and PC. It is also possible to use a crossover cable to connect an Acappella Router directly to either a Remote Panel or a PC; this option is only practical in very small systems. Figure 35 shows a Closed Network system with an Acappella router, a Remote Panel, and a PC connected to a switch.

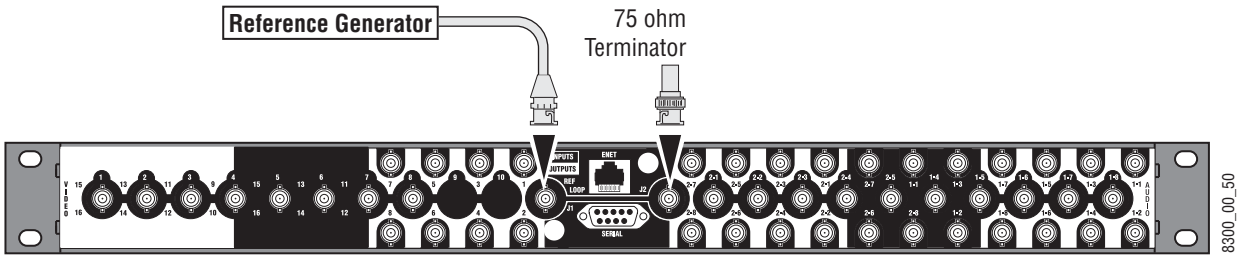
Figure 35. Ethernet Cabling



Reference Cabling

Reference signals are loop-thru with the end of the chain terminated. Color Black or Tri-Level Sync signals are used. The Reference shown in Figure 36 is the default cabling for plug and play.

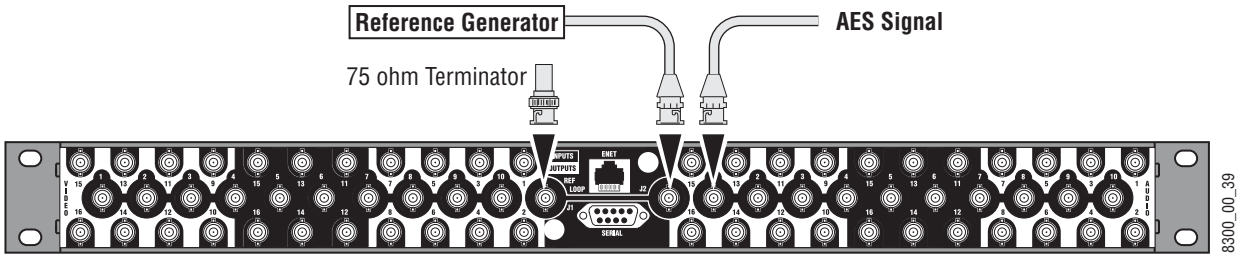
Figure 36. Video Reference Connections



See *Router Reference Configuration Page on page 73* to select AES Src 1 instead of the Color Black or Tri-Level Sync Reference. Web Page configuration is required

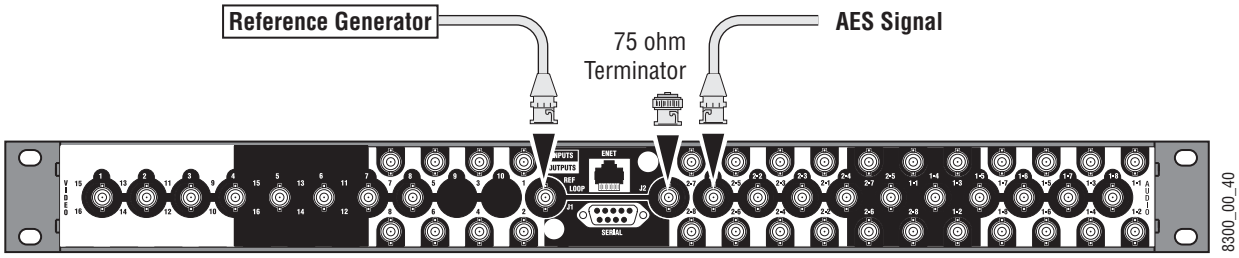
In Figure 37 a Continuous AES Signal is connected to Audio Input 1.

Figure 37. Reference Signal Cabling Option for Single Stream Audio



In Figure 38 a continuous feed AES signal is connected to Audio Input 2-1.

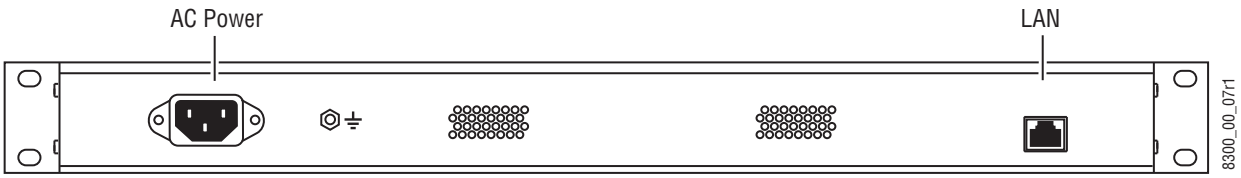
Figure 38. Reference Signal Cabling Option for Dual Stream Audio



Remote Panel Cabling

The Remote Panel has connectors for RJ-45 Ethernet and AC Power. See Figure 39.

Figure 39. Remote Panel Cabling



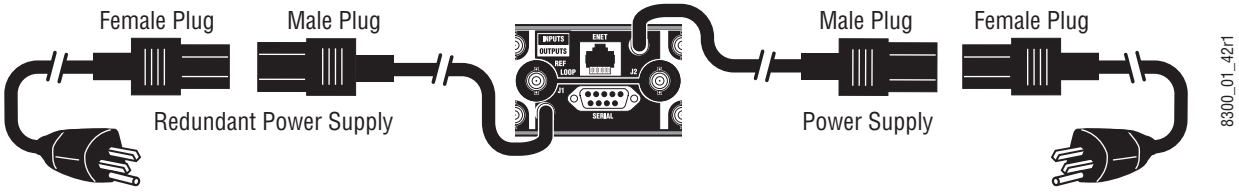
Power

Digital Frames

The Acappella digital frame uses internal auto-ranging AC power supplies. One Power Supply is standard, the optional second Power Supply is fully redundant.

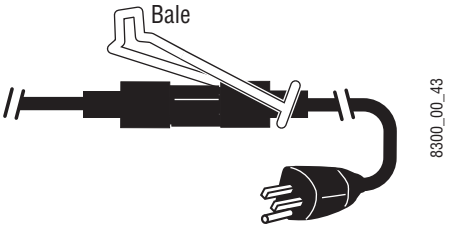
The frame ships with one or two captive power cords. A separate power cord (shipped with the frame) needs to be attached to each of the captive power cords as shown in Figure 40

Figure 40. AC Power Supplies



A bale clamp is provided to secure the power cords.

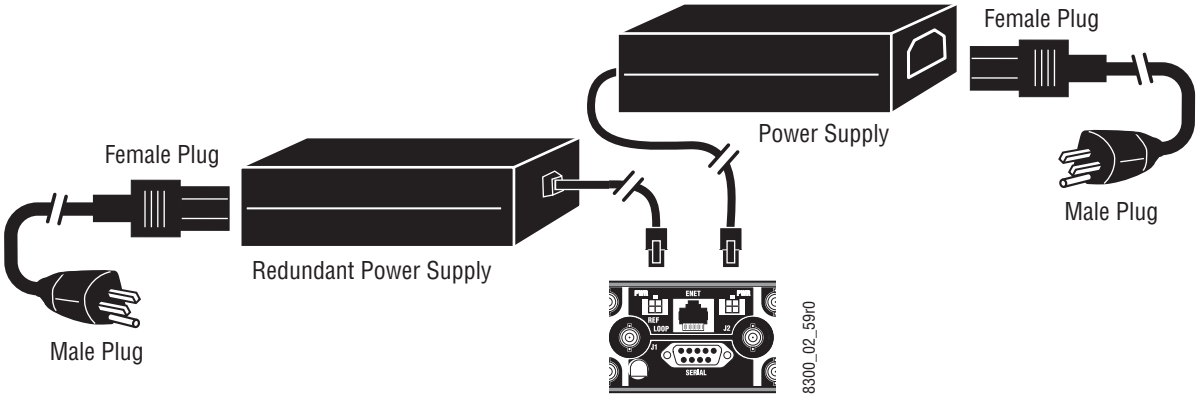
Figure 41. Power Cord Bale Clamp



Analog Frames

The Acappella analog frame uses external auto-ranging AC power supplies. The power supplies connect to the rear of the frame (Figure 40).

Figure 42. External Power Supplies



Defaults for Plug and Play

Default Levels are determined by the router's physical configuration. A router with a physical configuration of 8x8HR-DU would have 3 default Levels; Level 1 is HD wideband reclocking serial digital Video, Level 2 is AES digital Audio 1, Level 3 is AES digital Audio 2.

The default AES digital Audio attributes are; **Audio mode: Normal**, **Resolution: 20 bit**, and **Block Align: On**. All other AES digital Audio attributes are inactive.

Section 3

Panel Operation

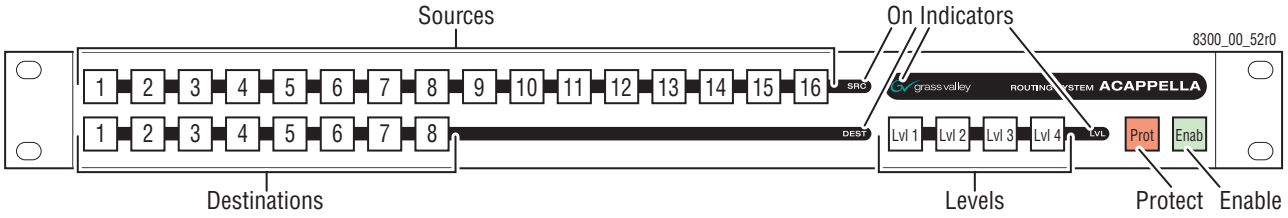
Local Panels and Remote panels expand the functionality of the Acappella router.

A frame that has 8 Inputs, 4 Outputs, digital video and Dual Stream digital AES audio, would have three Levels of 8 inputs and 4 Outputs as follows:

- Eight inputs and four outputs of video,
- Eight inputs and four outputs of audio, and
- A second set of eight inputs and four outputs of audio.

The On Indicators will be lit when there is power to the panel. See Figure 1. Button illumination will be either Off, Backlit, Low Tally, or High Tally depending on the button's status.

Figure 1. 16x8 Local Panel Layout



Enable Button

The **Enable** button is green and is found on the lower right of the panel. See Figure 1.

Enable Button Action

Press and release of an active **Enable** button causes the following actions:

- Deactivates the panel,
- Inactive **Enable** button is illuminated at Backlight Tally, and
- The **Protect** and **Source** buttons do not operate.

Press and release of an inactive **Enable** button causes the following actions:

- Activates the panel, and
- Active **Enable** button is illuminated at High Tally.

Other button activity on an inactive panel (not enabled):

- Source Tally (on active Destinations) is displayed normally,
- Active Destination can be changed (by press and release of another Destination button) to view Source status on the new Destination,
- Levels can be changed to view Source status on any Level, and
- A Destination Gang preset can be created, but not Taken.

Protect Button

No change is allowed to the current Source on a protected Destination, either by action on this panel, or by any remote device (via ethernet) action. Any device can enable or disable the Destination protection. The **Protect** button is red and is found on the lower right of the panel. See Figure 1.

Protect Button Action

Press and release of the inactive **Protect** button to activate a Protect causes the following actions:

- Active **Protect** button is illuminated at High Tally,
- Activates Protect status on the active Destinations, and
- All Destinations in a Destination Gang are protected.

Press and release of the active **Protect** button causes the following actions:

- Inactive **Protect** button is illuminated at Off Tally,
- Deactivates Protect on the active Destinations, and
- All Destinations in a Destination Gang are removed from the Protected state.

Source Button

Single Source Button Action

Press and release of a single **Source** button causes the following actions:

- Connects a Source to the active Destination on all active Levels,
- Tallys only the active Source at High Tally illumination intensity,
- All other Sources become inactive at Backlight Tally illumination intensity,

If a Breakaway,

- The single Source button is High Tally,
- The left most active Level button is High Tally,
- The Breakaway level is low tally, and
- Inactive Level Tally remains at Backlight intensity,

If Chop function is active (Local Panel),

- Press and release of a **Source** button inactivates the Chop, and
- Connects the Source to the active Destination,

Note Chop is a toggle between two Sources to a single Destination.

If Destination Gang and All Levels are active (Local Panel),

- Press and release of a **Source** button connects that Source to all Destinations in the Gang,
- All **Destination** buttons (in the Gang) are High Tally, and
- Active **All Level** button Tally is updated to High Tally,

If Destination Gang is active, but not All Levels active (Local Panel),

- Press and release of a **Source** button connects that Source to all Destinations in the Gang for only the active Levels,
- The individual **Destination** buttons (in the Gang) are either Low Tally to indicate Breakaway, or High Tally to indicate no Breakaway, and
- All active **Level** button Tally is updated to indicate either Breakaway as Low Tally, or no Breakaway as High Tally.

Note Chop is not available on a Remote Panel. The Chop will only be on the Local Panel and on the Local Levels output. It will not change the output of the Remote Levels in the system. However, if any Source is selected by any panel in the system it will stop the Chop.

Multiple Source Button Action (Local Panel)

Press and release of a **Source** button while press and hold of the current **Source** button causes the following actions:

- Initiates the Chop function between two Sources on a single Destination,
- If Destination Gang is currently active, Chop will not invoke, and
- Both **Source** buttons are High Tally during active Chop function.

After Chop function is activated, press of any button will inactivate the Chop.

Note Chop is not available on a Remote Panel. The Chop will only be on the Local Panel even in systems that have remote levels. However, if any Source is selected by any panel in the system it will stop the Chop.

Destination Button

Single Destination Button Action

Single **Destination** button press and release causes the following actions:

- Activates that Destination,
- Inactivates all other Destinations,
- Active **Destination** button is High Tally,
- Inactive **Destination** buttons are Backlight Tally,
- Updates the Source Tally and active Level Tally to reflect the active Destination status,
- Inactive Level Tally remains at Backlight Tally, and
- Destination Gang is cancelled.

Multiple Destination Button Action

Press and release of a **Destination** button while press and hold of active **Destination** button will create a Destination Gang condition with the following actions:

- A second press and release of a secondary **Destination** button (while the primary **Destination** button is still depressed) will drop or add (toggle) that Destination from the Destination Gang,
- If any Destination is currently Protected, that Destination will not be added to the Gang,

When a secondary Destination is added to the Destination Gang,

- High Tally if it is connected to the same Source (on all active Levels) as the primary Destination,
- Low Tally if it is connected to a different Source (on any active Level) as the primary Destination, and
- All active **Level** button Tally is updated to indicate either Breakaway as Low Tally, or no Breakaway as High Tally.

Level Button

The left most enabled **Level** button is the Tally Level, it is High Tally and the Source Tally is updated to be the Source on this Level.

Single Level Button Action

Press and release of a disabled **Level** button causes the following actions:

- Activates the Level,
- High Tally if the Source connected on that Level is the same Source as the left most Tally Level button,
- Low Tally if the Source connected on that Level is not the same Source as the left most Tally Level button

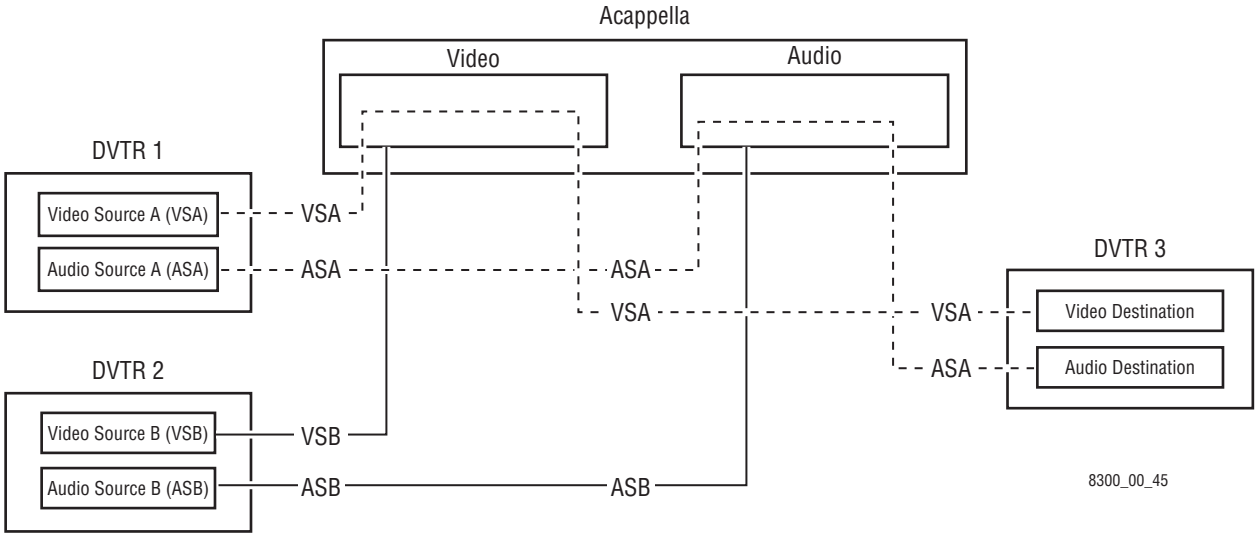
Press and release of enabled **Level** button causes the following actions:

- Inactivates that Level, and
- **Level** button is Backlight Tally.

Multi-Level Switching

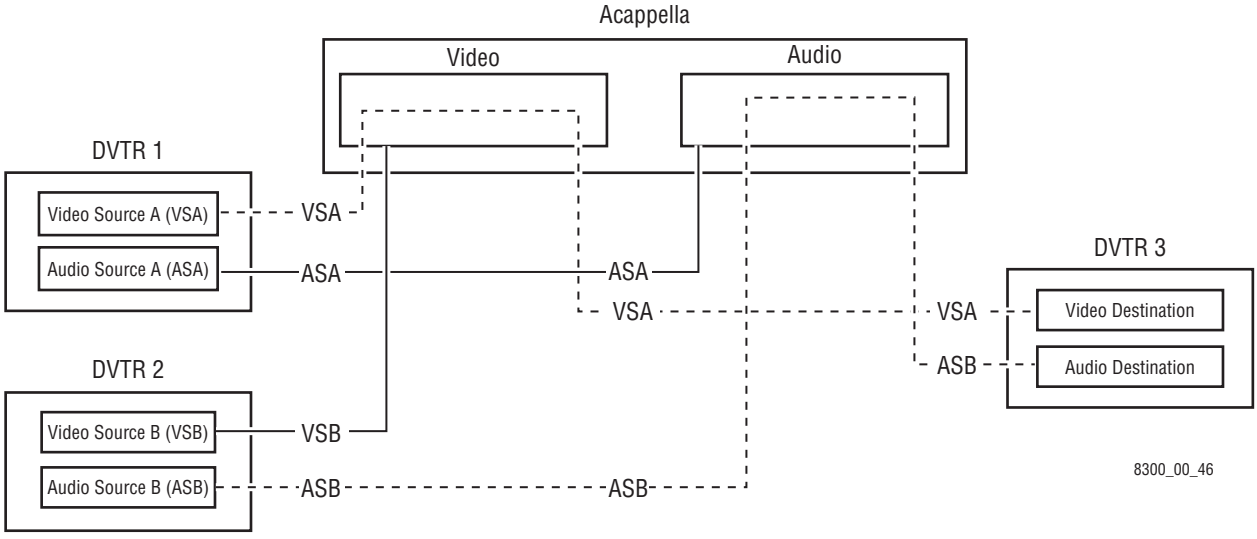
There are two modes of multi-Level switching: All-Level Takes and Breakaway Takes. All-Level Takes switch the same input number on all Levels, to the controlled Destination, as shown in Figure 2.

Figure 2. Traditional All-Level Take



A Breakaway Take is performed by accessing the control Levels of a Destination individually and selecting a different Source on at least one Level other than that selected on the others. Breakaways allow a Destination to selectively utilize video and audio from different Sources.

Figure 3. Breakaway Take



Section 4

Software and Configuration

Network Configuration

PC Requirements

A customer supplied PC is used for software installation and initial system configuration. This PC must meet the following minimum requirements:

- 256 Mb RAM,
- 10 Mb available hard disk space,
- 100BaseT Ethernet Network Interface Card,
- Monitor with a screen resolution of 1024 x 768,
- Windows XP SP2 and above operating system,
- Logged in with Administrator-level privileges for the local machine, and
- Internet Explorer version 6.0 or later.

PC Network Configuration

The PC you will use must be configured to operate on the Acappella stand-alone network. This is accomplished by setting the IP address of the PC to be compatible with the IP addresses of the Acappella system components. In general, the first three octets of the IP address must be the same, and the last IP address octet must be unique for each device on the network.

See Table 1 on page 46 for a recommended IP address for your PC that will work with an Acappella system using default network settings.

The exact method used to change the IP address of a PC varies, depending on the computer's operating system. Before changing the PC's IP address you should note down the existing values so you can easily reconfigure the computer back to normal operation when finished using it with Acappella.

Default System IP Addresses

Acappella systems ship with default IP addresses shown in Table 1.

Table 1. Acappella System Default IP Addresses

Device	IP Address	Subnet Mask	Gateway
Acappella Matrix Frame	192.168.0.40	255.255.255.0	192.168.0.1
Acappella Remote Panel	192.168.0.41	255.255.255.0	192.168.0.1
User Provided PC (recommended setting)	192.168.0.1	255.255.255.0	192.168.0.1

If your Acappella system has multiple frames and/or multiple remote panels, these defaults will need to be changed. See *Setting IP Addresses* *on page 52* for specific instructions.

Software

Acappella ships with a software CD. Several applications on the CD enable you to make adjustments to the Acappella configuration. After you have added a PC to the Acappella network, you need to install the Acappella software on the PC.

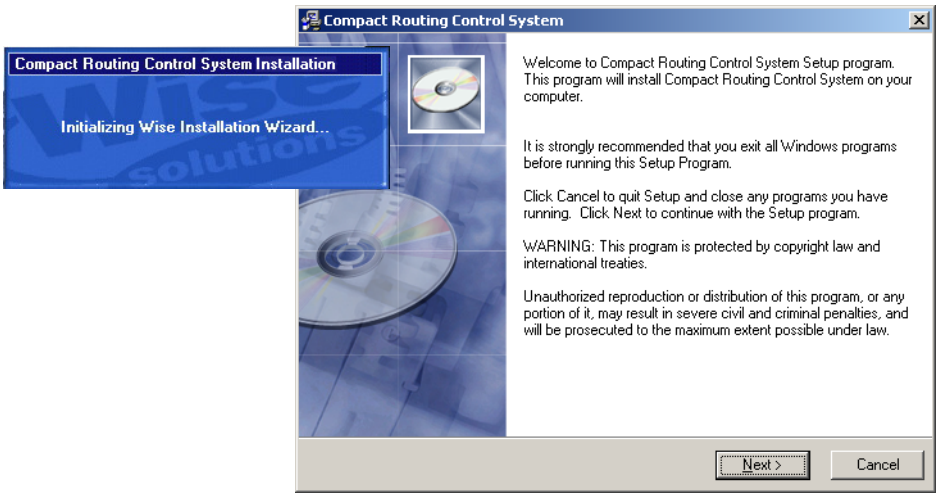
Software Installation

The Acappella Software CD will install the Acappella Matrix software, Acappella Remote Panel software, NetConfig application (a Network Configuration Tool), NetConfig Instruction Manual, and the Acappella Instruction Manual on a PC.

1. Insert Acappella Software CD, it will autostart. If the CD does not start look for the Setup.exe file.

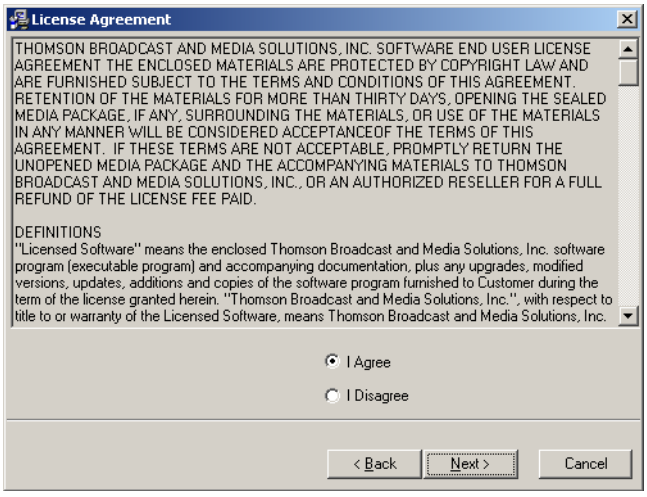
2. Click **Next** when the Welcome screen appears.

Figure 4. Welcome Window



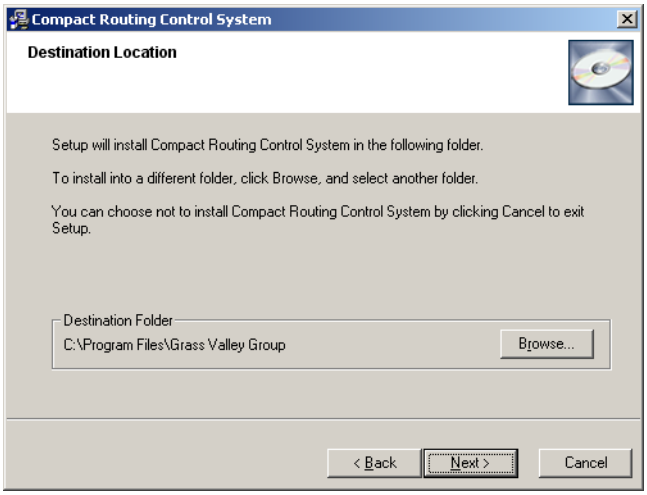
3. Select **I Agree**, then click **Next**.

Figure 5. License Windows



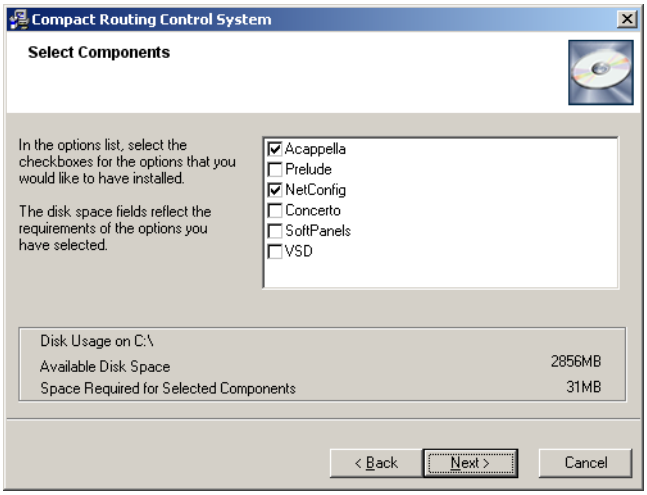
4. Click **Next** to accept the default directory or **Browse** to select a different location for the directory.

Figure 6. Directory Window



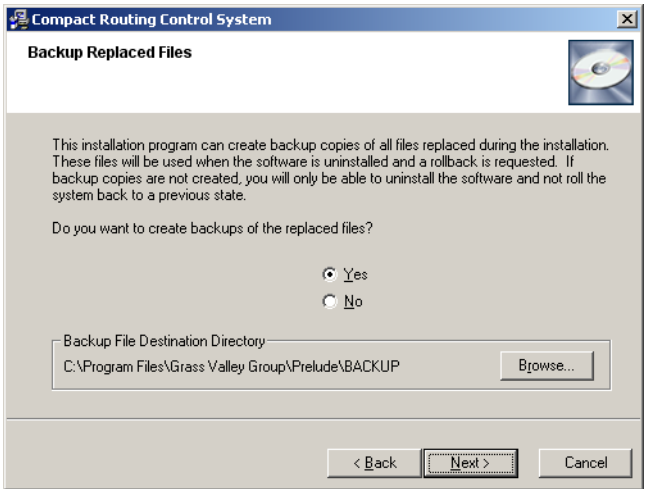
5. Click **Next** to accept all the applications or deselect any applications you don't want and then click **Next**.

Figure 7. Applications Window



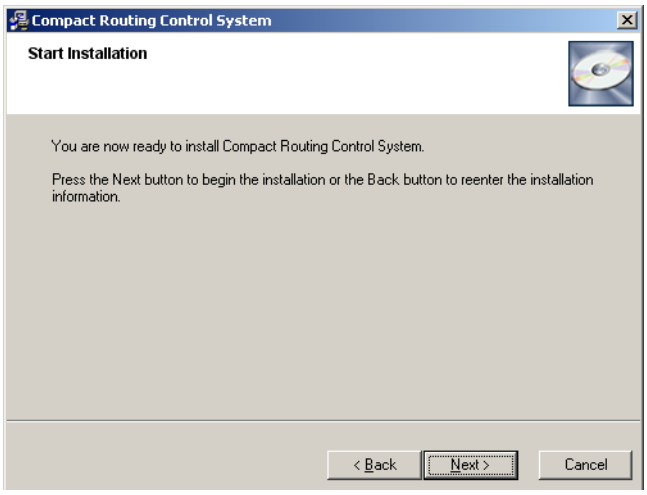
6. Click **Yes** to backup current files. This only applies to upgrading or reinstalling the software.

Figure 8. Start Installation Window



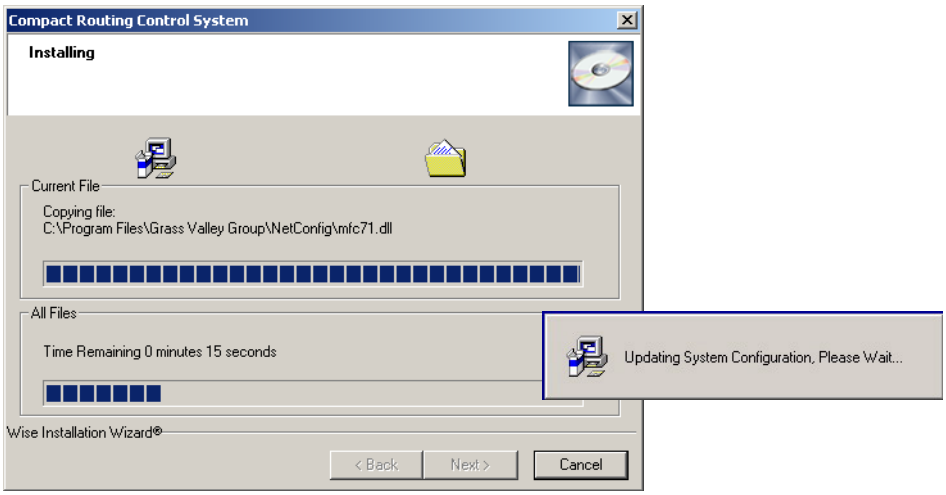
7. Click **Next** to begin the Installation.

Figure 9. Start Installation Window



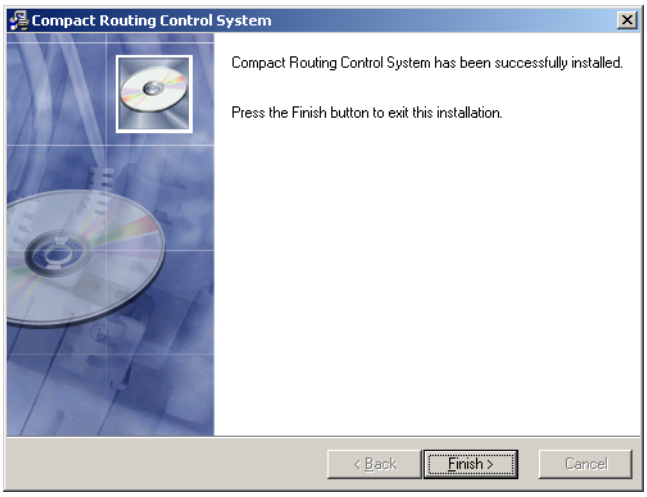
Status windows will appear while the software is loading.

Figure 10. Status Windows



8. Click Finish to complete the Installation.

Figure 11. Finish Window



NetConfig

The NetConfig application is designed to make network configuration simple. NetConfig discovers devices on the network, and these devices can be configured remotely using the PC on which NetConfig has been installed. NetConfig incorporates a web browser that displays web pages served by the devices on the network. NetConfig is also used for software installation to these devices.

Acappella routers are shipped with the NetConfig client installed as are many other Grass Valley products. Once the NetConfig software is installed on a PC, you will be able to view and interact with all the NetConfig client devices on the same network.

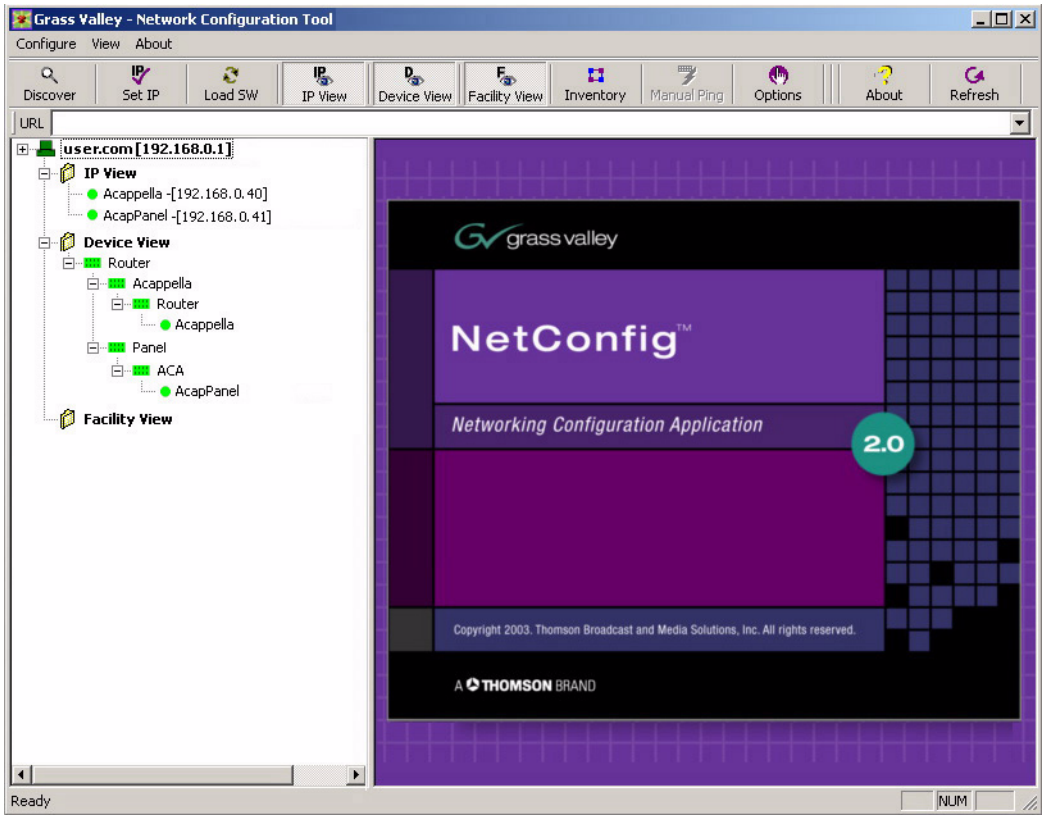
To open NetConfig find the shortcut on the PC's desktop.

The left side of the NetConfig application screen displays the logical tree of the devices on the network. The root of the logical tree is the name and the IP address of the PC on which NetConfig is running. The current status of each discovered device is reported by the color of its icon. A red dot, for example, indicates a device is no longer communicating, which might mean it has been disconnected from the network.

The right portion of the screen is the web browser view. When you click a device on the left, the home page for that device is displayed in the web browser view on the right.

In a closed network, Acappella and an Acappella Remote panel would appear as shown in Figure 12.

Figure 12. NetConfig Window



Select the device that you want to view from either the IP View or the Device View. See *Acappella Configuration Pages* *on page 57* for details.

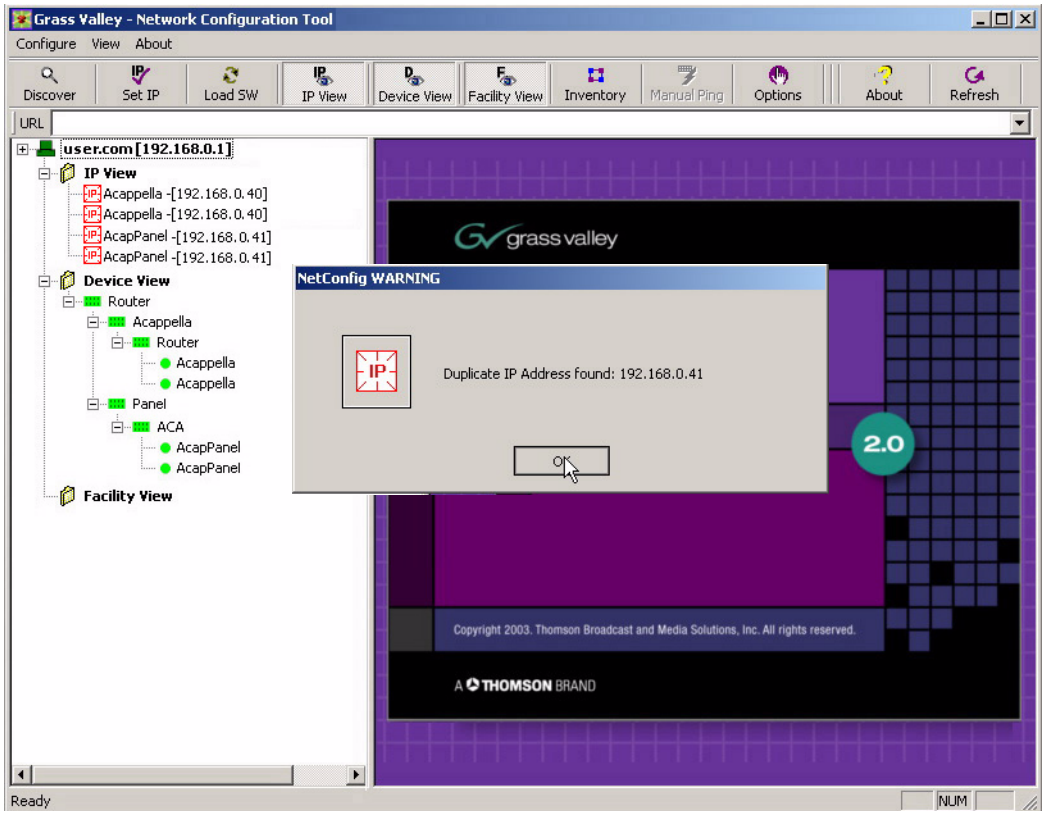
NetConfig Manual

A NetConfig manual .pdf file is installed onto the PC along with the NetConfig application. The manual is located in a Documentation subdirectory in the NetConfig directory.

Setting IP Addresses

In systems that have more than one Acappella router and/or more than one Remote Panel the IP Addresses need to be changed, since the same device types ship with the same IP addresses (see *Default System IP Addresses* *on page 46*). Resolving duplicate IP addresses is easily accomplished with NetConfig. If a device is installed on the network with the same IP address as another device, when the new device is discovered a warning message will be displayed. The IP View will also show the two devices with the same address with an IP symbol as shown in Figure 13. This can occur if new devices with factory default IP addresses are installed on the network.

Figure 13. Devices with Duplicate IP Addresses



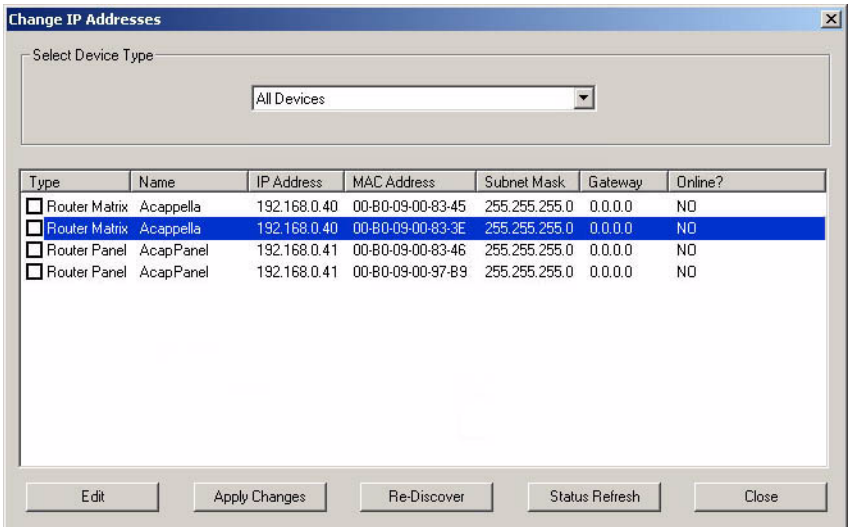
To Resolve Duplicate IP addresses:

1. Select the NetConfig **Set IP** icon on the toolbar or the Device IP Addresses in the Configure pull-down.

Figure 14. Set IP

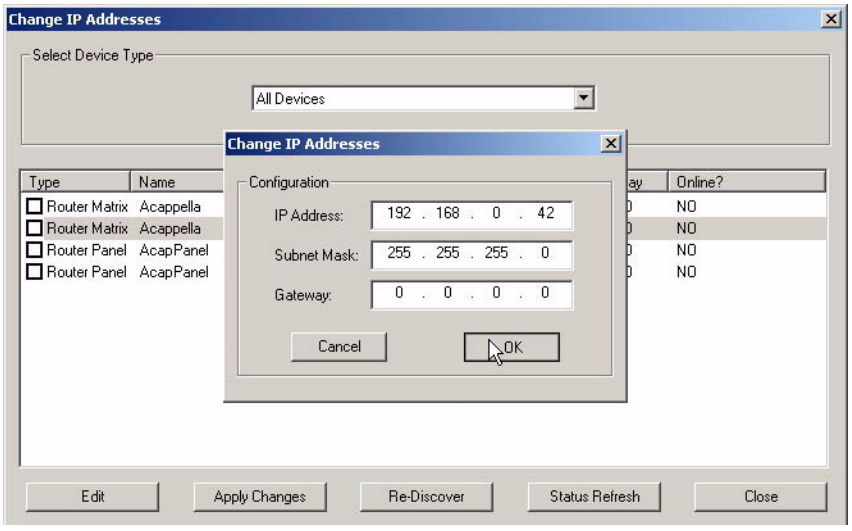
2. Highlight one of the devices with a duplicate IP address.

Figure 15. Duplicate IP



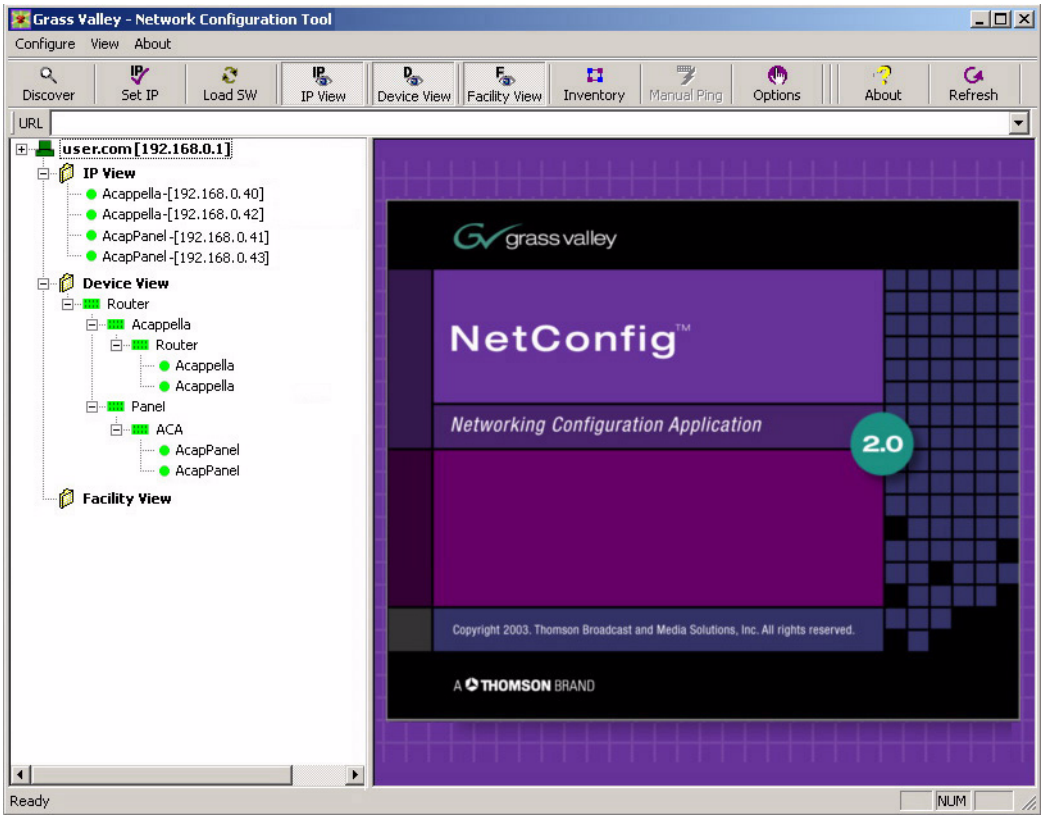
3. Click **Edit**, then change the last octet of at device's IP address to be unique. The first three octets of all the IP addresses must be identical, so all the devices are on the same network.

Figure 16. Change IP



4. Click **Apply Changes**. The device resets, and the new IP address will be reported in the left pane of NetConfig screen.

Figure 17. New IP Address



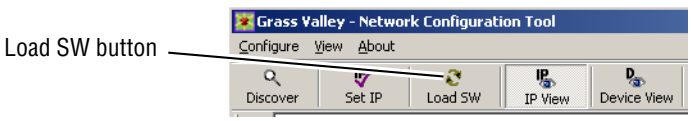
When all devices have unique IP addresses, it can be extremely helpful to label each device with its currently assigned IP address. Sticky labels that can be removed are advisable, since the IP address may be changed in the future. To identify a specific remote panel when several are connected at once, send a reset command to a panel and see which front panel buttons go off and back on.

Load Software

Use NetConfig to load software to Acappella routers and Acappella Remote Panels.

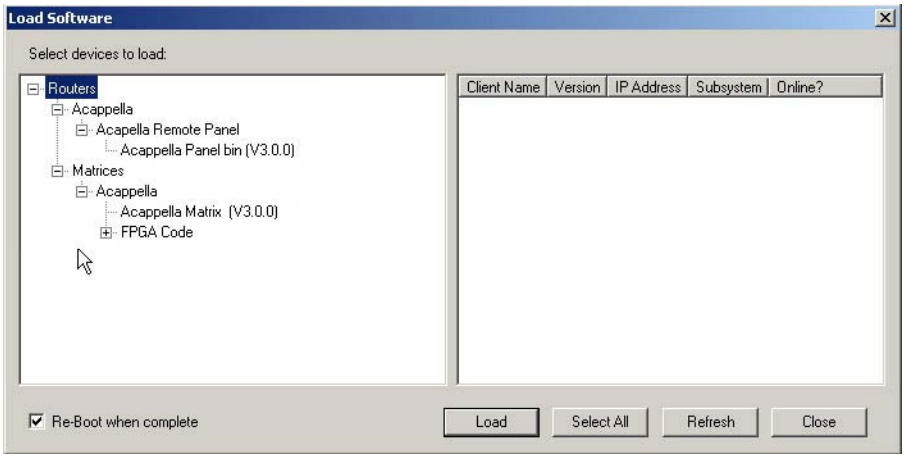
1. Open NetConfig and select the **Load SW** button in the toolbar.

Figure 18. Load SW



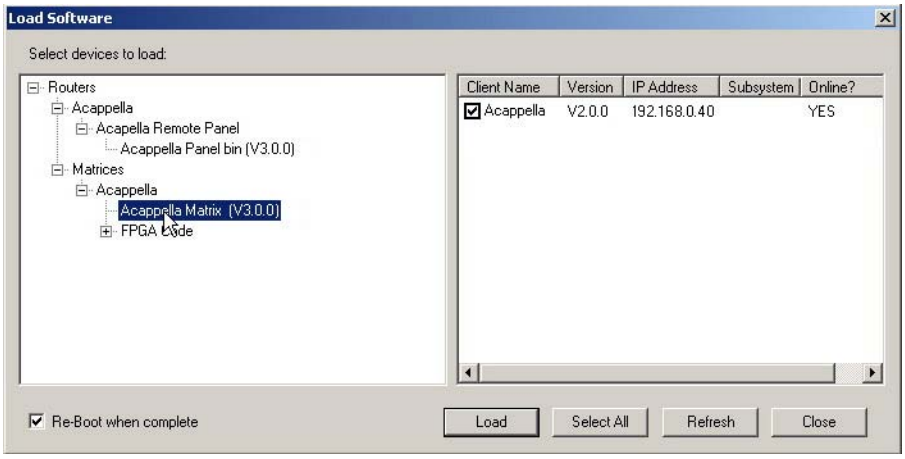
2. The Load Software window will open with Router displayed. Navigate through the folders to view the latest versions of Acappella panel and matrix software available for loading, as shown in Figure 19.

Figure 19. Update Devices Window



3. Highlight **Acappella Matrix** for Acappella matrices. Matrices will appear in the right pane of the window, see Figure 20.

Figure 20. Acappella Matrix



4. Check the box for the Acappella to update in the **Client Name** list.

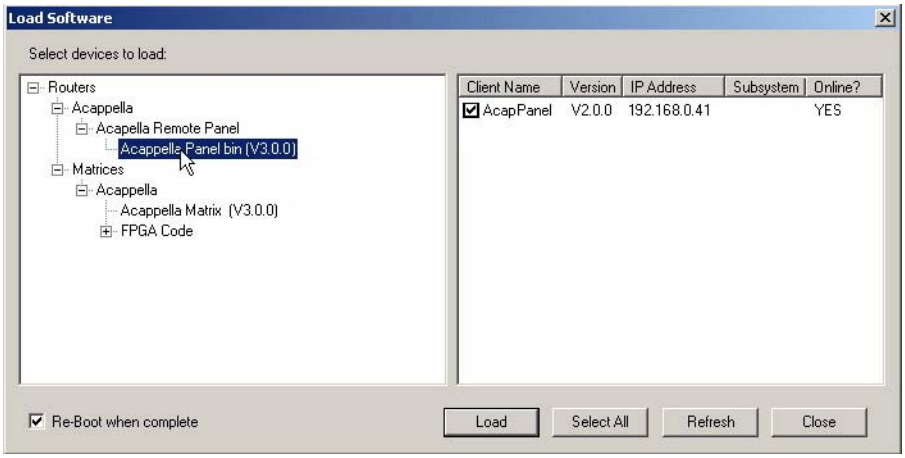
5. Check the **Re-Boot when complete** checkbox in the lower lefthand corner to have the matrix re-boot when the software update is complete.

6. Click the **Load** button to begin the update.

7. Once all matrix downloads are complete, use the **Refresh** button to update the window and check that the version of software has been downloaded to each selected device successfully.

8. Highlight **Acappella Panel bin** for Remote Panels. The Remote Panels on the network will appear in the right pane of the window, see Figure 21.

Figure 21. Remote Panels



9. Check the box for the Acappella Remote Panel to update in the **Client Name** list.

10. Check the **Re-Boot when complete** checkbox in the lower left corner to have the panel(s) re-boot when the software update is complete.

11. Click the **Load** button to begin the update.

12. Once all Panel downloads are complete, use the **Refresh** button to update the window and check that the version of software has been downloaded to each selected device successfully.

13. When finished, select the **Close** button.

Web Browser Interface

Enter the IP address set for the Acappella matrix frame or Remote panel into a web browser to access the Acappella configuration pages. If you don't know what these IP addresses are, you can use NetConfig to see the IP Addresses of all the devices on that network.

Acappella Configuration Pages

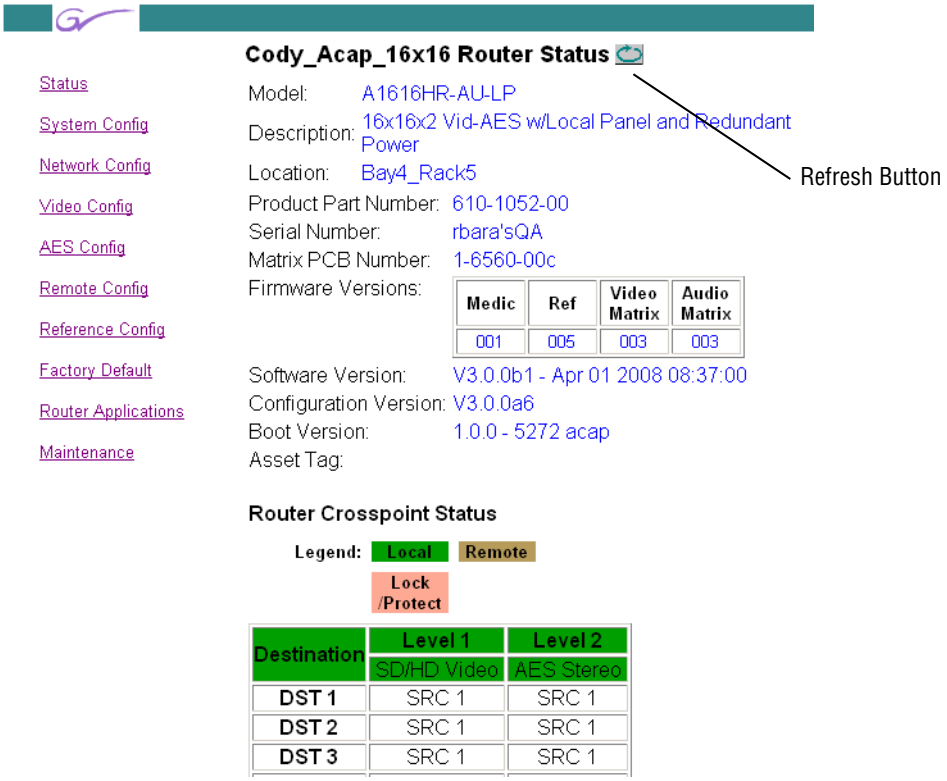
Router Configuration

Acappella routers use a set of web pages to provide information and to allow user defined configuration changes. The pages are accessed by either NetConfig or a web browser.

Router Status Page

The Router Status page is a read only page. Some of the information displayed here is entered automatically such as Product Part Number, Serial Number, etc. The Location and Asset Tag can be changed on a different page. The Level, Source (SRC), and Destination (DST), Crosspoint status will reflect the current state of the router when the page was accessed. To update the Crosspoint information click on the **Refresh** button.

Figure 22. Router Status Page



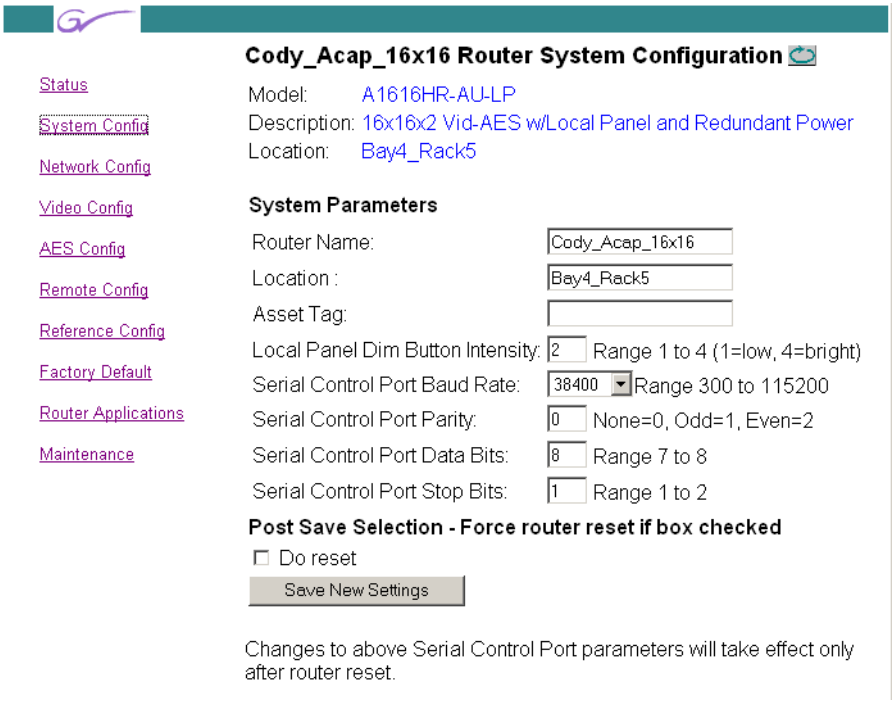
Refresh Button

An refresh button icon located at the top of this and other Acappella web pages updates the web page with the latest information (Figure 22).

Router System Configuration Page

The Router System Configuration page is used to make adjustments to the router system parameters.

Figure 23. Router System Configuration Page



The first three user configuration items are optional and can be left blank:

Router Name:

This field is used to give the router a unique name. The name entered here will appear at the top of each of the router web pages. The name will also appear in the NetConfig logical tree list under **IP View** and **Device View**. The field will accept up to 60 characters. However, it is recommended that entries be kept short to keep the name from wrapping.

Location:

This field is used to give the router a physical location name. The location entered here will appear in the header for each of the router web pages. The field will accept up to 60 characters. However, it is recommended that entries be kept short to keep the name from wrapping.

Asset Tag:

This field is used to track internal capital asset numbers that a user might assign to a router. The field will accept up to 20 characters.

The following two settings come from the factory with default settings. User adjustments can be made to these settings. The default settings can be restored on the *Router Factory Defaults Page* page.

Local Panel Dim Button Intensity:

This setting is used to adjust the button brightness at Low Tally.

Serial Control Port Baud Rate:, Parity:, Data Bits:, and Stop Bits:

These settings are used for serial interface settings for the 9 pin D connector on the router. These settings are configured according to the requirements of the controlling serial device.

The following two controls are used to change the settings:

Do reset

When checked, the router will be reset when the **Save New Settings** button is clicked.

Save New Settings

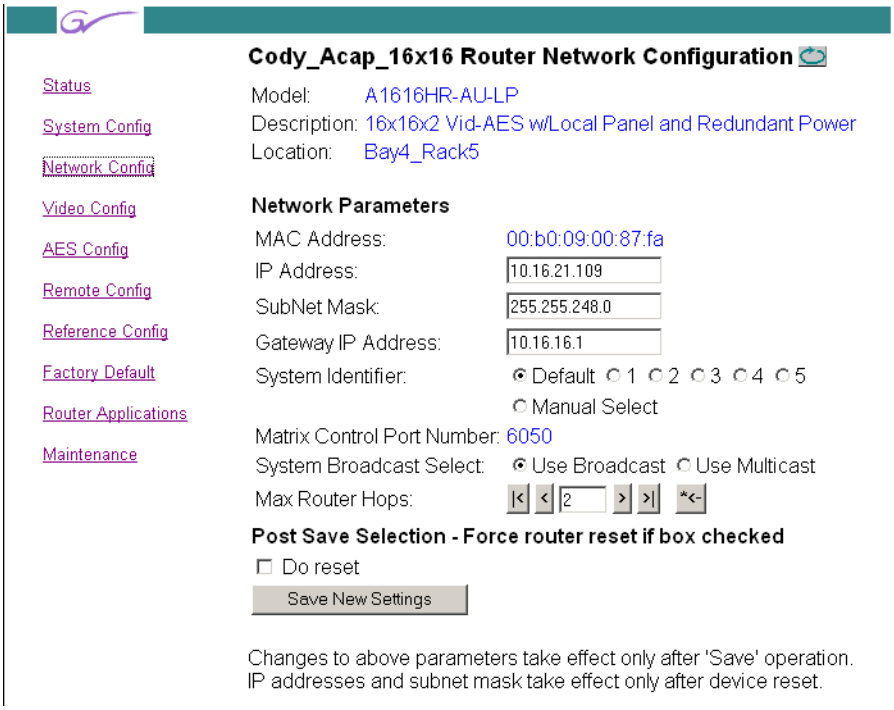
This button saves changes to the **Router Name**, **Location**, **Asset Tag**, and **Local Panel Dim Button Intensity** fields.

To view changes after clicking the **Save New Settings** button, click on the **Refresh** button.

Router Network Configuration Page

Router Network Configuration page is used to change the IP Address, SubNet Mask, and Gateway IP Address, of the router.

Figure 24. Router Network Configuration Page



Setting IP Addresses with Web Page

CAUTION If there is more than one panel or frame in a system, duplicate IP addresses may exist. To resolve duplicate IP Addresses see *Setting IP Addresses* *on page 52*.

The IP addresses of the device can be set directly from its web page by entering the new numbers in the **Ethernet IP:**, **Subnet Mask:** and **Gateway IP:** fields.

You will need to check **Do reset** and **Save New Settings** before the change will take effect.

System Identifier:

Leave this setting to **Default** on an Acappella system running on its own network.

If your Acappella system is running on a network shared by Prelude or Encore systems, you can isolate them from one another by assigning different ports for each system. The easiest way to do this is to assign one of the System Identifier buttons (Default, 1 - 5) to all the components of the first system, and then assign a different button to all the components of the

next system. The **Matrix Control Port Number** reports the actual port that will be used by the device. For example, if you wish to run an Acappella system on the same network as an Encore system, you can choose button **1** (port 6051) for the Acappella frame and all the Acappella panels. The Encore system can continue to use the default port setting (6050).

Note All components on an individual system must use the same System Identifier (port) number.

Alternatively, you can assign a specific port number to a device by choosing **Manual Select**, which opens a text entry field. This feature is intended only for qualified system administrators experienced with network configuration.

System Broadcast Select:

Leave this setting at **Use Broadcast** if your Acappella system has none or only a small number of remote panels (three or less).

Selecting **Use Multicast** makes this Acappella device employ a more efficient networking mechanism, useful for systems with several remote panels.

Note All components on an individual system must use the same Broadcast settings.

Router Video Configuration Page

The Router Video Configuration page is used to set parameters on a Destination by Destination basis.

Figure 25. Router Video Configuration Page

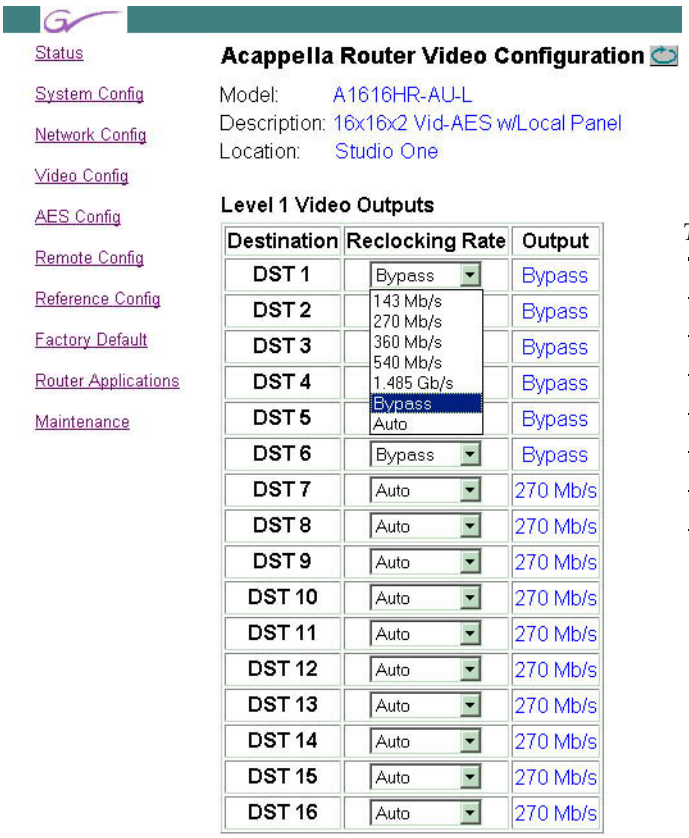


Table 2. Rates

143Mb/s	SD or Wideband
270 Mb/s	SD or Wideband
360 Mb/s	SD or Wideband
540 Mb/s	SD or Wideband
1.485 Gb/s	HD only
Bypass	Non-reclocking
Auto	Reclocking

Note Analog Video Acappella systems do not display a Video Configuration Page because there are no user adjustments of the analog video.

On Digital Video systems, the Router Video Configuration Page will not appear unless the Acappella router has a video level.

The default setting is **Auto**.

Auto reclocking will lock to a signal rate of either 143 Mb/s, 270 Mb/s, 360 Mb/s, 540 Mb/s, or 1.485 Gb/s (1.485 Gb/s is HD Wideband).

Bypass will pass the signal without reclocking.

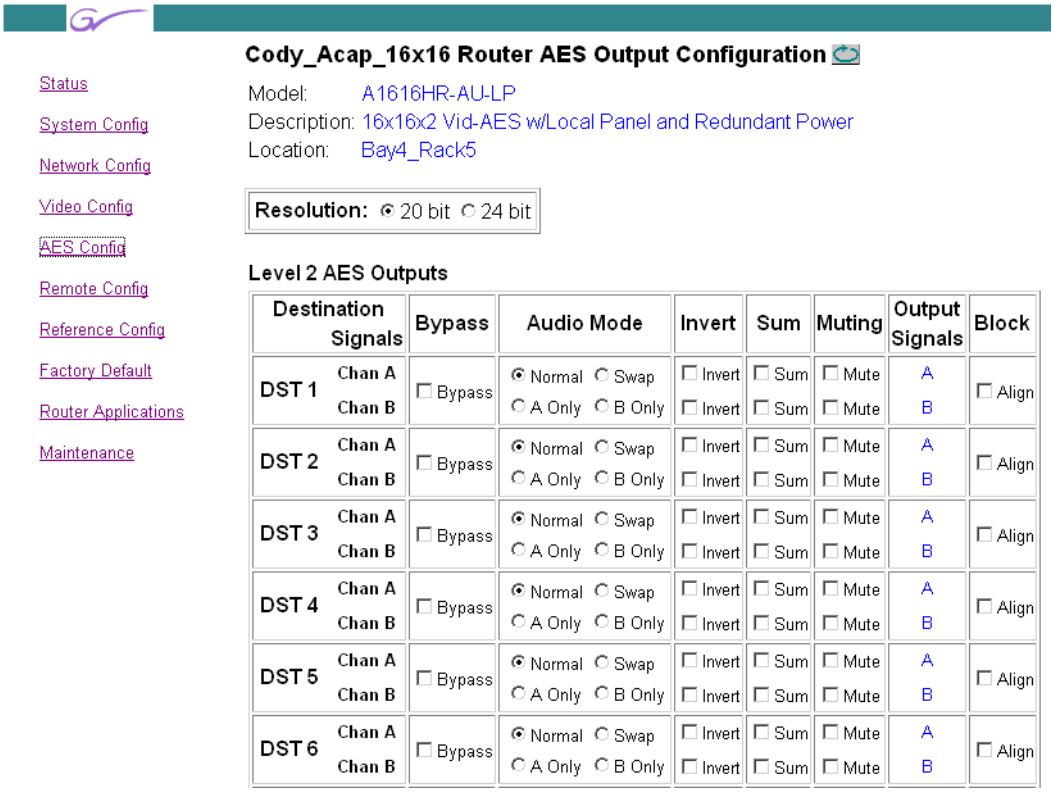
Selecting a signal rate such as 270 Mb/s will cause the Output to lock to the selected signal rate. If the incoming signal is not the selected rate the Output will be put into Bypass mode. For example, if the incoming signal is 1.485 Gb/s and the reclocking rate selected is 540 Mb/s which is incorrect, then the signal would be in Bypass with no reclocking and the Output would report Not Locked.

After selecting a new reclocking rate, the router will try to lock the Output to that rate. It may take several seconds and clicking the **Refresh** button to see the change. Figure 25 shows Bypass and Auto settings. If a signal rate such as 270 Mb/s is selected as the Reclocking Rate then the Output would show **270 Mb/s**.

Router AES Configuration Page

Note Analog Audio Acappella systems do not display an AES Configuration Page.

Figure 26. Router AES Output Configuration Page



Several digital audio attributes may be assigned. The defaults are Resolution **20 bit**, Audio Mode **Normal** (Stereo) and Block Align **On**.

Resolution:

This attribute determines how the signal bits are processed. A signal has 24 bits with the last four bits designated as auxiliary (AUX) bits.

In **20 bit** mode the four AUX bits pass through the router unaffected by any processing. If channels A and B are swapped, the four AUX bits stay in the same place. If the signal is muted, the four AUX bits are not muted.

In **24 bit** mode the router will treat the four AUX bits as though they are part of the audio data. If Channels A and B are swapped, the four AUX bits will swap locations. If the audio is muted, the four AUX bits will be muted.

The **Bypass** is setting is used to pass an asynchronous signal. Placing a Destination signal into **Bypass** mode makes the other settings in the table disappear. Unchecking the **Bypass** setting returns the last saved settings.

Figure 27. Bypass Mode

Destination Signals	Bypass	Audio Mode	Invert	Sum	Muting	Output Signals	Block
DST 1 Chan A Chan B	☑ Bypass					A B	

Audio Mode	Invert	Output Signals
◉ Normal ○ Swap ○ A Only ○ B Only	☐ Inve e ☐ Inv te	A B
○ Normal ◉ Swap ○ A Only ○ B Only	☐ In ute ☐ In Mute	B A
○ Normal ○ Swap ◉ A Only ○ B Only	☐ Mute ☐ Mute	A A
○ Normal ○ Swap ○ A Only ◉ B Only	☐ Mute ☐ Mute	B B

Invert	Sum	Muting	Output Signals
☑ Invert	☐ Sum	☐ Mute	-A
☑ Invert	☐ Sum	☐ Mute	-B
☐ Invert	☑ Sum	☐ Mute	A+B
☐ Invert	☑ Sum	☐ Mute	A+B
☑ Invert	☑ Sum	☐ Mute	-A-B
☑ Invert	☑ Sum	☐ Mute	-A-B

Muting	Output Signals
☑ Mute	Muted
☑ Mute	Muted

Audio Mode

There are four variations in this mode:

- **Normal** Channel A to Channel A and Channel B to Channel B,
- **Swap** Channel A to Channel B and Channel B to Channel A,
- **A Only** Channel A to Channel A and to Channel B, and
- **B Only** Channel B to Channel A and to Channel B.

Only one of the four variations can be active.

Invert

When a channel is inverted a - (minus sign) will appear in front of the A or B in the Output column.

Sum

When the channels are summed both an A and a B will appear in the Output column. A + (plus sign) will appear between the two letters unless the channels are inverted.

Mute

This attribute creates digital silence. **Mute** overrides all other settings. Removing a **Mute** restores the previously applied settings. If a Source lacking a signal is selected, the router will internally generate a synchronous silence signal to keep downstream equipment locked.

AES Attributes Reference

The AES Attributes are illustrated here for general reference. Acappella uses Channel A for Channel 1 or Left, and Channel B for Channel 2 or Right.

Figure 28. AES Attributes

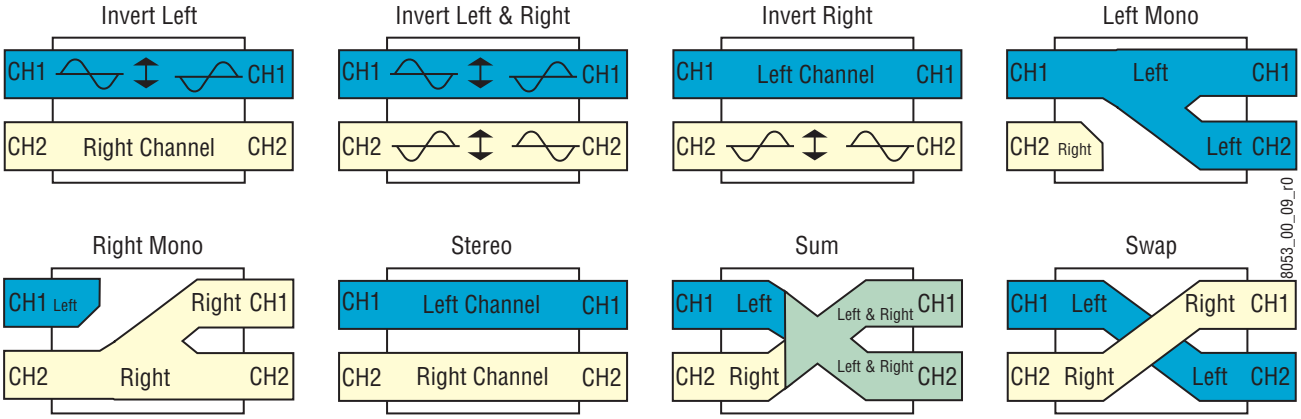


Table 3. AES Attributes

AES Attribute	Description
Invert Left	Inverts Left (Channel 1) only. Right (Channel 2) is not affected.
Invert Right	Inverts Right (Channel 2) only. Left (Channel 1) is not affected.
Right Mono	Right (Channel 2) is sent to both Channel 1 and Channel 2.
Sum	Left (Channel 1) and Right (Channel 2) are combined.

AES Attribute	Description
Invert Left & Right	Inverts Left (Channel 1) and Right (Channel 2).
Left Mono	Left (Channel 1) is sent to both Channel 1 and Channel 2.
Stereo	Neither Left (Channel 1) nor Right (Channel 2) is affected.
Swap	Left (Channel 1) and Right (Channel 2) are swapped.

Figure 29. AES Attribute Combinations

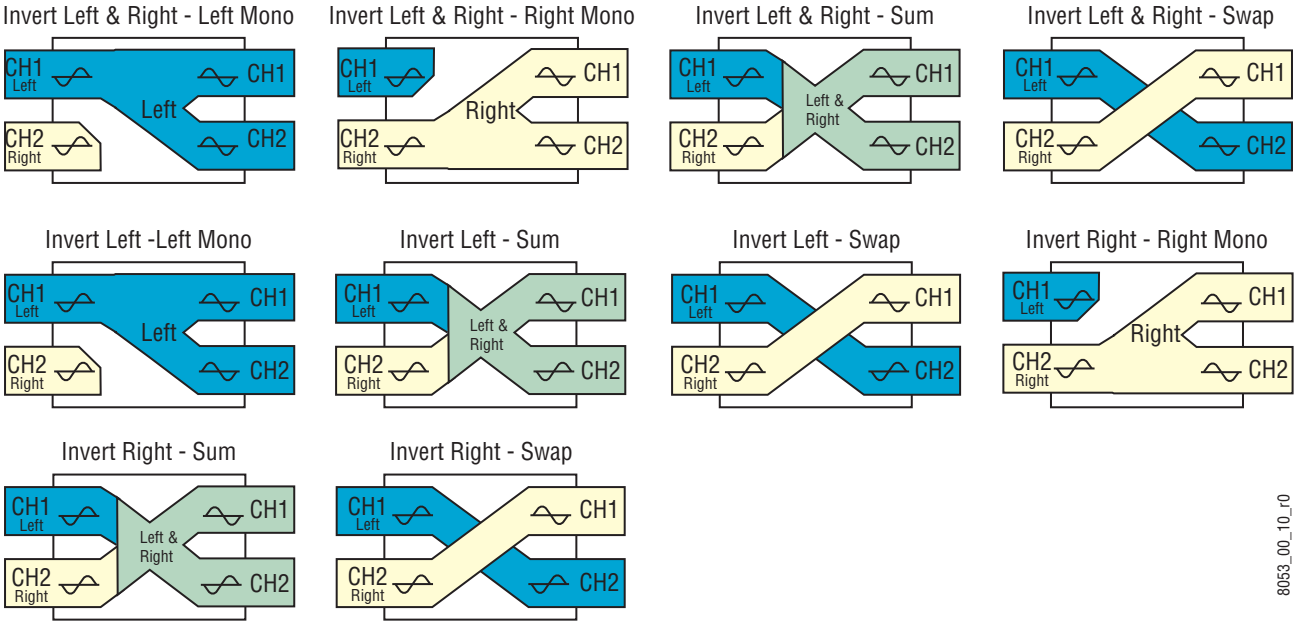


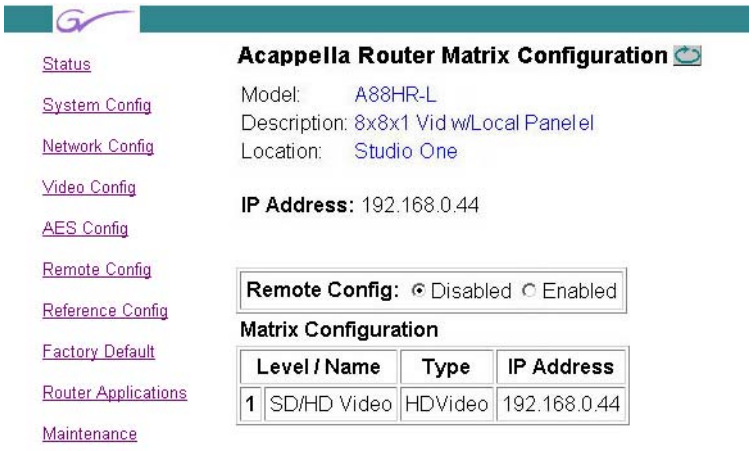
Table 4. AES Attribute Combinations

AES Attribute Combination	Description
Invert Left & Right - Left Mono	Inverts Left (Channel 1) and Right (Channel 2) then Left (Channel 1) is sent to both Channel 1 and Channel 2.
Invert Left & Right - Right Mono	Inverts Left (Channel 1) and Right (Channel 2) then Right (Channel 2) is sent to both Channel 1 and Channel 2.
Invert Left & Right - Sum	Inverts Left (Channel 1) and Right (Channel 2) then Left (Channel 1) and Right (Channel 2) are combined.
Invert Left & Right - Swap	Inverts Left (Channel 1) and Right (Channel 2) then Left (Channel 1) and Right (Channel 2) are swapped.
Invert Left - Left Mono	Inverts Left (Channel 1) no effect on Right (Channel 2) then Left (Channel 1) is sent to both Channel 1 and Channel 2.
Invert Left - Sum	Inverts Left (Channel 1) no effect on Right (Channel 2) then Left (Channel 1) and Right (Channel 2) are combined.
Invert Left - Swap	Inverts Left (Channel 1) no effect on Right (Channel 2) then Left (Channel 1) and Right (Channel 2) are swapped.
Invert Right - Right Mono	Inverts Right (Channel 2) no effect on Left (Channel 1) then Right (Channel 2) is sent to both Channel 1 and Channel 2.
Invert Right - Sum	Inverts Right (Channel 2) no effect on Left (Channel 1) then Left (Channel 1) and Right (Channel 2) are combined.
Invert Right - Swap	Inverts Right (Channel 2) no effect on Left (Channel 1) then Left (Channel 1) and Right (Channel 2) are swapped.

Router Remote Configuration Page

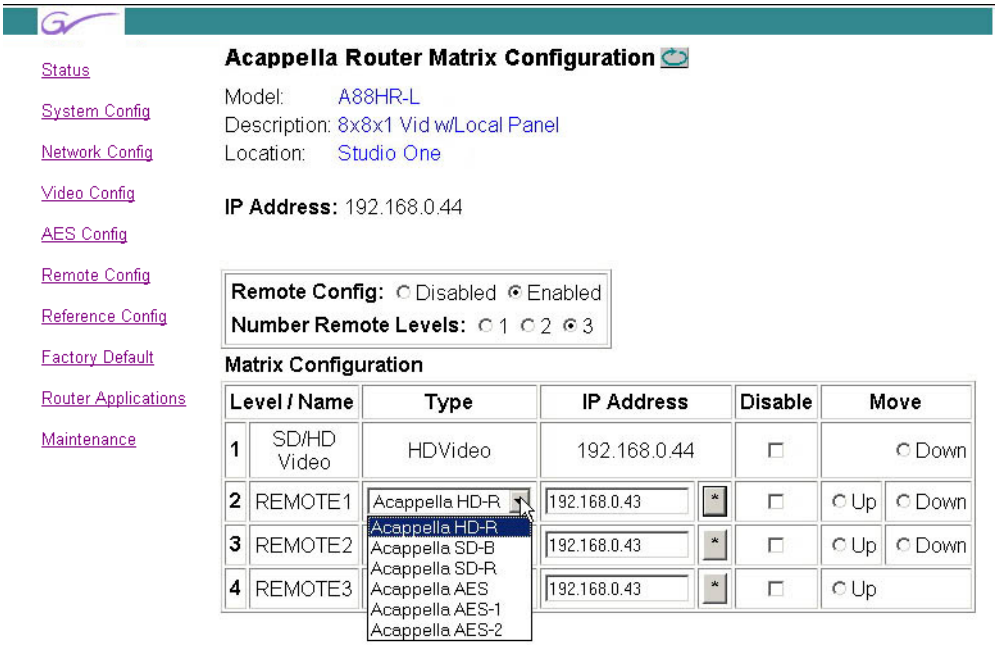
The Remote Configuration page allows you to create systems using more than one frame.

Figure 30. Local Frame with Remote Configuration Disabled



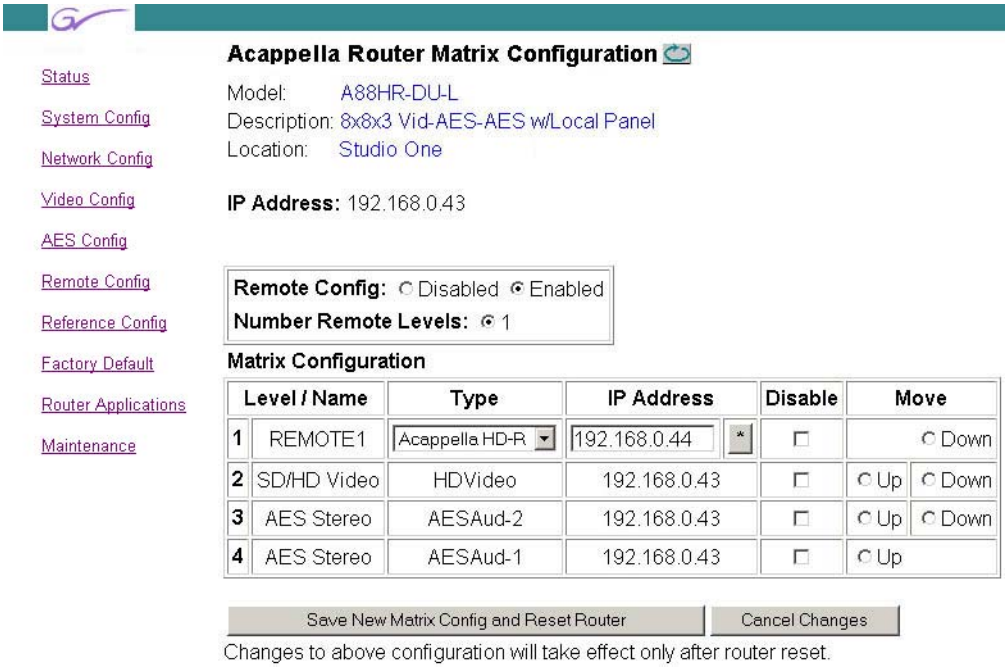
The example screens in Figure 31 and Figure 32 show two frames creating a four Level system. Figure 31 shows a frame that has a single Wideband HD reclocking 8x8 Level. By combining this frame with another frame that has a single Wideband HD reclocking 8x8 Level, and two Digital Audio AES 8x8 Levels (Figure 32), you have created a four Level system with two Levels of Video and two Levels of Audio.

Figure 31. Single Level Local Frame with Three Remote Levels



The order of levels in the configuration of the two frames must match. If the single Level frame is configured as Level 1, it has to be Level 1 on all frames in the system. You can create systems with up to 4 Levels. To change the order of the Levels use the Move column radio buttons.

Figure 32. Three Level Local Frame with One Remote Level



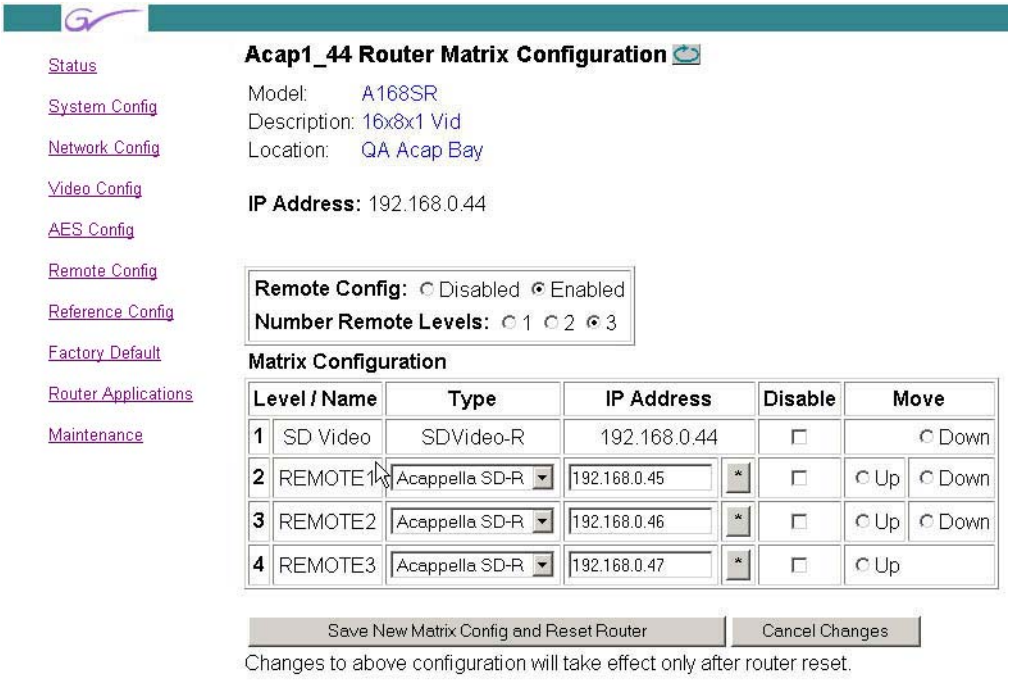
Create a Four Level HD Wideband System

This example uses four separate frames of 16x16 SD Digital Video to create a four level system.

1. Select first frame, enable 3 remote Levels on the Remote Config Web page.

2. Verify IP Addresses and Type are correct for remote Levels, select **Save New Matrix Config and Reset Router.**

Figure 33. First Frame Level 1



3. Select second frame, enable 3 remote Levels.

4. Use **Down** to move the Level to it proper place as Level 2.

Note To move Levels always use the **Up** and **Down** buttons, never try to reorder Levels using IP Addresses.

Figure 34. Second Frame Level 2 Move Down

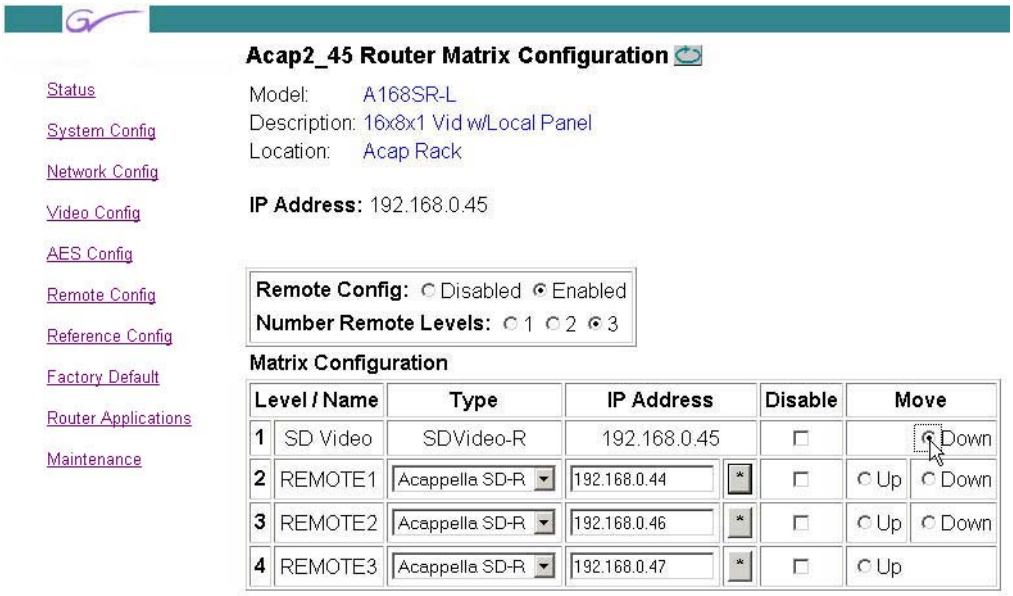
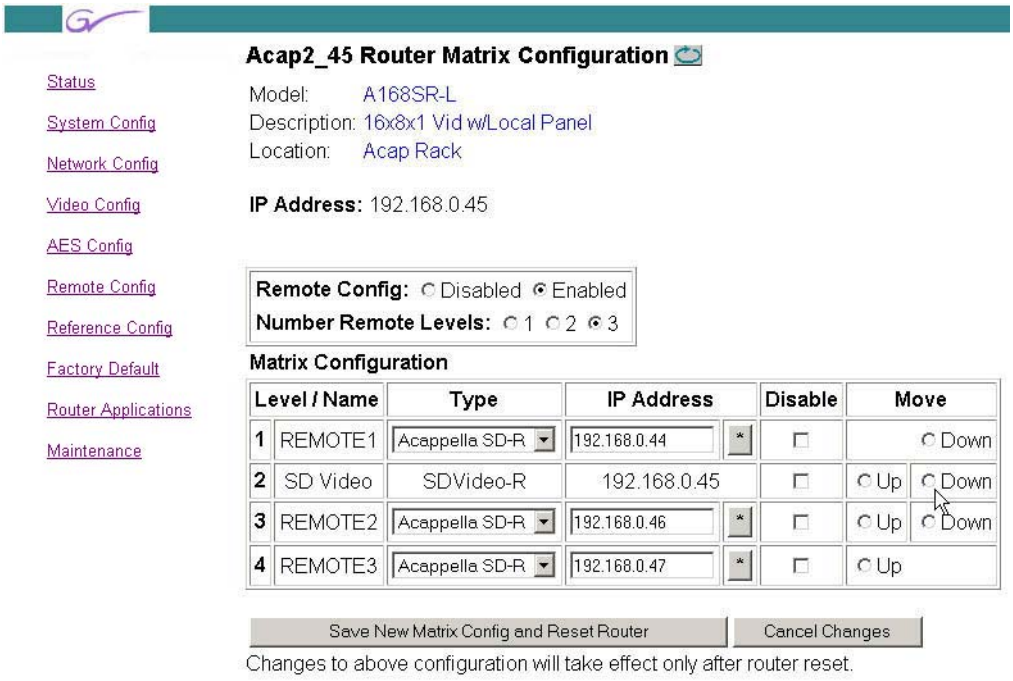


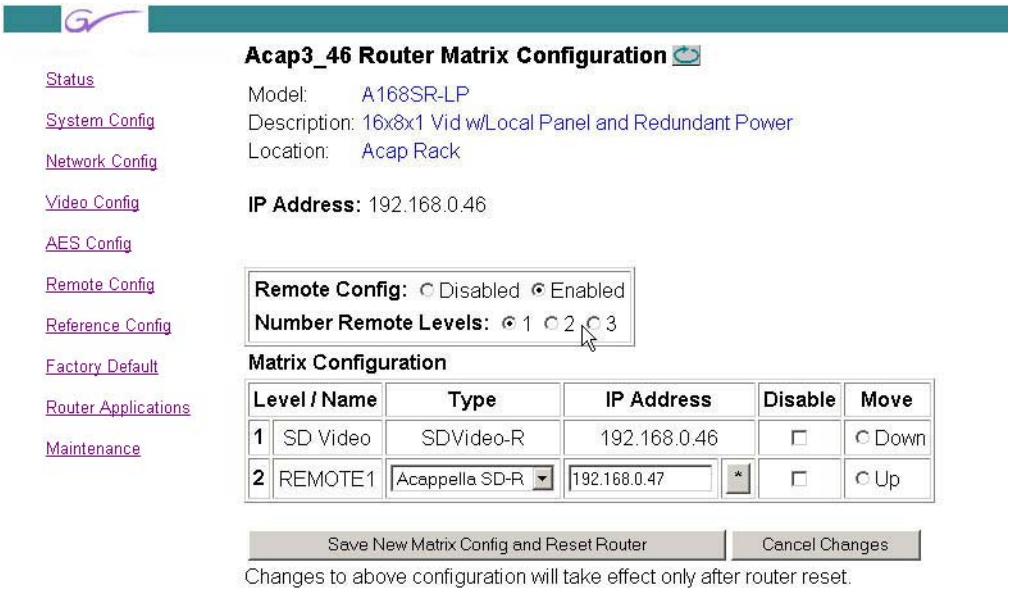
Figure 35. Second Frame Level 2



5. Verify IP Addresses and Type are correct for remote Levels, select **Save New Matrix Config and Reset Router**.

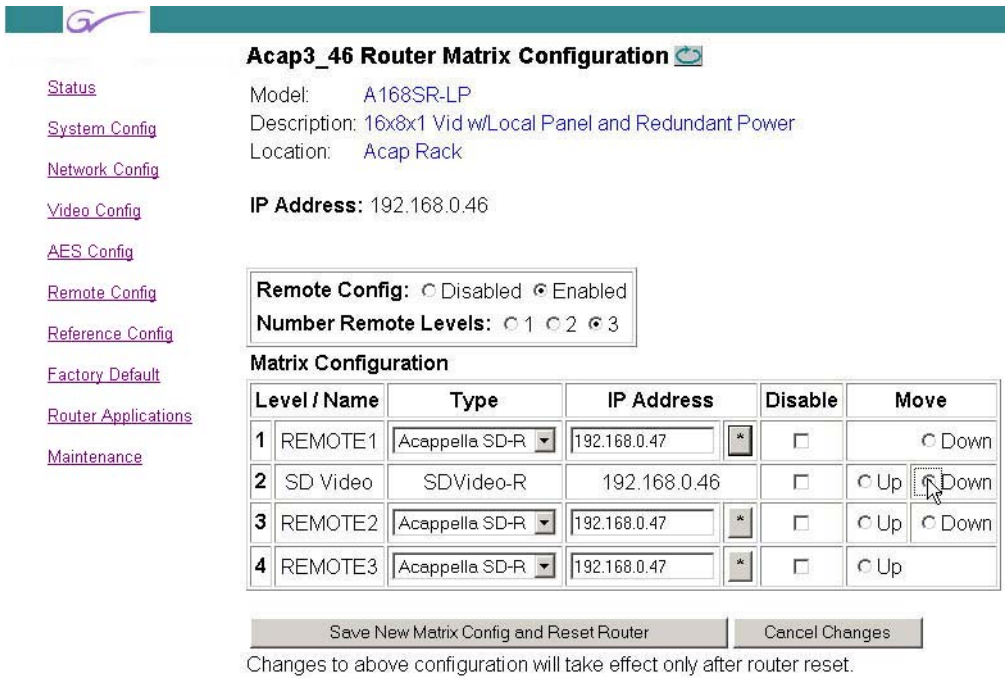
6. Select third frame, enable 3 remote Levels.

Figure 36. Third Frame Level 3



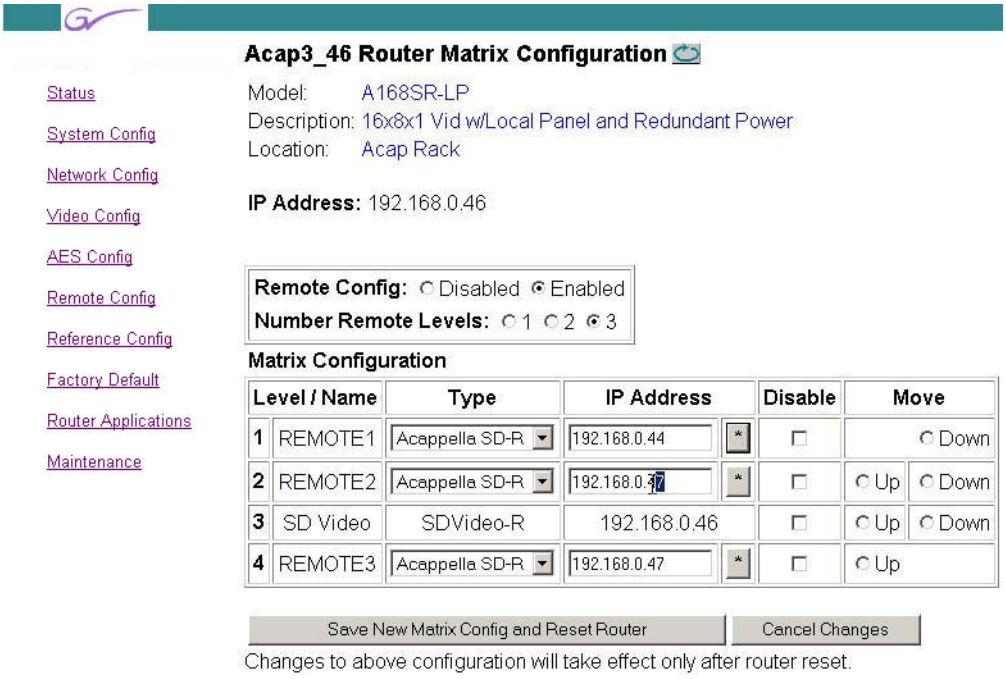
7. Use **Down** to move the Level to it proper place as Level 3.

Figure 37. Third Frame Level 3 Move Down



8. Verify IP Addresses and Type are correct for remote Levels, if not change, then select **Save New Matrix Config and Reset Router**.

Figure 38. Third Frame Level 3 After Move Down

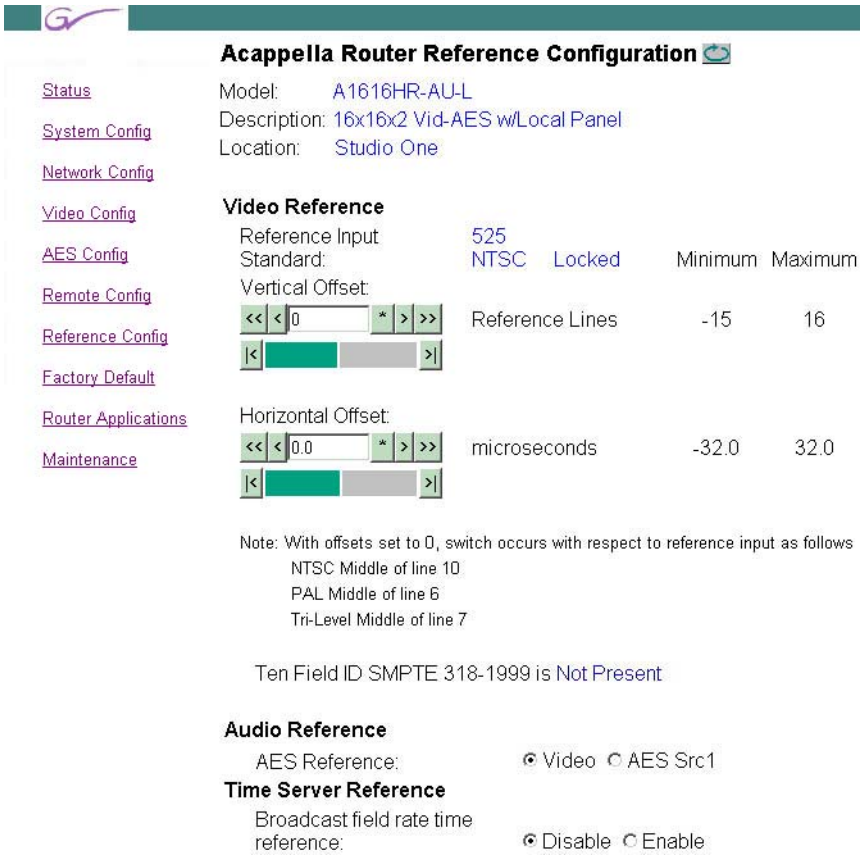


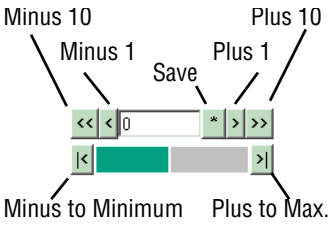
9. Select the fourth frame, enable three remote levels on the Remote Configuration page, order the levels to match the other three frames in the system, with frame four as Level 4.

Router Reference Configuration Page

Router Reference Configuration Page is used to make adjustments to the reference signal when the signal is out of zero time with the Source signals.

Figure 39. Router Reference Configuration Page





The video reference adjustments are set using the indicators as shown. The bar on the bottom of the indicator will move to the left and right to show how the current adjustment relates to the total range. There are two indicators, one for Vertical Offset and one for Horizontal Offset. With Offsets set to zero (0), switches occur with respect to reference input.

The default setting depends on your reference signal; NTSC is middle of line 10, PAL is middle of line 6, and Tri-Level is middle of line 7.

The Audio Reference default is to use the Video Reference. To use an AES signal as the Audio Reference select **AES Src1**. See *Reference Cabling* *on page 35* for signal cabling requirements. If AES Src 1 is selected and the signal connected to Source 1 is either not a continuous feed or is missing then **Invalid** will appear. If the signal is connected correctly and is the right type then **AES Present** will appear.

The time Server Reference needs to be enabled to get accurate frame boundary switching. In any system with more than one Acappella frame, one frame will show **State: Server** and the rest of the frames will show a **State: Client**.

Figure 40. Server and Client States

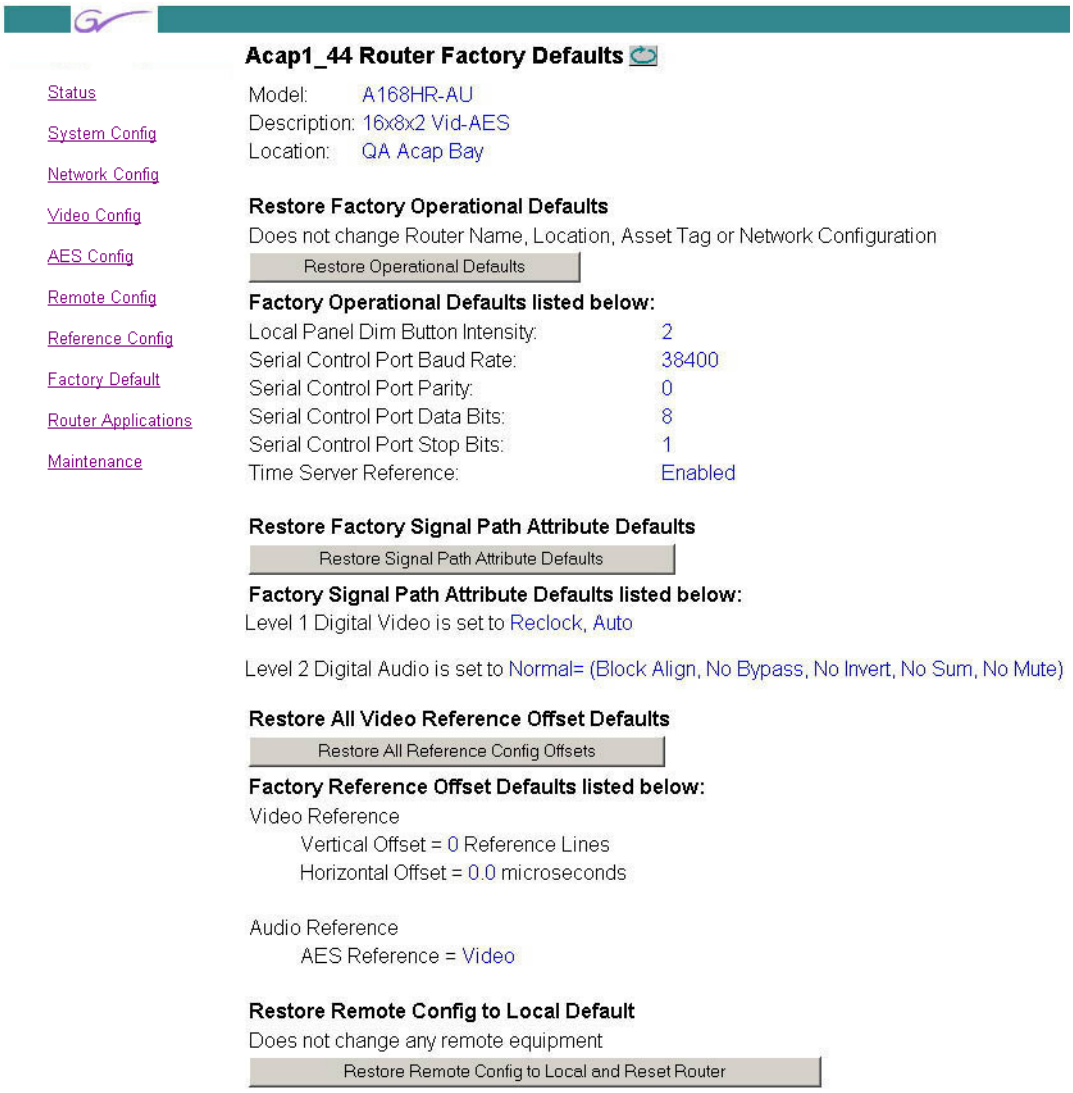
In a system with only one frame and no remote panel the State will show **Sleep**.

Note The only time the Time Server is not needed is if there is only one Acappella frame and no remote panels in the system, or if Acappella is being controlled by Encore.

Router Factory Defaults Page

Router Factory Defaults page shows the settings for the items that have factory defaults. To restore the listed settings to the factory defaults click on the **Restore Defaults** button.55

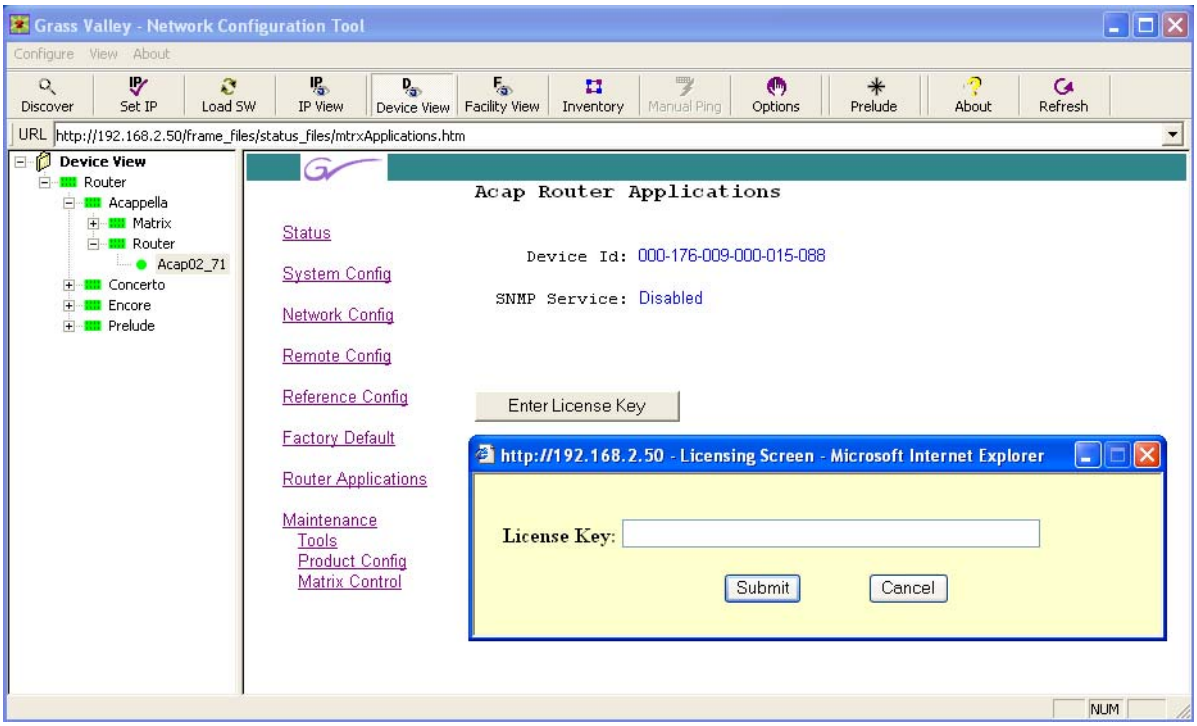
Figure 41. Router Factory Defaults



Acap Router Applications Page

The Acap Router Applications page shows the Device ID of the matrix, and permits entering License Key information for the SNMP option (Figure 42).

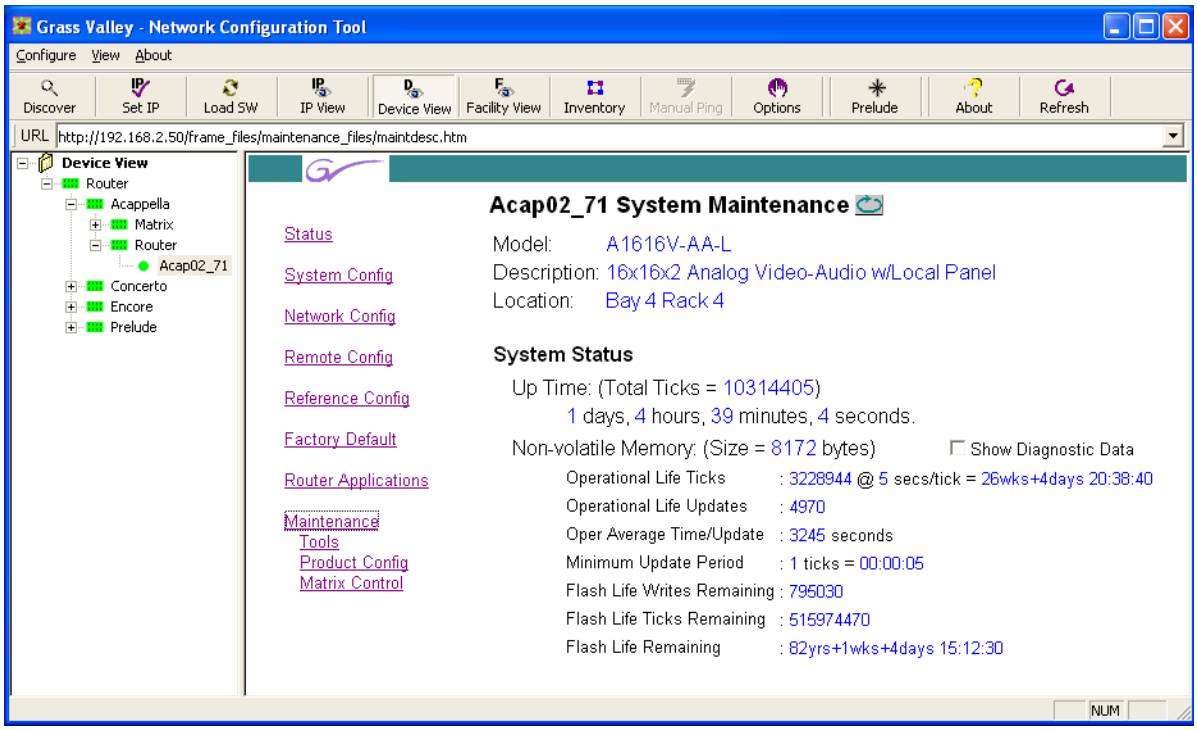
Figure 42. Acap Router Applications



Maintenance Page

The System Maintenance pages are intended only for use by factory engineers for testing and troubleshooting (Figure 43).

Figure 43. Maintenance Pages

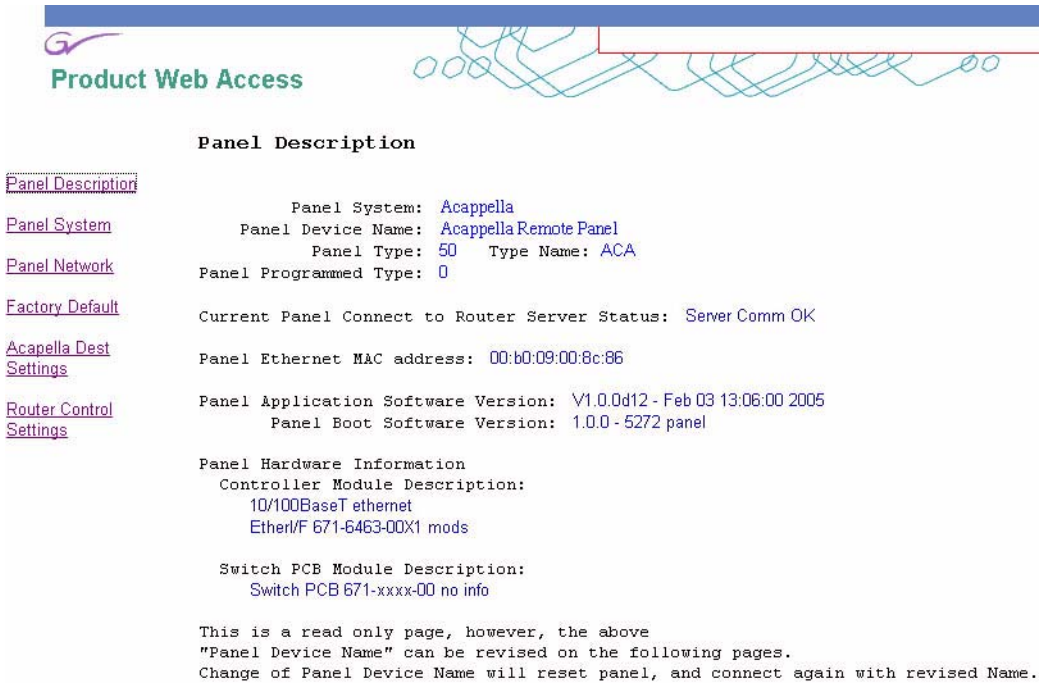


Remote Panel Configuration

Panel Description Page

Panel Description page is a read only page. All of the information displayed here is entered automatically except the Panel Device Name which is entered on a different page.

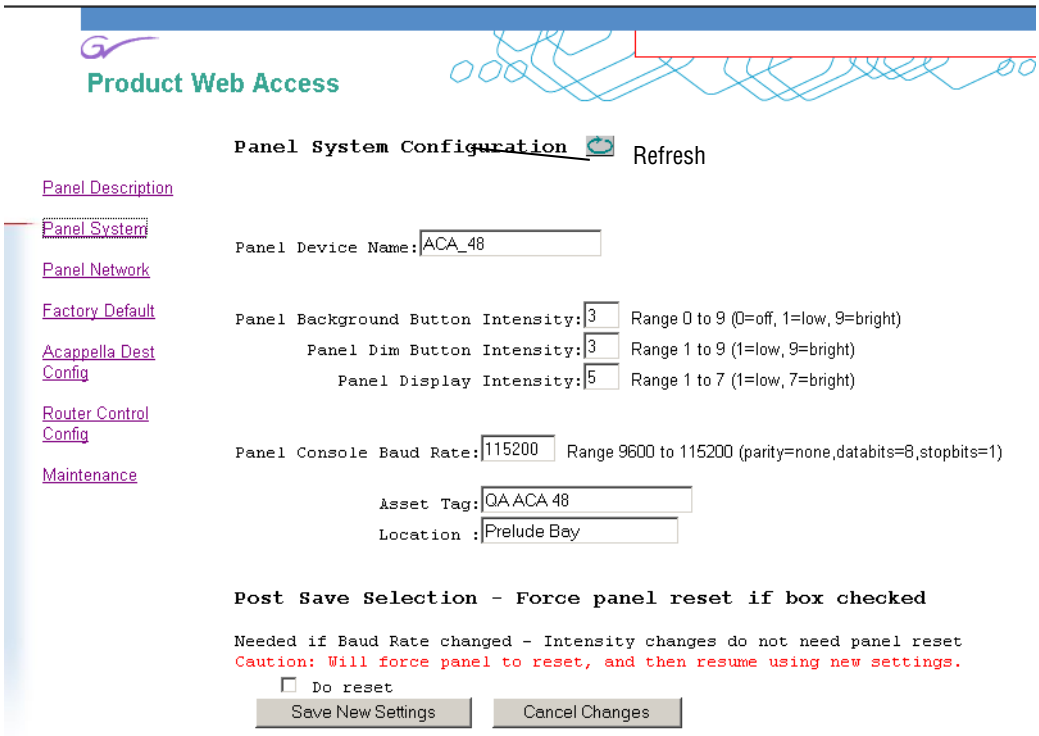
Figure 44. Remote Panel Description Page



Remote Panel System Configuration

Panel System Configuration page is used to make adjustments to the Remote Panel.

Figure 45. Remote Panel System Configuration Page



Panel Device Name:

The panel device name field is optional. This field is used to give the remote Panel a unique name. The name entered here will appear at the top of each of the Remote Panel pages. The name will also appear in the NetConfig logical tree list. The field will accept up to 60 characters. However, it is recommended that entries be kept short to keep the name from wrapping.

Asset Tag:

This field is used to track internal capital asset numbers that a user might assign to a remote panel. The field will accept up to 20 characters.

Location:

This field is used to give the remote panel a physical location name. The location entered here will appear in the header for each of the remote panel web pages. The field will accept up to 60 characters. However, it is recommended that entries be kept short to keep the name from wrapping.

The following settings come from the factory with default settings. User adjustments can be made to these settings. The default settings can be restored on the *Remote Panel Network Configuration* page.

Panel Background Button Intensity:

This setting is used to adjust the button background brightness. This is primarily used to illuminate the panel so the buttons can be seen in a dark environment.

Panel Dim Button Intensity:

This setting is used to adjust the button brightness at Low Tally.

Panel Display Intensity:

This setting is not used.

Panel Console Baud Rate:

This setting is used to adjust the Baud rate.

Save New Settings

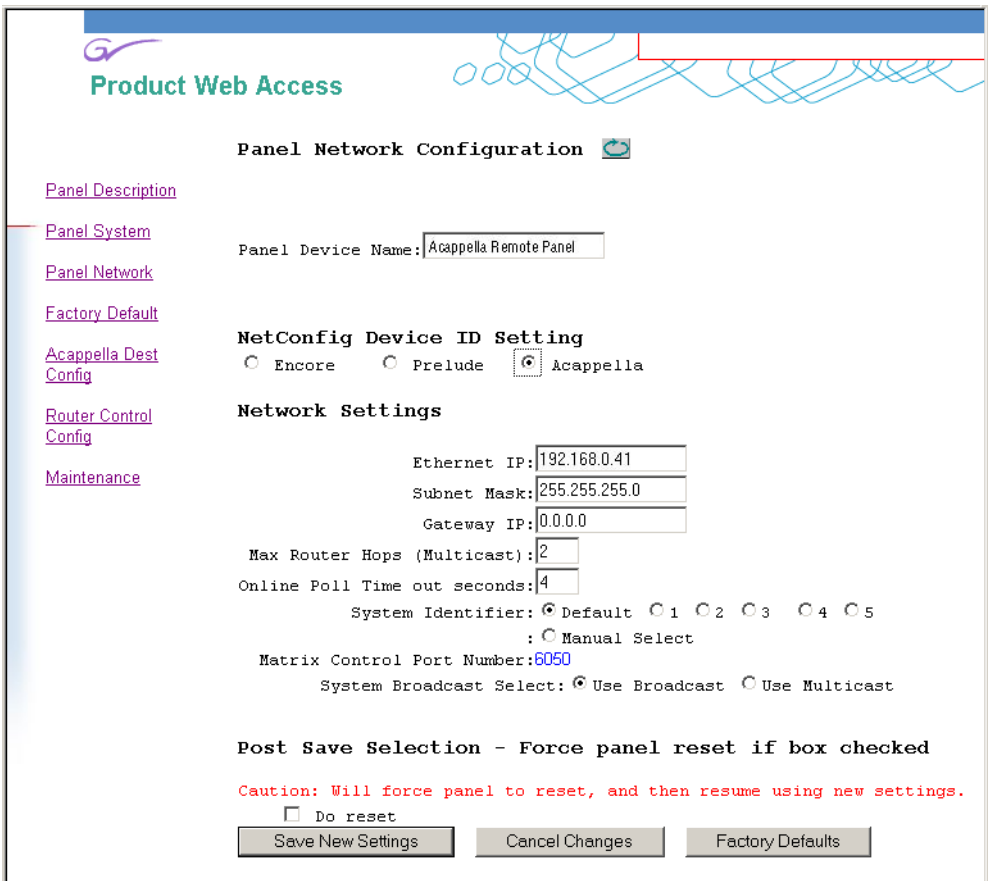
This button saves changes to the **Router Name**, **Local Panel Dim Button Intensity**, **Panel Display Intensity**, and **Panel Console Baud Rate** fields (reset is required to save Baud Rate changes). To view changes after clicking the **Save New Settings** button, click on the **Refresh** button.

Note Intensity changes do not need panel reset, changes are saved by pressing **Enter**.

Remote Panel Network Configuration

The Panel Network Configuration page is used to change the IP Address, SubNet Mask, Gateway IP Address, and Ethernet Port for the panel.

Figure 46. Remote Panel Network Configuration Page



Setting IP Addresses with Web Page

CAUTION If there is more than one panel or frame in a system, duplicate IP addresses may exist. To resolve duplicate IP Addresses see *Setting IP Addresses on page 52*.

The IP addresses of the device can be set directly from its web page by entering the new numbers in the **Ethernet IP:**, **Subnet Mask:** and G**ateway IP:** fields.

You will need to check **Do reset** and **Save New Settings** before the change will take effect.

NetConfig Device ID Setting:

These buttons report the current identity of the control panel. Leave this setting on **Acappella** for use with an Acappella system.

System Identifier:

Leave this setting to **Default** on an Acappella system running on its own network.

If your Acappella system is running on a network shared by Prelude or Encore systems, you can isolate them from one another by assigning different ports for each system, using the System Identifier buttons. See *System Identifier: on page 60* for an explanation of this feature.

Note All components on an individual system must use the same System Identifier (port) number.

System Broadcast Select:

Leave this setting at **Use Broadcast** if your Acappella system has none or only a small number of remote panels (three or less).

Selecting **Use Multicast** makes this Acappella device employ a more efficient networking mechanism, useful for systems with several remote panels.

Note All components on an individual system must use the same Broadcast settings.

Saving Settings

You must select **Do Reset** and click on **Save New Settings** before any changes made to this page will take effect. Remember that all components of a specific system must have the same port settings, so if you change this you must change all the others components to match.

Remote Panel Factory Defaults

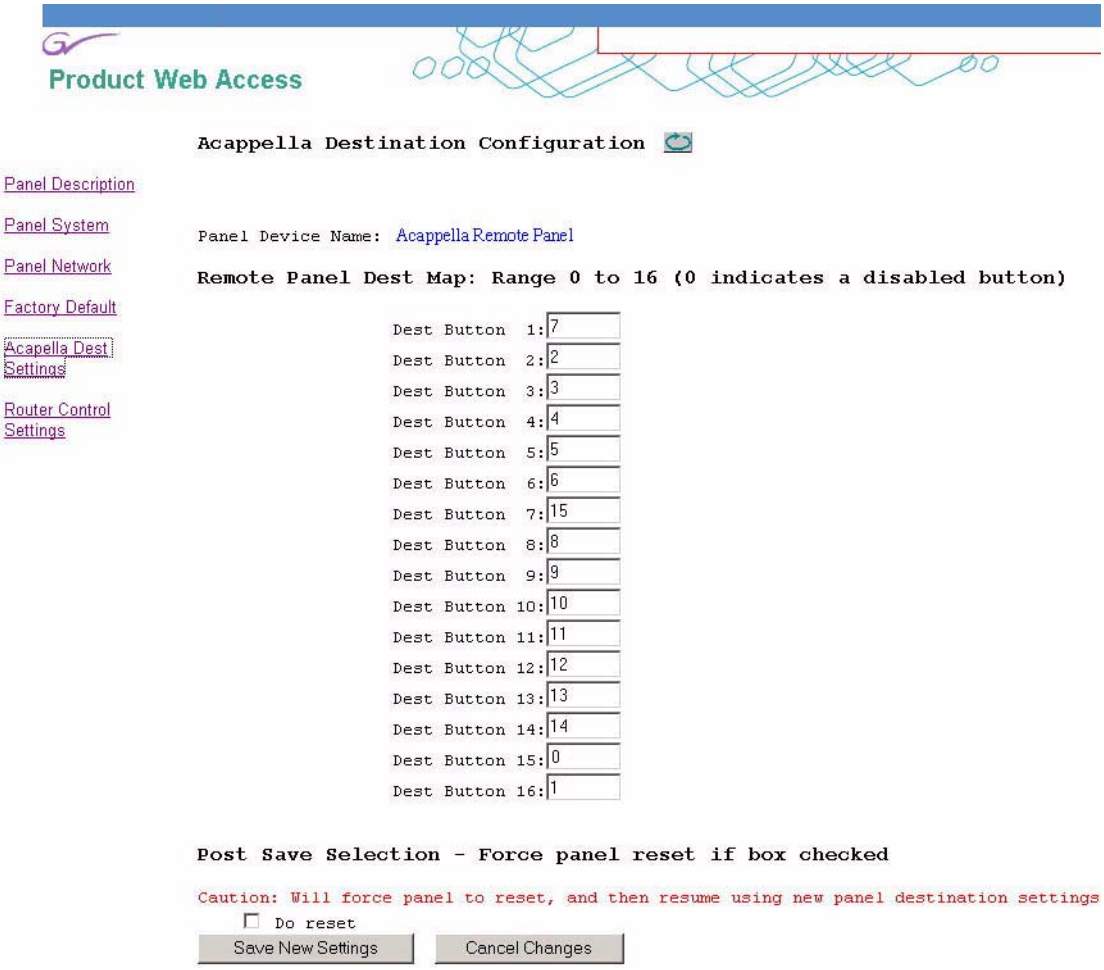
Panel Factory Defaults page displays the factory default settings. This is a read only page.

Figure 47. Remote Panel Factory Defaults Page

Remote Panel Acappella Destination Configuration

Destination Configuration page is used to assign physical connector to specified Destination button. A reset is required for reassignments to take effect.

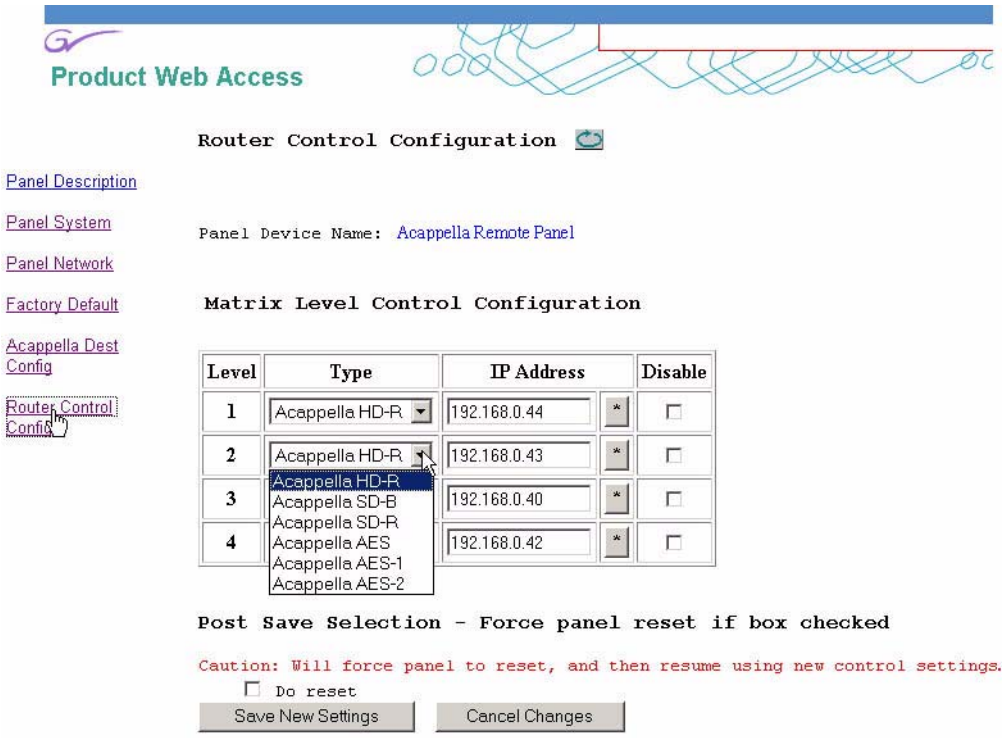
Figure 48. Remote Panel Destination Configuration Page



Remote Panel Router Configuration

This Router Configuration page is used to select Levels to be used by the Remote Panel.

Figure 49. Router Configuration Type



Select the Acappella Router Level type from the dropdown menu (Table 5) and enter the IP Address of the router.

Table 5. Level Types

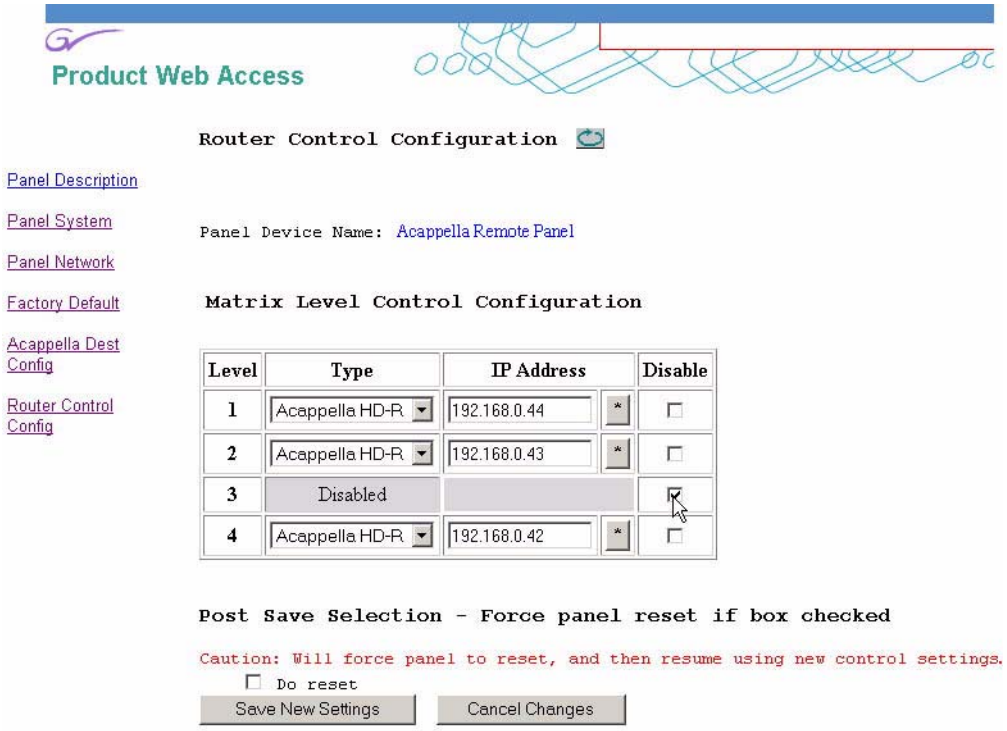
Acappella HD-R	HD Wideband Digital Video Reclocking
Acappella SD-R	SD Digital Video Reclocking
Acappella SD-B	SD Digital Video Non-reclocking
Acappella AES	AES/EBU Digital Audio
Acappella AES-1	AES/EBU Digital Audio Dual Stream 1
Acappella AES-2	AES/EBU Digital Audio Dual Stream 2

Check **Do reset** and click **Save New Settings** to apply selection.

Remote panels can use Levels from any Acappella frame in the system.

To use fewer than four Levels select the Disable box for the Level. See Figure 50.

Figure 50. Router Configuration Type



External System Control of Acappella

Serial Control

An Acappella router can be controlled using the 9 pin RS-422 D connector on the rear of the router. Acappella supports the Terminal/Computer Interface (T/CI) protocol that employs synchronous serial ASCII commands.

Commands may be issued to control the router by either an operator entering commands manually (using a terminal interface like hyperterminal), or by an automation or other external system. This connection is point-to-point; a cable from the serial connector on the Acappella router to the command Input device.

Note Refer to the latest version of the *Routing Products Protocols Manual* for information about the Terminal/Computer Interface (T/CI) Protocol used to control Acappella systems. This manual is available for download on the Grass Valley web site (see page 4).

Encore Control

Acappella Matrix

An Acappella matrix can be controlled directly by an Encore system. The Acappella matrix is treated the same as other matrices (Concerto for example) and communicates via Ethernet.

An Acappella matrix is configured for control by Encore using the same procedures as other matrix types. However, each Acappella frame can be configured with only one video level and one audio level. Multiple video or audio levels (up to four each) require multiple Acappella frames.

Control Panels

Acappella, Encore, and MS7000 remote panels used to control Acappella matrices through the Encore system are configured the same as panels controlling other matrix types. If you use Acappella remote panels to control multiple frame Acappella matrices (multiple levels), you will also need to use Acappella frame web pages for configuration (see *Remote Panel Router Configuration* *on page 85*).

5

Maintenance and Troubleshooting

Field Replaceable Units

Acappella frames are not serviced in the field. Return faulty units to a designated repair depot. Contact Customer Service. (See *Contacting Grass Valley* *on page 4*.)

Troubleshooting

Check Connections

- Connections should be tight and electrically sound
- Cables should be checked for damage

Check Inputs

- AC power connections,
- Signal input (video, audio) must be present and within specifications,
- Cable length should be within recommended limits,
- Reference Signal must be present, within specifications, and must not be electrically noisy, and
- Input Video Signals are required to be zero timed for proper switch point.

Problems and Solutions

Switching Problems

Switching Latency

All crosspoints involved in a Take do not switch in the same vertical interval. This can be caused by noisy or missing VI Reference signal and/or incorrect timing on the Input signals. All Input Video signals are required to be zero timed. Digital Audio signals are automatically phased to the Reference signal.

If using a remote panel, check that the Time Server Reference setting is enabled on the Router Reference Configuration web page.

SNMP Monitoring

Acappella supports the Simple Network Management Protocol (SNMP) for system monitoring. SNMP Agents reside on the monitored equipment, and SNMP monitoring software residing on a PC communicate to accomplish the system monitoring.

SNMP messages originating from Thomson Grass Valley equipment conform to the following standards:

- 1157 - SNMP v1
- 1901-1907 - SNMP v2c
- 3416 - Protocol Operations for SNMPv2
- MIB-II - (SysGroup and SNMP Group only)

SNMP Managers

Note Customers using the Thomson Grass Valley NetCentral application receive the required Management Information Bases (MIBs) with the NetCentral software. Customers using a Third Party SNMP Manager should contact Customer Service for instructions on obtaining MIBs.

NetCentral SNMP Manager

The Thomson Grass Valley NetCentral system is a suite of software modules, residing on one or more centrally located PC-compatible computers. These modules work together to monitor and report the operational status of devices using Simple Network Management Protocol (SNMP). The NetCentral product is sold separately.

Acappella SNMP Software supports the following MIBs:

- Thomson Common Matrix MIB
- GVG-Acappella MIB
- GVG-Element MIB

Third Party SNMP Managers

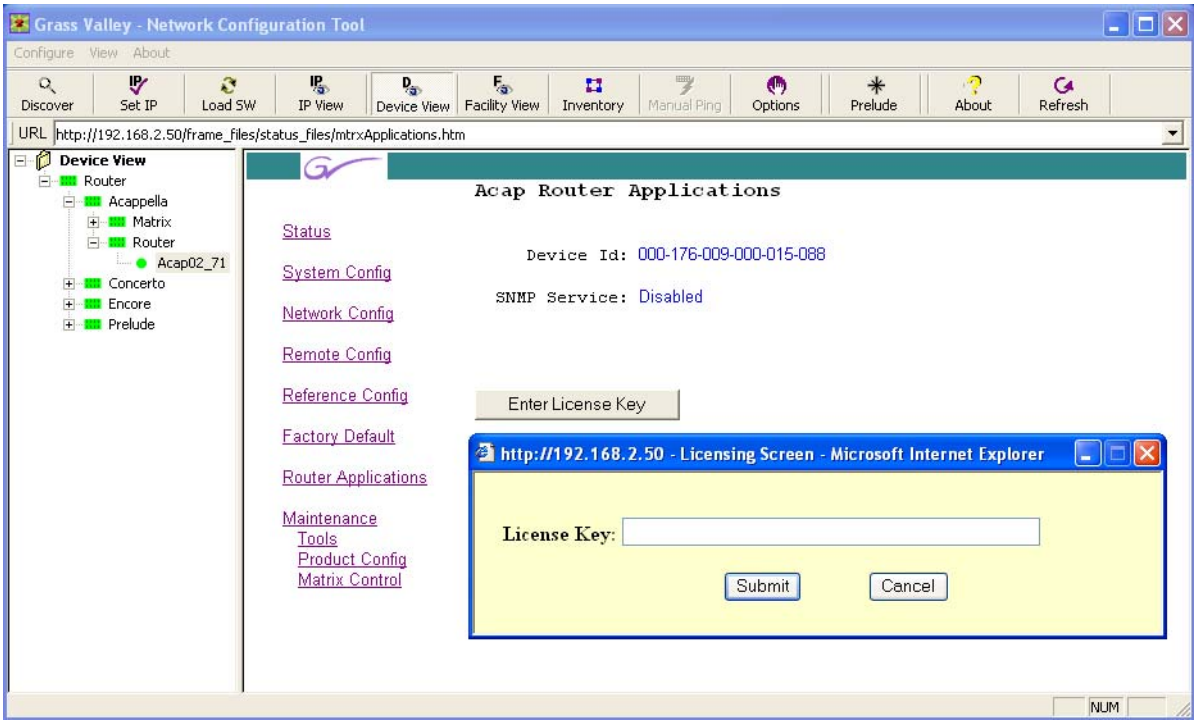
Other industry standard Third Party SNMP Managers can monitor Acappella matrices. For their installation & configuration, please contact your SNMP Manager Software vendor.

Acappella SNMP Agent Licensing

The Acappella SNMP Agent is an optional component. A License Key is needed to activate the SNMP Agent. Each license key is valid for an individual Acappella matrix, and is generated based on the Device ID of that matrix. The license is purchased from Thomson Grass Valley sales, and the license key is obtained from Customer Support by providing them the Device ID(s) and purchase confirmation.

The Acappella Device ID is displayed on the Acap Router Application web page. Clicking on the **Enter License Key** button opens a window allowing entry of the license key (Figure 51).

Figure 51. Acappella Device ID and License Key Entry



Monitored Acappella Matrix Parameters

The following groups of parameters can be monitored with the Acappella SNMP Agent software.

Table 6. Acappella Monitored Parameters

Category	Parameter	Description
General Information	Frame Type	Identify the frame type, e.g.: Acappella_Frame
	Router Name	Acappella Matrix Name configured from the Web page.
	Model No	Model number of Acappella matrix, such as A88SR-DU-LP
	Description	example: 16x4x2 Vid-AES
	Product Part Number	example: 610-1196-00
	Firmware Name	Name of the firmware, such as Medic FW, Reference FW, Video Matrix FW etc.
	Firmware Version	Version of the Firmware, such as 001, 005 etc.
	Software Version	
	Configuration Version	example: V3.0.0d1
	Boot Version	example: 1.0.0 - 5272 acap
	Location	Location of Acappella matrix. This can be configured from SNMP Manager, as well as Web page. This is stored as persistent data, so is retained across reboots.
	Asset Tag	Asset tag of Acappella matrix. This can be configured from SNMP Manager, as well as Web page. This is stored as persistent data, so is retained across reboots.
Network Information	IP Address	
	Subnet Mask	
	Gateway Address	
Product Configuration	Config Version	Version number of Acappella configuration.
	Number of Sources	
	Number of Destinations	
	Number of Levels	
	Number of Channels	
	Number of Controllers	
	Physical Matrices	
Control Point Information	Control Point IP Address	IP Address of the Control point that is configured in Acappella Matrix
	Control Point Status	Status of the Control point, such as Active/Faulty/Missing.
	Control Point Type	Type of the control point such as Controller or NP Client.
Reference Signal Information	Reference Name	Name of the reference signal currently connected to Acappella Matrix, such as Video Reference #1 etc.,
	Reference Status	Status of the reference signal, such as Present/Faulty/Missing
Frame Fan Information	Fan Name	Name of the Fan such as Fan #1, Fan #2
	Fan Status	Running or Missing

Table 6. Acappella Monitored Parameters - (continued)

Category	Parameter	Description
Input / Output Signal Information	Signal Alias	The Alias name of the signal.
	Signal Type	Signal type, such as SD/HD Video, AES signal etc.,
	Signal State	State of the signal, such as Detected/Not Detected etc.,
	Signal Last Changed	Time at which signal state was last changed.
	Signal Specific	This an OID and can be used to extend the signal information to another table.
	Signal Notify	Indicates the current status of Signal Alarm Config and allows a manager to control whether or not the agent will generate the Signal State notification.
	Matrix Index Number	Indicates the matrix index number of current signal.
	Connector Number	Gives the current connector number of signal.
	Signal Description	Signal description, such as SD/HD Video, AES signal etc.,
	Output Connected To	Matrix Input connector number currently connected to output. If the signal is an input signal, this value will be -1.

Acappella Matrix Traps

The following events are monitored by the Acappella SNMP agent software and trap messages can be sent to all configured SNMP managers.

Table 7. Acappella Trap Messages

Trap	Description
Reference Signal	If Acappella matrix loses Reference signal a trap message is sent to the manager. This error trap is cleared once Reference signal is restored.
Fan Error	If any error occurs in the fan a trap message is sent to the manager. This error trap is cleared once the fan is restored to the correct state. Digital Acappella has two fans and alarms for each. Analog Acappella may have only one fan and one alarm.
Input Signal Loss	If Acappella matrix detects loss of a digital input signal, a trap message is sent to the manager. This error trap is cleared once Input signal is restored back. Analog signal loss cannot be detected. **Note** The SNMP Agent software does not send traps on changes in the Input signal status unless it is configured to do so. This trap needs to be enabled using Acappella Matrix Web Page page.
Output Signal Loss	If Acappella matrix detects loss of an output digital signal, a trap message is sent to the manager. This error trap is cleared once Output signal is restored. Analog signal loss cannot be detected. **Note** The SNMP Agent software does not send traps on changes in the Output signal status unless it is configured to do so. This trap needs to be enabled using Acappella Matrix Web Page screen.
Loss of Control Point	If Acappella matrix detects it losses its control point, a trap message is sent to the manager. This error trap is cleared once the control point is restored.

Source and Destination Signal Loss Configuration

Digital signal loss SNMP traps are configured using the Acappella web pages. The SNMP settings are only available if SNMP is licensed on that matrix. Analog signal loss cannot be detected or reported.

The web pages available for configuration depend on the matrix type. For example, if the matrix is digital video only, there will be no AES configuration web page.

Video Destination and Source SNMP configuration is accessed via the **Video Config** web page (Figure 52 and Figure 53). AES SNMP is accessed via the **AES Config** web page (Figure 54 on page 97 and Figure 55 on page 98).

Clicking on the **Go to Input Config** or **Go to Output Config** button toggles the display between the Source and Destination configuration pages. The **Signal Alarm** can be turned on or off for each Destination and Source.

Figure 52. Video Destination SNMP Configuration

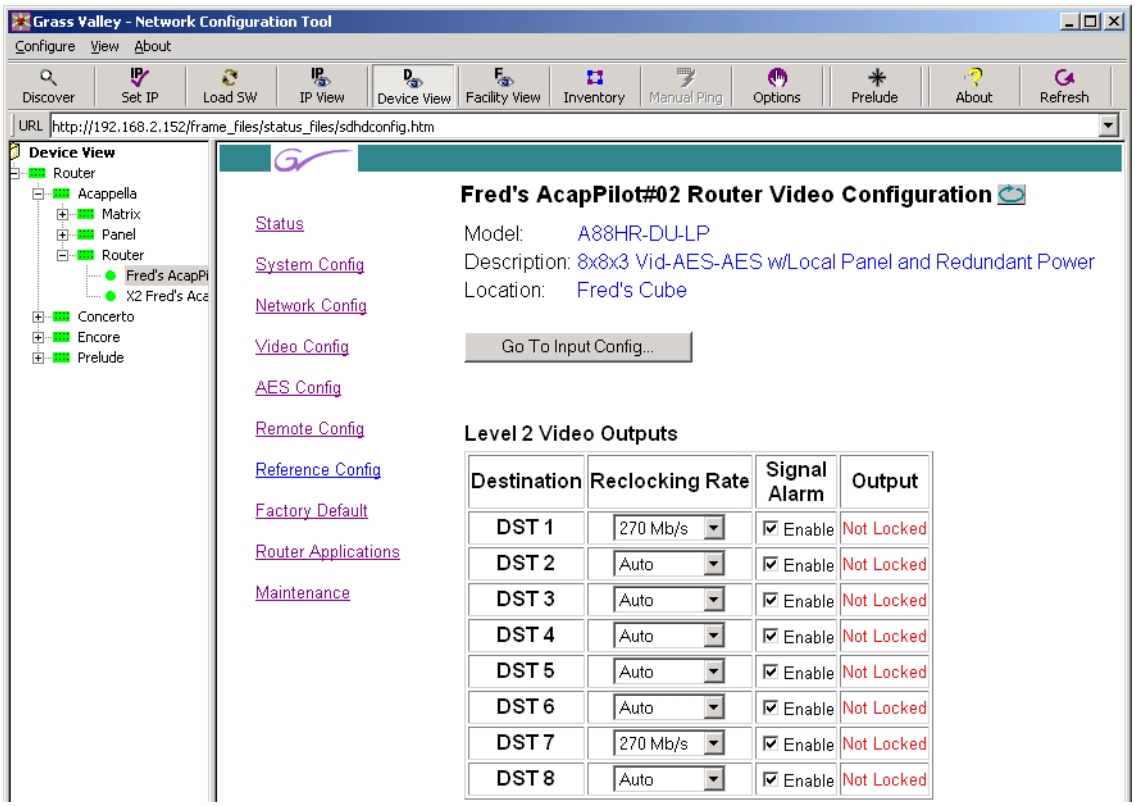


Figure 53. Video Source SNMP Configuration

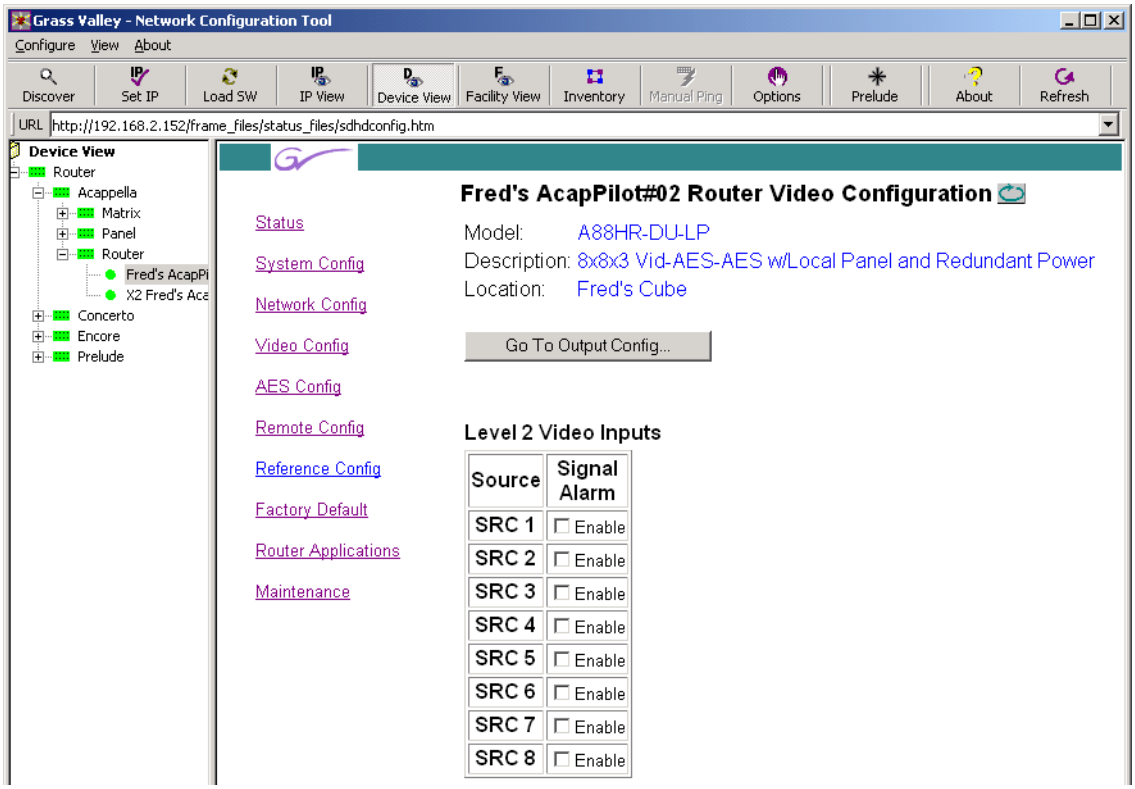


Figure 54. AES Source SNMP Configuration

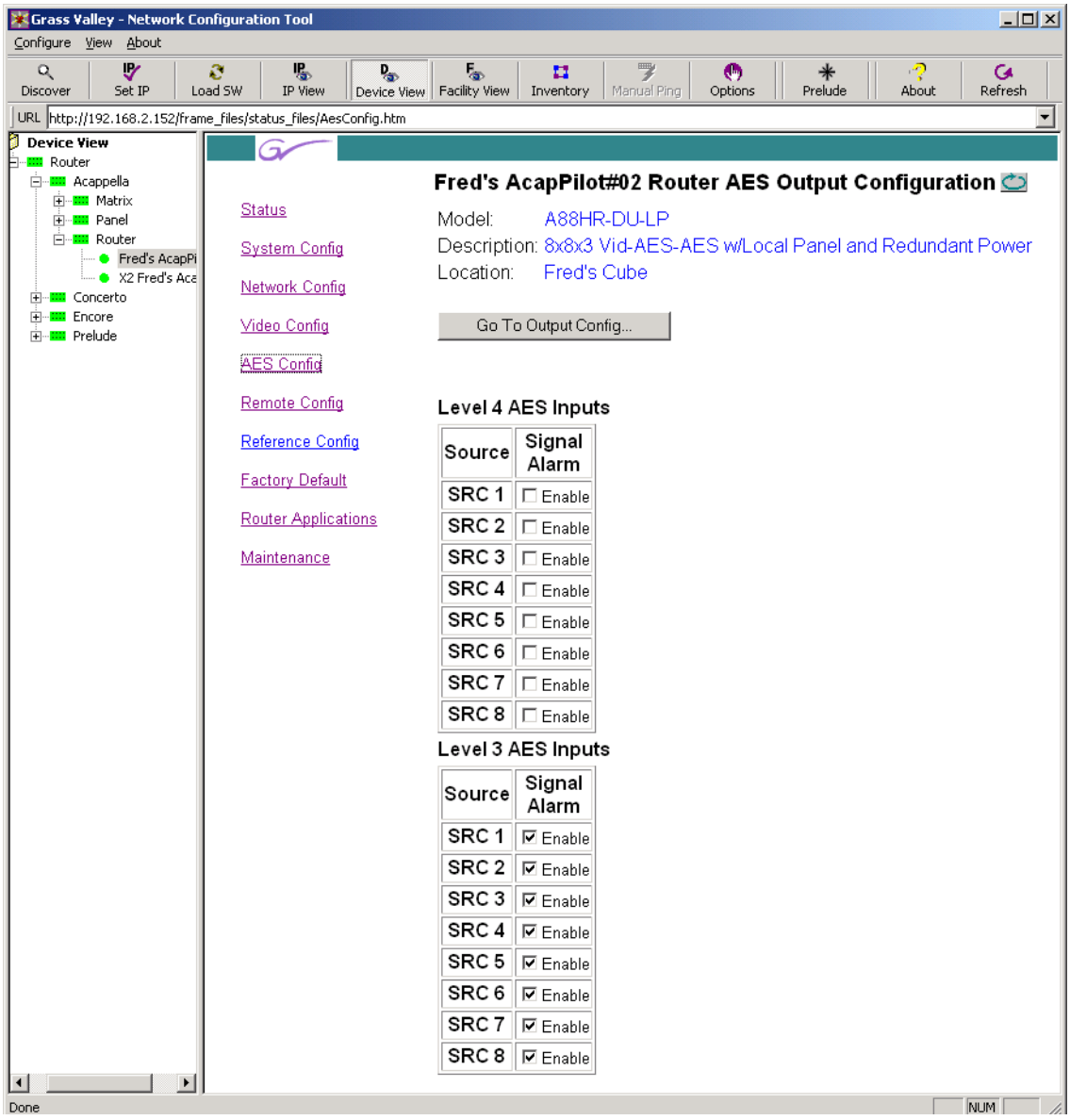
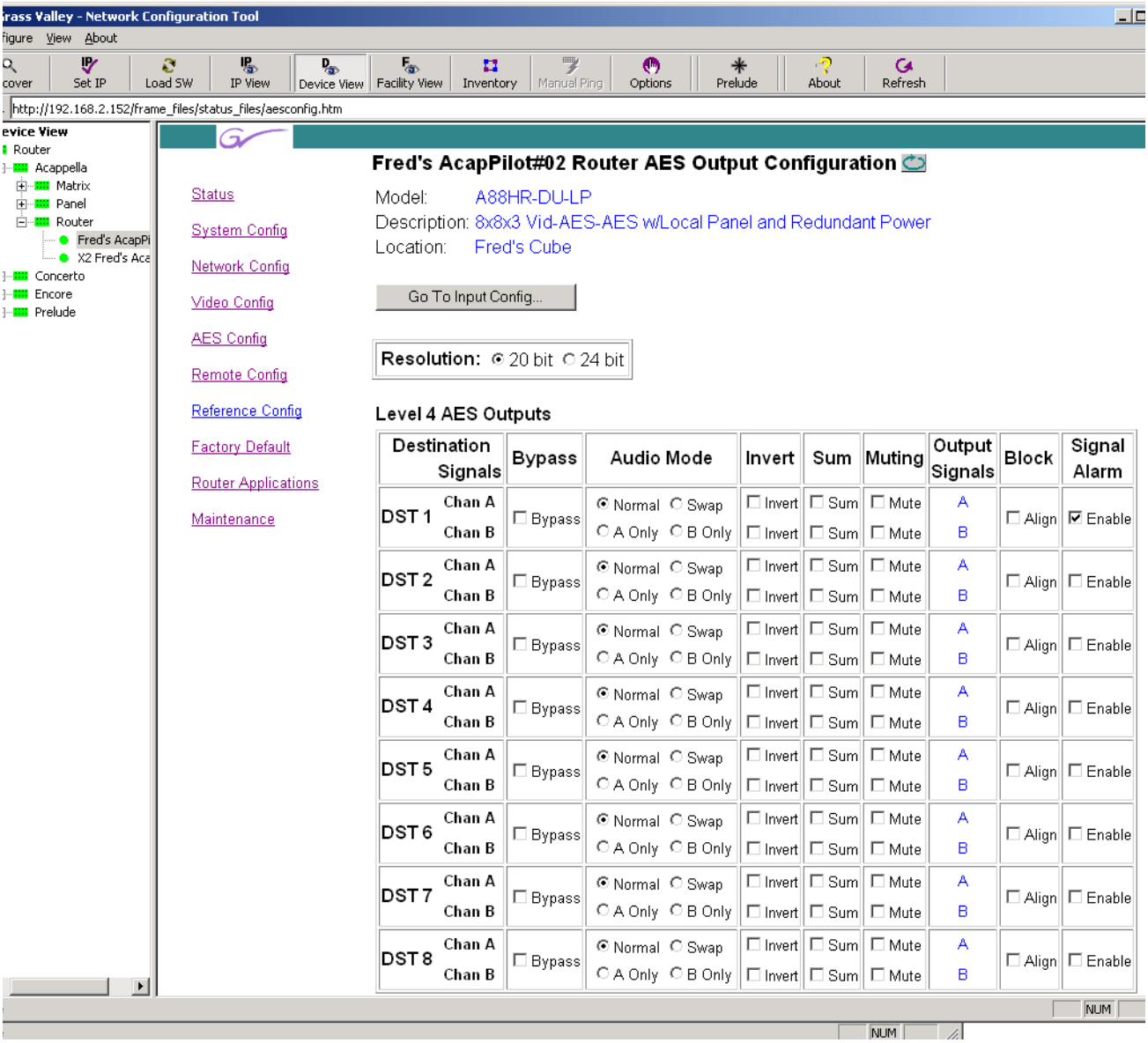


Figure 55. AES Destination SNMP Configuration



Appendix A

Specifications

Mechanical and Power

Table 8. Mechanical and Power Specifications, Maximum Configuration

Component	Depth (allow room behind for cabling)	Width	Height	Weight	Rack Units	Voltage Input	Power Consumption (Maximum)
Router	392 mm 15.43 in.	483 mm 19 in.	44 mm 1.75 in.	4.89 kg. 10.78 lbs.	1	100-240 V AC 50-60 Hz	≤ 40 W
Remote Panel	106 mm 4.18 in.	483 mm 19 in	44 mm 1.75 in.	1.04 kg. 2.3 lbs.	1	100-240 VAC 50-60 Hz	≤ 25 W

Environmental	
Temperature	0 - 40 degrees Celsius
Humidity	10-90%, non-condensing

Video Specifications

Video Reference

Table 9. Video Reference Specifications

Video Format	NTSC 525	Line Standard switching middle of line 10
	PAL 625	Line Standard switching middle of line 6
	Tri-Level	Line Stand switching middle of line 7
Vertical Offset (0 midpoint)		Adjustable from -15 lines up to +16 lines
Horizontal Offset (0 midpoint)	NTSC 525	Adjustable up to ± 31.5 µs
	PAL 625	Adjustable up to ± 31.1
	Tri-Level	720p/59.94 & 720p/60 adjustable up to ± 10.4 µs 720p/50 adjustable up to ± 12.7 µs 1080i/59.94 & 1080i/60 adjustable up to ± 14.2 µs 1080i/50 adjustable up to ± 17.2 µs 1080p/24 & 1080fs/48 adjustable up to ± 18.1 µs
Impedance/Connector		High, Looping – BNC
Return Loss		> 40 5dB (0.1 MHz-5 MHz) 75 ohm Termination

SD Digital Video

Table 10. SD Digital Video Specifications

SD Inputs		
Type		Serial digital video conforming to SMPTE 259M
Connector		BNC
Return loss		> 15 dB (10 MHz- 540 MHz)
Impedance		75 ohms
Cable equalization		Automatic ≤ 300 meters of Belden 1694A or equivalent for data rate ≤ 540 Mbps
SD Outputs		
Type		Serial digital video conforming to SMPTE 259M
Connector		BNC
Return loss		> 15 dB (10 MHz-540 MHz)
Signal amplitude		800 mV ±10% when terminated into 75 ohm
Impedance		75 ohms
Operational Modes		
Reclocking	SR	Automatic or manual selection of 143 Mbps, 270 Mbps, 360 Mbps, & 540 Mbps
Non reclocking	S	Non-reclocked operation or bypass switched from 10 Mbps to 540 Mbps with signals that have a maximum ones/zeros ratio of 20:1
DVB-ASI		
Supported		Polarity is preserved.

Wideband Digital Video

Table 11. Wideband Digital Video Specifications

Wideband Inputs	
Type	Serial digital video conforming to SMPTE 292M
Connector	BNC
Return loss	> 15dB (10 MHz-1.5GHz)
Impedance	75 ohms
Cable equalization	Automatic ≤ 100 meters of Belden 1694A or equivalent for data rate ≤ 1.485 Gbps
Wideband Outputs	
Type	Serial digital video conforming to SMPTE 259M or SMPTE 292M
Connector	BNC
Return loss	> 15dB (10 MHz-1.5GHz)
Signal amplitude	800 mV ±10% when terminated into 75 ohm
Impedance	75 ohms
Operational Modes	
Reclocking	Automatic or manual selection of 143 Mbps, 270 Mbps, 360 Mbps, 540 Mbps, & 1.485 Gbps
DVB-ASI	
Supported	Polarity is preserved.

Analog Video

Table 12. Analog Video Specifications

Analog Input	
Connector	BNC (IEC 60169-8)
Input impedance	75 ohm self terminating.
Input Return Loss	> 40dB, DC to 10MHz
Signal Type, Nominal Level	Composite Analog Video, or RGB 1Vpp, max 2Vpp
Cable Equalization	None
Clamping	None
Coupling	DC
Analog Video Output	
Connector	BNC (IEC 60169-8)
Impedance	75 ohm source terminated
Return Loss	> 40dB, DC to 10MHz
Nominal Level	1Vpp, max 2Vpp into 75 ohm termination
Coupling	DC
DC Offset	<50mV
Equalization	None
Analog Video Performance	
Frequency Response	±0.1dB DC to 10MHz,
	+0.5/-0.5dB, 10-30MHz,
	0 to -3dB @ 120MHz
Gain Uniformity	±0.1dB
Differential Gain	<0.15% @1Vpp
Differential Phase	<0.15∞ @1Vpp
K-Factor/ Pulse-to-bar	<0.5%
Tilt	<0.5%
Chroma/Luma Gain Inequality	<0.5%
Crosstalk	<-60dB DC to 4.43MHz most hostile condition
Hum and Noise	>70dB below 700mV unweighted with 10MHz bandwidth
Delay Scatter	±1∞ @4.43MHz between any two paths
Electrical Length	TBD
Temperature Range	0∞ to 40∞ C

Audio Specifications

AES Digital Audio

Table 13. AES Digital Audio Specifications

General	
Switch Point	Next audio sample after video switches
Switching Transients	No discontinuity, switching is frame synchronous
Signal Format	Unbalanced AES-3id-1995, SMPTE-276-M (specifies AES3)
AES Inputs	
Format	SMPTE-276-M (specifies AES3)
Cable Length	350M of RG59/U (9259) for 75 ohm systems 450M of 8281 for 75 ohm systems
Connector	BNC
Impedance	75 ohm
Return loss	≥ 25dB 0.1-6mhz 75 ohms unbalanced
Sample rate	48KHz
AES Outputs	
Format	SMPTE-276-M (specifies AES3)
Connector	BNC
Impedance	75 ohm
Voltage	1 Vpp into 75 ohms
Rise-time	Approximately 19nS
Return loss	≥ 25dB 0.1-6mhz
Input to output delay	≤ 4.2 audio samples
Reclocking	Yes
Output Jitter	≤1nS
Sample rate	48KHz

Analog Audio

Table 14. Analog Audio Specifications

Analog Inputs	
Signal Type	Balanced Analog Audio
Connector	6 position friction clamp connector for channel pair (+,-,GND,+,-,GND)
Max Input Level	+24dBu
CMRR @ 50-60Hz	>70dB
CMRR @ 20kHz	>=55dB
Input Common Mode Voltage Range	+/- 40V
Input Impedance Differential	>15k Ohms
ESD (Static Withstand Voltage)	10kV @ 330 Ohms, 150pF

Table 14. Analog Audio Specifications - (continued)

Analog Audio Outputs	
Signal Type	Balanced Analog Audio
Connector	6 position friction clamp connector for channel pair (+,-,GND,+,-,GND)
Max Output Level (System is voltage mode and not designed to support more than three outputs loaded with 600 Ohms.)	+24dBu Balanced, 10k Ohm Load (no cable)
	+18dBu Unbalanced, 10k Ohm Load (no cable, one of the outputs grounded)
	+24dBu Balanced into 600 Feet Belden 8451 cable + 600 Ohms. Capacitance of cable equivalent to 0.022uF.
Output Impedance	<= 25 Ohms Differential
OCMR (Output Common Mode Rejection)	>=46dB
DC on Output Differential	<= +/- 50mV
Analog Audio Performance	
Gain	Unity (0dB)
THD+N	<0.01%, 20Hz – 20kHz
IMD (SMPTE 4:1)	<0.01%, +24dBu, 600 Ohm/Hi Z load.
Crosstalk	>83dB isolation, 20Hz – 20kHz, all hostile
Frequency Response	20Hz-20kHz +/-0.1dB @1kHz -3dB @200kHz with smooth roll-off after 200kHz
Noise (22kHz un-weighted, RMS)	-85dBu
Gain Error	+/- 0.1dB typical, +/- 0.25dB max, with 10k Ohms or larger load

Appendix B

Native Protocol

Acappella Matrix 3.0 and newer software support the Native Protocol commands shown in Table 15. Refer to the separate *Routing Products Protocols Manual* for specific information.

Table 15. Acappella Native Protocol Command Support

Command	Notes
BK - Background Activities	N – Query system name
	R – Return Protocol Processor SW Revision #
	T – Return smsAPP software title
	t – Return Native Protocol software title
	E – Positive response setting (ON/OFF)
	I – Refresh Rate
	F – Query configuration Flags
	f – Clear configuration flags
QI & Qi - Query Destination Status on a Specific Level by Index	
QJ & Qj - Query Destination Status by Index	
QN - Query Names	IS - Source names with Source indices
	ID - Destination names with Destination indices
	L – Level names
TI - Take, Index with Level Index	Destination,Source Index[,<Level Index>]
TJ - Request Take Index with Level Bit Map	Takes Sources (on specified levels) to specified destination by index rather than name. Allows Breakaways

Note Commands like QN,IS and QN,ID will receive dummy source/destination names (such as dst_1, dst_2,…) from Acappella. The Acappella NP server uses Control By Index.

Index

Numerics

16x16
  cabling 31
  single stream 31
20 bit 63
24 bit 64
8x8
  cabling 32
  dual stream 32

A

A Only 64
AC power supplies
  external 37
  internal 36
Acap Router Applications page 76
Acappella
  control by Encore 87
Acappella Destination Configuration page 84
AES Attributes 64
  defaults 37
  settings 63
All-Level Take 44
  Illustration 44
analog audio
  pinouts 33
asset tag
  remote panel 79
  router 58
Audio Analog
  dual stereo 26
Audio Backplane Analog
  16x16 26
  16x4 26
Audio Backplane BNC
  16x16 23
  16x2 24
  16x4 24
  16x8 23
  8x4 25
  8x8 24
  Empty 25
Audio Backplane Dual Analog
  8x4 27
  8x8 27
Auto reclocking 62

B

B Only 64
Backplane Audio Analog 26
  16x16 26
  16x4 26
Backplane Audio BNC
  16x16 23
  16x2 24
  16x4 24
  16x8 23
  8x4 25
  8x8 24
  Empty 25
Backplane Audio Dual Analog
  8x4 27
  8x8 27
Backplane Video
  16x16 21
  16x2 22
  16x4 22
  16x8 21
  8x4 22
  8x8 22
  Empty 23
Breakaway Take
  Illustration 44
button
  Local Panel Destination 42
  Local Panel Enable 39
  Local Panel Level 43
  Local Panel Protect 40
  Local Panel Source 41

C

cabling
16x16 31
8x8 32
control 34
Ethernet 34
Remote Panel 36
control
cabling 34
Crosspoint
Switching Latency 90

D

defaults
AES Attributes 37
factory 75, 83
Device ID 76
Device View 51
Do Reset 82
Do reset 59
documentation online 4
dual stereo configuration 26
dual stream
8x8 32
duplicate IP address
resolving 52

E

Encore
control of Acappella 87
control of Acappells 17
panels configured to control Acappella 87
Ethernet
cabling 34

F

factory
defaults 75, 83
FAQ database 4
features 17
Frame model codes 27
frequently asked questions 4
Front
16x1 20
16x16 19
16x2 19
16x4 19
16x8 19
8x1 20
8x4 20
8x8 20
No Local Panel 18

G

general description 17
Grass Valley web site 4

I

information
router 57
installation
panel rack mount 30
router rack mount 29
Invert 64
IP address
resolving duplicate 52
setting 52
setting with web page 60
IP View 51

L

levels
used by remote panel 85
license key
SNMP 91
Local Panel Destination
button 42
Local Panel Enable
button 39
Local Panel Level
button 43
Local Panel Protect
button 40
Local Panel Source
button 41
location
remote panel 79

router 58

M

Maintenance page 77
manual
NetConfig 52
Multi-Level Switching 44
multiple frame configuration example 67
Mute 64

N

name
router 58
Native Protocol commands 105
NetCentral 91
NetConfig 51
main screen description 51
manual 52
NetConfig Device ID Setting 81
network configuration
of PC 45
Normal 64

O

On Indicators 39
online documentation 4

P

panel
rack mount installation 30
Panel Description page 78
panel device name 79
Panel Factory Defaults page 83
Panel Network Configuration page 81
Panel System Configuration page 79
PC
network configuration 45
requirements 45
pinouts
analog audio 33
Serial D connector 34
Prelude
control of Acappella 17
problem
reference 90

R

rack mounting
rear frame support 30
rear frame support kit 30
reference
adjustments 73
problem 90
video 35
Refresh button Icon 57
Remote Panel
cabling 36
remote panel
asset tag 79
levels used by 85
location 79
Remote Panel model codes 28
Remote Panel router
settings 85
restore defaults 75
router
asset tag 58
information 57
location 58
name 58
rack mount installation 29
Router AES Configuration page 63
Router Factory Defaults page 75
router name 58
Router Network Configuration page 60
Router Reference Configuration page 73
Router Remote Configuration page 67
Router Status page 57
Router System Configuration page 58
Router Video Configuration page 62
RS-422 86

S

Save New Settings 59, 82
Serial
D connector pinouts 34

Serial Control 86
settings
  AES Attributes 63
  Remote Panel router 85
  system 80
  Video 62
Simple Network Management Protocol (SNMP) 90
single stream
  16x16 31
SNMP
  license key 91
  licensing 91
  monitored parameters 93
  NetCentral manager 91
  signal loss configuration 94
  standards 90
  third-party manager 91
  traps 94
SNMP monitoring 90
SNMP option
  license key 76
software 51
  installation on PC 46
  loading to devices 54
  NetConfig 51
Software CD 46
software download from web 4
Sum 64
Swap 64
Switching Latency, Problems 90
system
  settings 80
System Broadcast Select 61, 82
System Identifier 60, 82

T

Take
  All-Level 44
  All-Level Illustration 44
  Breakaway Illustration 44
Terminal/Computer Interface (T/CI) protocol 86

V

Video
  settings 62
Video Backplane
  16x16 21
  16x2 22
  16x4 22
  16x8 21
  8x4 22
  8x8 22
  Empty 23
video reference 35

W

web browser Interface 56
web page
  Acap Router Applications 76
  Acappella Destination Configuration 84
  Maintenance 77
  Panel Description 78
  Panel Factory Defaults 83
  Panel Network Configuration 81
  Panel System Configuration 79
  Router AES Configuration 63
  Router Factory Defaults 75
  Router Network Configuration 60
  Router Reference Configuration 73
  Router Remote Configuration 67
  Router Status 57
  Router System Configuration 58
  Router Video Configuration 62
web site documentation 4
web site FAQ database 4
web site Grass Valley 4
web site software download 4