



VBrick 7000 Series Appliances

VBrick v3.1 H.264 Appliance Admin Guide



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This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC rules, Class A for OC-3C Interface, Class A for the SDI Interface. 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 their own expense. This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations. Cet appareil numérique de la Classe A respecte toutes les exigences du règlement sur le matériel brouilleur du Canada.



VBrick declares that this product conforms to the following certificate standards for electromagnetic emissions when installed according to the manufacturer's specifications: EN 55022:2006; EN 55024:1998, A1:2001, A2:2003; EN 61000-3-2:2005; EN 61000-3-3:1995, A1:2001, A2:2005.



This product is Listed by Underwriters Laboratories Inc. Representative samples of this product have been evaluated by UL and meet applicable safety standards. Although this product can operate in a 70°C environment, the maximum recommended room ambient is 66°C or lower to meet UL 60950-1 accessible surface temperature requirements.



This product incorporates High-Definition Multimedia Interface technology. HDMI, the HDMI Logo, and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI Licensing LLC in the United States and other countries.

About VBrick Systems

Founded in 1997, VBrick Systems, an ISO 9001 certified vendor, is a privately held company that has enjoyed rapid growth by helping our customers successfully introduce mission critical video applications across their enterprise networks. Since our founding, VBrick has been setting the standard for quality, performance and innovation in the delivery of live and stored video over IP networks—LANs, WANs and the Internet. With thousands of video appliances installed world-wide, VBrick is the recognized leader in reliable, high-performance, easy-to-use networked video solutions.

VBrick is an active participant in the development of industry standards and continues to play an influential role in the Internet Streaming Media Alliance (ISMA), the MPEG Industry Forum, and Internet2. In 1998 VBrick invented and shipped the world's first MPEG Video Network Appliance designed to provide affordable DVD-quality video across the network. Since then, VBrick's video solutions have grown to include Video on Demand, Management, Security and Access Control, Scheduling, and Rich Media Integration. VBrick solutions are successfully supporting a broad variety of applications including distance learning and training, conferencing and remote office communications, security, process monitoring, traffic monitoring, business and news feeds to the desktop, webcasting, corporate communications, collaboration, command and control, and telemedicine. VBrick serves customers in education, government, healthcare, and financial services markets among others.

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H.264 Appliance v3.1 Admin Guide

Preface

This document explains how to configure a VBrick H.264 network video appliance. It provides detailed information about all configurable appliance options and parameters. The VAdmin management application is used for all configuration tasks. VAdmin is a browser-based application that makes it easy to configure your appliance and to optimize performance and get the best video. The *VBrick H.264 Appliance Getting Started Guide* explains how to setup the appliance and how to use VAdmin.

Note When viewing the screenshots in this manual, keep in mind that many of the configuration options for the appliance are mutually exclusive. This means that, depending on which options you select, you may see new fields or you may not see previously existing fields. Although the screenshots may not always show all options, they are explained in detail in the text.

This online help system provides access to VBrick H.264 documentation. It has a powerful search engine so you can get answers to technical questions in seconds; it also has the documentation in PDF format if you need hard-copy. Our publications team is committed to providing first-rate documentation and your feedback is important to us. If you find errors or omissions, click the e-mail icon in the upper-right corner of this window or send your feedback to documentation@vbrick.com

1. Introduction	Provides an overview of the H.264 appliance and explains how to login and get help.
2. System Configuration	These pages explain in detail how to configure system-level parameters such as IP address and host name.
3. Video/Audio Configuration	These pages describe audio and video input parameters and explain how to use the pre-built templates for best results.
4. Program Configuration	These pages explain program information and video destination parameters, as well as how to configure the internal web server.
5. Monitor	Explains various monitoring pages including network, video/audio, status logs and program status.
6. Troubleshoot	This page explains how to use standard troubleshooting tools to run network, device, and traceroute tests.
7. KLV Metadata	Explains how to insert global positioning or telemetry metadata into video feeds for specialized applications.
8. Advanced Transport Stream Settings	Explains how to use advanced settings when configuring transport streams for Mode and Forward Error Correction.

Getting Help

If you need help, or more information about any topic, use the online help system. The online help is cross-referenced and searchable and can usually find the information in a few seconds. Use the tree controls in the left pane to open documents and the up and down arrows to page through them. Use the **Search** box to find specific information. Simply enter one or more words in the box and press Enter. The search results will return pages that have all of the words you entered—highlighted in yellow (Internet Explorer only). The **Search** box is not case-sensitive and does not recognize articles (a, an, the), operators (+ and –), or quotation marks. You can narrow the search by *adding* words.

Our publications team is committed to accurate and reliable documentation and we appreciate your feedback. If you find errors or omissions in any of our documents, please let us know. If you can't find the information you need in this document, or from your reseller, you can contact VBrick Support Services on the [web](#), by [e-mail](#), or by calling 1-203 303-0222. For faster service, be sure to have your VBrick product serial number or support contract number. Support Services can usually answer your technical questions in 24 business hours or less. Note that all VBrick documentation is on the web. For more information about any VBrick product, go to www.vbrick.com/documentation

Font Conventions

Arial bold is used to describe dialog boxes and menu choices, for example: **Start > All Programs > VBrick**

Courier fixed-width font is used for scripts, code examples, or keyboard commands.

Courier bold fixed-width font is used for user input in scripts, code examples, or keyboard commands.

This bold black font is used to strongly emphasise important words or phrases.

Folder names and user examples in text are displayed in this sans serif font.

User input in text is displayed in this bold sans serif font.

Italics are used in text to emphasize specific words or phrases.

Printer-Friendly

Click on the following link to print a hard copy of this document.

[VBrick H.264 Appliance Admin Guide](#)

▼ To save or print a PDF document:

1. Click once to open the PDF document in Acrobat Reader.
2. To save or print a PDF document, right-click and select **Save Target As** or **Print Target**.



Introduction

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VBrick H.264 Encoding Appliances support 720p and 1080p high definition video resolutions for incredible quality video at bandwidths of 1 Mbps and up. Appliances also support a wide variety of standard definition resolutions for lower bandwidth applications, such as streaming to wireless and mobile devices. Each H.264 Encoding Appliance supports Multiple Bit Rate (MBR) encoding enabling organizations to stream HD content to HD enabled devices, while streaming the same content in standard definition for remotely connected users and mobile devices.

VBrick's H.264 streaming video is supported by a number of players including Adobe Flash, Apple QuickTime, Microsoft Windows Media Player (with VBrick plug-in), and embedded players for multiple browsers and operating systems. Broadcast live while recording locally to an optional on-board hard drive. Recorded files can be sent to a Video On-Demand Server or Distributed Media Engine. Each appliance can deliver streaming video via multicast directly to the IP network, serve live unicast streams via RTSP for up to 200 clients, or push a unicast stream to 25 destinations.



Figure 1. VBrick H.264 Network Video Appliance

Home Page

The Home page provides a snapshot of the current status of the appliance. All text fields are read-only and there are no editable fields on this page. The colored LED indicators in the middle of the page give you a quick snapshot of the health and status of the appliance. See [VAdmin LEDs](#) below for an explanation of what they mean.

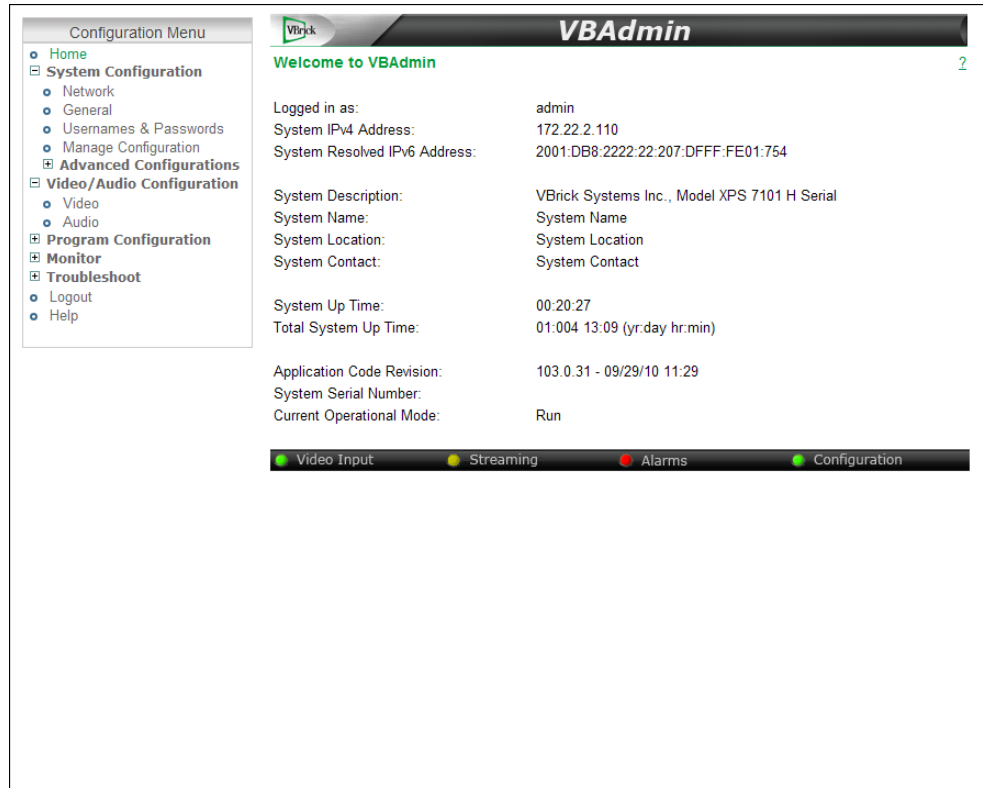


Figure 2. VAdmin Home Page

Logged in as	The user who is currently logged in.
System IPv4 Address	Read from the System Configuration > Network page.
System Resolved IPv6 Address	Read from the System Configuration > Network page.
System Description	Read from the Monitor > System page.
System Name	Read from the System Configuration > General page.
System Location	Read from the System Configuration > General page.
System Contact	Read from the System Configuration > General page.
System Up Time	Read from the Monitor > System page. Refreshed every 60 seconds.
Total System Up Time	Read from the Monitor > System page. Refreshed every 60 seconds.
Application Code Revision	Read from the Monitor > System page.
System Serial Number	Read from the Monitor > System page.

Current Operational Mode	<p>Indicates the current operational mode of the VBrick. The following modes are supported. See Operational Modes on page 104 for more information.</p> <ul style="list-style-type: none"> • Run Mode – Normal operation. • Diagnostics – User selected mode for running certain VBrick diagnostics. • Maintenance Mode – Automatically launched when the software does not load. • Limited Run Mode – Limited operational mode (not selectable). Normally occurs if a hardware problem exists within the VBrick but it can still partially operate. • Overloaded Mode – Limited operational mode (not selectable). This mode occurs when the VBrick is configured to handle more video than its operational capacity. If this occurs, the VBrick needs to be reconfigured to reduce the number of streams and/or data rates. Under this condition, the appliance temporarily reduces video traffic in order to maintain VBAAdmin functionality.
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VBAAdmin LEDs

The colored LEDs in the middle of the page give you a quick snapshot of the health and status of the appliance. These indicators are dynamically refreshed every five seconds and give you an up-to-the-minute snapshot of the current status.



Video Input	<ul style="list-style-type: none"> • Green – Running. • Red – Video Input problem.
Streaming	<ul style="list-style-type: none"> • Green – at least one transmitter or server client is streaming. • Yellow – no transmitters or server clients are streaming.
Alarms	<ul style="list-style-type: none"> • Green – no alarms are present. • Red – one or more alarms are present.
Configuration	<ul style="list-style-type: none"> • Green – no configuration errors are present. • Yellow – one or more configuration errors are present.

VBAAdmin Overview

VBAAdmin is explained in detail in the H.264 Appliance Getting Started Guide. The H.264 Appliance has an integrated management interface (VBAAdmin) that lets you manage VBrick configuration from an external browser. This allows network managers to remotely configure and monitor the appliances from virtually anywhere. As shown in Table 1 you can launch VBAAdmin in Internet Explorer or Firefox (other browsers are not supported by VBrick). You connect to VBAAdmin by pointing to the IP Address (for example: <http://192.168.5.5>) of the VBrick appliance and logging in with a user name and password. VBAAdmin is one of several ways you can manage the appliance (for example you can also use Telnet or the Command Line interface) but VBAAdmin is the easiest to use. Note that some changes to the

configuration will initiate an automatic reboot. When this happens, wait approximately 60 seconds, then refresh the page and log back in with your user name and password.

Note VAdmin has a read-only View mode and an interactive Edit mode where you can actually make configuration changes. *All VAdmin screens in this document are shown in Edit mode.*

Table 1. Supported Browsers (VAdmin)

Browser	Version
Microsoft Internet Explorer	6.0 or higher
Mozilla Firefox	2.0 or higher

Login

- ▼ To login to an H.264 appliance:
 1. Open a browser and enter the IP address of the appliance in the address bar.
 2. Login to VAdmin with a valid user name and password (case-sensitive), and then click the **Log In** button. The default user name and password is `admin` and `admin`. It is highly recommended that you use the Maintenance pages in VAdmin to change the user name and password. The user name and password cannot exceed 20 characters. It may include any combination of alphanumeric characters and only the following special characters:
~ ! # \$ ^ * + & [] { } | < > -

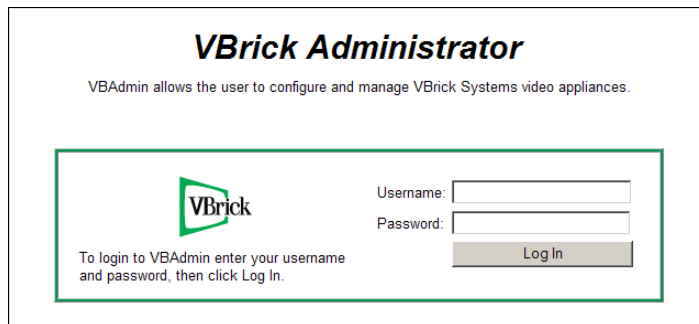


Figure 3. VAdmin Login Page

Configuration Overview

Use the following basic steps to configure your appliance.

Configuration Quick Start

This section gives a quick overview of the steps you would typically need to perform to configure a VBrick H.264 encoder. As shown in Figure 4, the appliance supports three video encoders and three audio encoders for multiple bit rate encoding. It also support a fixed number (shown in parentheses) of streams, transmitters, servers, and archivers.

- ▼ To quickly configure an encoder appliance:
 1. Set up the appliance and connect a video source as explained in the *H.264 Appliance Getting Started Guide*.

2. Configure the [Video](#) and [Audio](#) sources as explained in the various sections of this document.
3. Configure the [Streams](#) for the program.
4. Configure the [Transmitters](#) for the program.
5. Configure the [Servers](#) for the program.
6. Configure the [Archivers](#).
7. If you complete the above steps successfully, you will have configured the appliance.

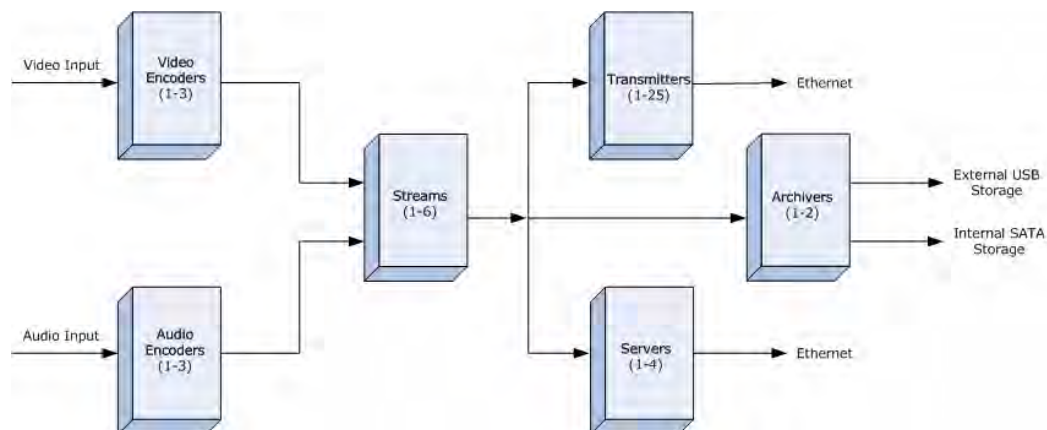


Figure 4. Block Configuration Diagram

Video/Audio

Use the Video/Audio Configuration pages to define the video and audio sources. You can also use the preconfigured templates to control a single video or a single audio rate. Templates are part of the rate configuration for each audio or video source. The **Load Template** button launches a pop-up window showing the available templates with preconfigured values. See [Video/Audio Configuration](#) on page 39 more for information.

Streams

There are six streams available for configuration. A "stream" is a bundled group of resources that describes the characteristics of the video and audio. A stream specifies the Video Rate, Audio Rate, and Transport Type and can be transmitted, served, or archived. Once a stream is defined, it can be used by any combination of transmitters, servers, and archivers. With most "transport types" there is no automatic stream selection: each transmitter and server must be configured with a specific stream. With "smooth streaming," multiple video rates are delivered in one stream and IIS determines which stream to serve. See [Streams](#) on page 61 more for information.

Transmitters

There are 25 transmitters available for configuration. Each references a stream that can be pushed and each is selectable as unicast or multicast. The configuration parameters are divided into a common section (on the Program Configuration > Global page) and another section (on the Program Configuration > Transmitters page) which configures each individual destination. See [Transmitters](#) on page 69 more for information.

Servers

There are four servers available for configuration. Each references a stream that can be served. The configuration parameters are divided into one common section (on the Global page) and another section (on the Servers page) which are used to configure an individual server. The H.264 appliance is a streaming server that can be controlled by a remote decoder client via RTSP and RTCP protocols. In server mode, a served program does not become active on the network until requested by a client. The client may be a software player like StreamPlayer, or a QuickTime player on a PC or a Macintosh. See [Servers](#) on page 76 more for information.

Archivers

There are two archivers available for configuration. Each references a stream that can be archived. An Archiver is used to store a local copy of a stream on existing internal or external hard drives. Archivers reference a stream which is basically comprised of a Video Rate, an Audio Rate, and a Transport Type. Archiving can be controlled locally using the **Start** and **Stop** buttons or it can be controlled from VEMS. VEMS can start and stop an archive and FTP files to and from the appliance. See [Archivers](#) on page 79 more for information.

Optimizing System Performance

VBrick appliances are designed to accommodate a variety of configurations. VBrick configuration choices enable the widest range of features and capabilities and are designed to provide the user with a high degree of flexibility. In some extreme cases, users can create configurations that exceed the normal processing capacity of the unit causing it to not perform optimally. Corrective action usually involves reducing a video rate or disabling a stream or transmitter. In general, video quality improves when video rate is increased toward the maximum of 20 Mbps. In short, video quality is subjective and relates to other components such as the response of the human eye, the quality of the original content and signal, and the quality of the decoder and monitor.

As a general rule, use the lowest video rate that best suits the application. When configuring VBrick devices, pay close attention to the total bit rate of all streams exiting the unit. The sum of all streaming traffic should be closely monitored and kept to a minimum whenever possible. Once you have selected and applied a configuration to the unit, you can check the status of the processor and device load using VAdmin or CLI. The CPU utilization and overloaded status variables are an excellent indication on the unit's overall health. If the CPU utilization is high or an overloaded condition is occurring, you can simply reduce bit rates; reduce the number of streams, transmitters, or served clients; and re-run the test. As a part of regular maintenance, you should periodically check the **CPU utilization** and the **Overloaded Count** (on the Monitor > [System](#) page) to ensure the unit remains within normal operating limits.

Getting Help

A link to the online help system is available from the Configuration Menu on the left side of the VAdmin page. This help system has a powerful full-text search engine that can quickly find the information you need. You may wish to take a few minutes to familiarize yourself with the help system. It can save time when trying to find information about appliance parameters or options. When using VAdmin, click on the question mark hyperlink in the upper-right corner of each page to get context-sensitive help for that page.

Configuring Local Online Help

The online help system points to a VBrick web server and requires an Internet connection. In some cases it may be preferable (and faster) to put the help files on your local web server. To do this you will need to edit two MIB variables using the Command Line Interface or a MIB browser. You will also need to copy the help files from the Product CD to your web server.

▼ To install the help files and point to a local server:

1. Open the CLI using Telnet or HyperTerminal. (For more about using the CLI, see the "Command Line Interface" chapter in the *H.264 Appliance Getting Started Guide*.)
2. Begin an edit session and set the following VBrick parameters as shown below. When done, apply and save the configuration as shown. Note that all commands are case-sensitive.
3. Replace `web_server_ip_address` with the complete path to the Default Web Site > Home Directory on your local server.

```
SVAR vbrickEditName=  
SVAR vbrickEditName=admin  
SVAR vbrickSysConfigurableHelpLinksEnable=2  
SVAR "vbrickSysConfigurableHelpLinksURL=http://<web_server_ip_address>  
SVAR vbrickSysApplySet=2  
SVAR vbrickSysSaveConfiguration=2
```

4. Insert the "H.264 Appliance Product CD" in your computer and open Windows Explorer.
5. Right-click on the CD and select **Explore**. Then copy and paste the folder `VBrick_H264Help` into the path you specified in Step 3 above.

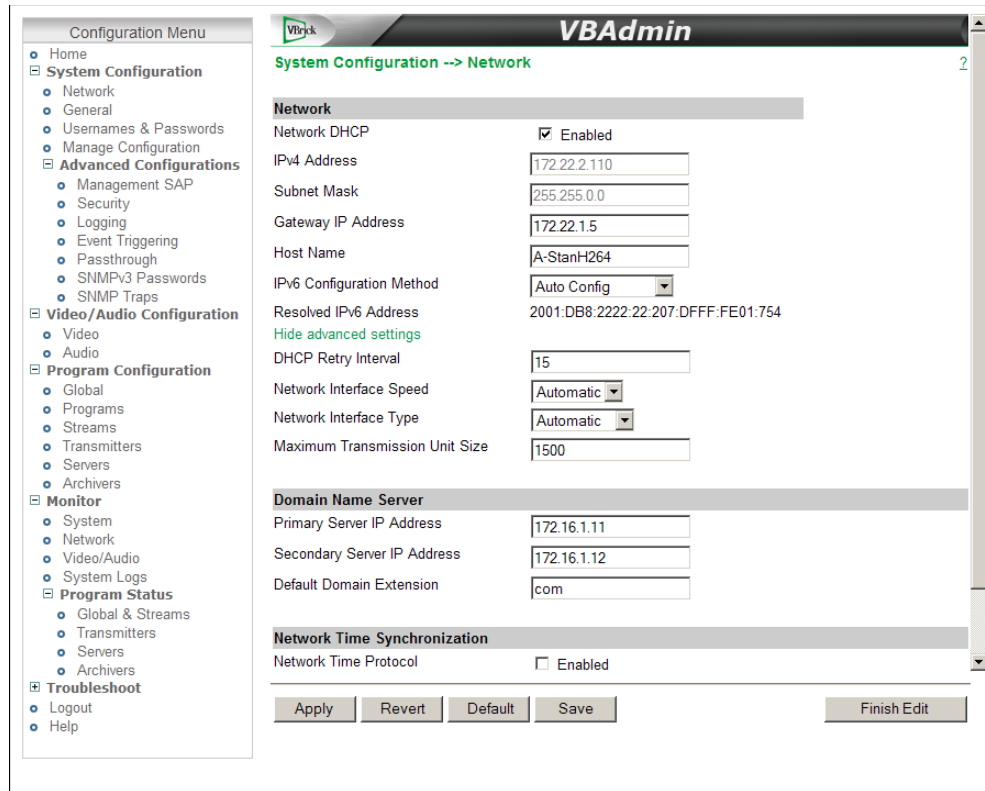


System Configuration

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Network



Network DHCP	Default = Enabled. Dynamic Host Configuration Protocol. If DHCP is enabled, the appliance gets its IP Address, Subnet Mask, and Gateway from the DHCP server. If the DHCP server supplies the DNS server address, these parameters will replace the user-entered DNS settings. If DHCP is enabled and the appliance cannot obtain an IP address from the server, it will start in limited run mode after 90 seconds, using its default IP Address of 172.17.5.5. After 15 minutes, it will automatically reset and again attempt to acquire an address. The LCD screen on the front of the VBrick will indicate a DHCP failed message. Note: The VBrick appliance requires a minimum DHCP lease length of 8 minutes to work, however it is recommended to extend the lease time to what is maximally available via the network to avoid disruptions.
IPv4 Address	This is either a static or a DHCP-enabled IPv4 IP address.
Subnet Mask	Subnet mask for the VBrick address.
Gateway IPv4 Address	Gateway IP Address for communicating across distinct network segments.
Host Name	The Host Name defaults to the Media Access Control (MAC) address, a hardware address that uniquely identifies each node of a network. The VBrick Host Name identifies the appliance to various network applications including DHCP, SNMP and VBrick application tools. <i>The Host Name can be a maximum of 18 characters; the first character must be a letter and the rest can be letters, numbers, or hyphens.</i>
IPv6 Configuration Method	Select the IPv6 configuration method. Note that IPv6 is supported on VAdmin, Web Services, SNMP, and Telnet. Ipv6 is not supported on SNMP notifications, Announcements, Management SAPs, and Streaming. <ul style="list-style-type: none"> • Auto Config – The device will auto-configure the IPv6 address using the (NDP) MAC-based address. Default • DHCPv6 – The device will use an external IPv6 DHCP server. • Static Assignment – Use to manually set IP address.
Resolved IPv6 Address	Displayed if IPv6 Configuration Method above is Auto Config or DHCPv6.
IPv6 Address	Static Assignment only. Manually enter an IP address.
IPv6 Network Prefix Length	Static Assignment only. Manually enter the network prefix length.
DHCP Retry Interval	See above. Use to adjust the time (in minutes) before the appliance will reset and attempt to acquire an IP address. Range 3–15. Default = 15.

Network Interface Speed	<p>10Mbps, 100Mbps, or Automatic. This allows the Ethernet interface of the VBrick to be manually forced to 10 or 100 Mbps. Automatic is the default and recommended setting. Automatic enables auto negotiation and the appliance will automatically match its speed setting to the speed of the switch or hub to which it is attached. Automatic can resolve up to 1GB depending on your network.</p> <p>The settings for Network Interface Speed and Network Interface Type are interdependent. They must both be set to Automatic or they must both be set manually. Manual settings should be used only in the rare case when the appliance is attached to network equipment that does not support auto negotiation. The VBrick's capabilities will be limited when its Ethernet link is at 10 Mbps and/or Half Duplex. If auto negotiation fails, the VBrick defaults to 100 Mbps, Full Duplex, and attempts "parallel detection," an alternative way to sense speed. Status parameters are available on the network status screen to indicate the state of the link and the current configuration of the Ethernet hardware. In auto mode, they reflect the results of the negotiation and in manual mode they follow the configuration options.</p>
Network Interface Type	<p>Half Duplex, Full-Duplex, or Automatic. This allows the Ethernet interface of the VBrick to be manually forced to Half or Full Duplex. The default setting is Automatic which enables auto negotiation in the appliance so it will automatically match its duplex setting to that of the switch or hub that it is attached to. Automatic is the default and recommended setting. The settings for Network Interface Speed and Network Interface Type are interdependent. See the description of Network Interface Speed above.</p> <p>Note: Half Duplex is only supported on encoder models with a Hardware Revision level of 2.1 or higher. To check revision level, go to Monitor > System page.</p>
Maximum Transmission Unit Size	<p>Range 1024–1500 (default = 1500). The MTU is used for all network traffic from the VBrick and defines the largest network packet size that will be transmitted. A higher MTU brings higher bandwidth efficiency and VBrick recommends using the default. However you may wish to reduce MTU size to meet the requirements of some networks with VPN or other security tunnels that cannot tolerate 1500-byte packets.</p>

Domain Name Server

Primary Server IP Address	This is the primary server used for DNS.
Secondary Server IP Address	This is the secondary server used for DNS.
Default Domain Extension	This is the domain name used for DNS.

Network Time Synchronization

These fields are used to synchronize network time using the host name or IP address of a known server to provide a synchronized time for all appliances in the network.

Note Network Administrators please note. DHCP Option 4 (TIME) and Option 42 (NTP) are requested from the DHCP server to obtain SNTP server addresses. One or both of these options must be enabled in the DHCP server for these addresses to be returned to the VBrick. If both are returned, the VBrick will use the NTP server address. If the DHCP server configuration is unknown, it is recommended that the address(es) be manually entered since the DHCP server-supplied address will always override a manually-entered address.

Network Time Protocol	Check to enable network time synchronization. Default = Disabled.
Primary Server IP Address	Primary host name (VBrick Host Name or DNS Host Name) or IP address of valid SNTP server providing time synchronization. A blank field indicates the server address will be acquired via the DHCP server only if the Network DHCP field above is checked.
Secondary Server IP Address	Secondary host name (VBrick Host Name or DNS Host Name) or IP address of valid SNTP server providing time synchronization. A blank field indicates the server address will be acquired via the DHCP server only if the Network DHCP field above is checked.

External FTP Server

An external FTP server can be used with an Archiver in order to FTP recorded streams to an external device. See [Archivers](#) on page 79 for more about this functionality. The FTP User Name and Password must be set up properly on the remote FTP server. If they are not entered the same as what is set up on the server, the VBrick will be unable to connect and perform the transfer.

FTP Server Destination	The host name or IP address for the FTP server. It accepts up to 20 characters.
FTP Server Username	The FTP server user's account name. Anonymous FTP is supported. Default = <code>vbrick</code> .
FTP Server Password	Optional. The password required to access the FTP server. Accepts up to 20 characters. Default = <code>vbrick</code> .
FTP Server Directory	Optional. This object allows a manager to switch to a different directory within the FTP server after login. Accepts up to 64 characters. Default = /

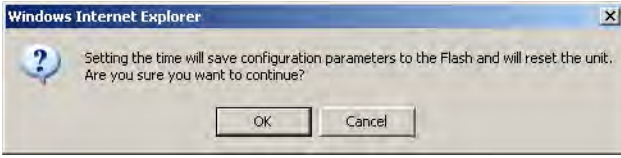
General

System Identification

The **Name**, **Location**, and **Contact** fields are used to identify the appliance. They *are not* changed when you click **Default**. (They *are* changed when you reset to the defaults on the Manage Configuration page.)

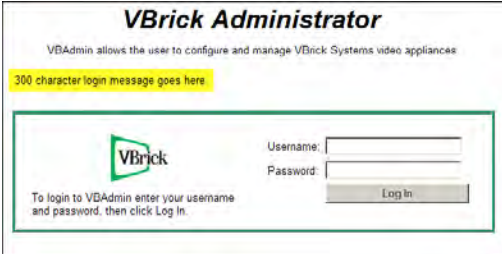
System Description	Read-only. Company name, appliance model number, and serial number.
System Name	User-defined. System name, for example Biology Dept.
System Location	User-defined. System location, for example West Campus.
System Contact	User-defined. Contact person, for example Jane Doe.

System Time

System Date Time	 <p>Sets system date and time in <code>mm/dd/yyyy hh:mm</code> format. The appliance will reset when you click Set Time.</p>
Time Zone	Select from list: (GMT-12) Eniwetok – (GMT +12) Auckland.

Daylight Saving Time	U.S. only. Check this box and the appliance will automatically adjust for Daylight Savings Time. This is particularly useful when monitoring the System Logs.
----------------------	---

Additional System Settings

Operational Mode	<p>Indicates the configured operational mode of the appliance. The Current Operational Mode is shown on the Monitor > System page. The following modes are supported. See Operational Modes on page 104 for more information.</p> <ul style="list-style-type: none"> • Run – Normal operation. • Diagnostics – User selected mode for running certain VBrick diagnostics. • Maintenance – Automatically launched when the software does not load. • Limited Run – Launched when significant conditions occur. • Overloaded – Launched when the CPU is overloaded.
Login Message	 <p>Enter up to 300 characters of alphanumeric text and special characters (except quotation marks) that will be displayed on the login page.</p>

System Reset

Reset	Resets (i.e. reboots) the appliance. A reset does not change, save, or reset any configuration parameters.
-------	--

Front Panel

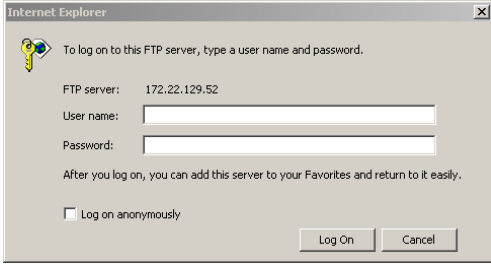
The parameters shown here are used to configure the appearance and behavior of the front panel. Access to front panel Configuration Mode is restricted by Pin number. Pin numbers (default = 0000) are defined on the [Usernames & Passwords](#) page. Some VBrick H.264 appliance models used for security and surveillance have a front panel without keypad buttons or an LCD screen. If you have one of these devices, the front panel configuration parameters explained below are *not* displayed. For a description of how to actually *use* the front panel, see [Front Panel Edit](#) in the *H.264 Appliance Getting Started Guide*.



Figure 5. H.264 Appliance Front Panel

Configuration Menu	
<ul style="list-style-type: none"> • Home ▣ System Configuration <ul style="list-style-type: none"> • Network • General • Usernames & Passwords • Manage Configuration ▣ Advanced Configurations <ul style="list-style-type: none"> • Management SAP • Security • Logging • Event Triggering • Passthrough • SNMPv3 Passwords • SNMP Traps ▣ Video/Audio Configuration ▣ Program Configuration ▣ Monitor ▣ Troubleshoot <ul style="list-style-type: none"> • Logout • Help 	<div style="border: 1px solid gray; padding: 5px;"> <p>System Reset</p> <p style="text-align: center;"><input type="button" value="Reset"/></p> <hr/> <p>Front Panel</p> <p>Hide Front Panel Advanced Settings</p> <p>Config Mode <input checked="" type="checkbox"/> Enabled</p> <p>Display IP Address <input checked="" type="checkbox"/> Enabled</p> <p>Display Hostname <input checked="" type="checkbox"/> Enabled</p> <p>Display Transmitter Information <input checked="" type="checkbox"/> Enabled</p> <p>Display User Description <input checked="" type="checkbox"/> Enabled</p> <p>User Description 1 <input type="text" value="VBrick Systems"/></p> <p>User Description 2 <input type="text" value="r"/></p> <p>User Function Description 1 <input type="text" value="FC1: Description"/></p> <p>User Function Description 2 <input type="text" value="FC2: Description"/></p> <p>User Function Description 3 <input type="text" value="FC3: Description"/></p> <p>User Function Description 4 <input type="text" value="FC4: Description"/></p> <p>Read or Write Script Files <input type="button" value="FTP Scripts"/></p> <p>User Function Script 1 <input type="text" value="FC1Scriptbt"/></p> <p>User Function Script 2 <input type="text" value="FC2Scriptbt"/></p> <p>User Function Script 3 <input type="text" value="FC3Scriptbt"/></p> <p>User Function Script 4 <input type="text" value="FC4Scriptbt"/></p> <hr/> <p style="text-align: center;"> <input type="button" value="Apply"/> <input type="button" value="Revert"/> <input type="button" value="Default"/> <input type="button" value="Save"/> <input type="button" value="Finish Edit"/> </p> </div>

Config Mode	Use this option to allow or prevent users from making configuration changes via the front panel. If disabled, users (in Function mode) can still run scripts from the front panel using the F1–F4 function keys.
Display IP Address	Check to display the appliance IPv4 address on LCD panel.
Display Hostname	Check to display the appliance hostname on LCD panel.
Display Transmitter Information	Check to display transmitter name and destination IP address on LCD front.
Display User Description	Check to display user-defined text on the first two lines of LCD panel.
User Description 1	Enter user-defined text (20 chars. max.) that will be displayed on first line of LCD panel. Default = <code>VBrick Systems</code>
User Description 2	Enter user-defined text (20 chars. max.) that will be displayed on second line of LCD panel. Default = <code>Release nn.nn.nnn</code>

<p>User Function Description 1–4</p>	<p>After navigating to Function mode with the Mode button, there are four configurable lines of text you can use to describe the behavior associated with each function key. For example, you might define the four configurable lines of text as follows. See Mapping a Function Key below for more information.</p> <p>F1 - Start Transmitting F2 - End Transmitting F3 - Mute Audio F4 - Unmute Audio</p>
<p>Read or Write Script Files</p>	<p>You can add scripts to the <code>/scripts</code> folder on the appliance via FTP by clicking on the FTP Scripts button and logging in. (The default credentials are <code>admin/admin</code>.)</p> 
<p>User Function Script 1–4</p>	<p>Use this parameter to associate a user-defined and user-named .txt script file with (F1–F4) function keys on the front panel. Simply press the appropriate function key to execute the script. For an example of a user-defined script, see Mapping a Function Key below.</p>

Mapping a Function Key

The front panel can be used to execute predefined scripts that perform specified actions on the appliance. For example you may have a script mapped to the **F1** key that enables or disables a transmitter. You run a script by pressing the function key that was mapped to that script in VAdmin. Scripts are saved and uploaded to the appliance via FTP.

- ▼ To map a function key (**F1–F4**) to a script file:
 1. Create a script text file (see sample below) for the action(s) you wish to perform.
 2. In VAdmin navigate to the System Configuration > General page, scroll down to Front Panel, and click **Show advanced settings**.
 3. Optional. Enter a **User Function Description 1** that will be displayed on the front panel to describe the function, for example: `F1 - Enable Transmitter`
 4. Click **FTP Scripts** to FTP your previously created .txt file to the `/scripts` folder on the appliance. You will need to create this folder if not already present.
 5. In the **User Function Script 1** field enter the name of the corresponding .txt file that will be mapped to **F1**, for example: `enabletransmitter.txt`
 6. After you Apply, Save, and exit Edit mode, you are done. Press the **F1** button on the front panel to execute the script.

Sample Function Key Script

All VBrick appliance parameters can be set or changed using scripts. For detailed information about getting and setting VBrick parameters, see the "Command Line Interface" topic in the *H.264 Getting Started Guide*. Remember that an `ApplySet` command is always required and

comments are not allowed on the same line as a command. Two sample script files are shown below. Script 1 sets the bit rate to high and changes the description to **Go low**. Script 2 sets the bit rate to low and changes the description to **Go high**. *These scripts will let you use the same function key (F1) to toggle between low and high bit rates.*

Sample Script 1: use-high-bitrate.txt

The sample script "use-high-bitrate.txt" sets the bit rate to 4M, reprograms **F1** to say Go-low, and selects the "use-low-bitrate" script.

```
//Sets F1 key to switch from high bit rate to low bit rate
SVAR vbrickEncoderVideoH264TargetBitRate.1.1=4000000
SVAR vbrickEncoderVideoCommonApplySet.1=2

//Change key name and script file name
SVAR vbrickFrontPanelUserFunctionDescription.1=Go-Low
SVAR vbrickFrontPanelUserFunctionScriptFilename.1=use-low-bitrate.txt
SVAR vbrickFrontPanelApplySet=2
```

Sample Script 2: use-low-bitrate.txt

This script "use-low-bitrate.txt" sets the bit rate to 500K, reprograms **F1** to say Go-high, and selects "use-high-bitrate" script.

```
//Sets F1 key to switch from low rate to high bit rate
SVAR vbrickEncoderVideoH264TargetBitRate.1.1=500000
SVAR vbrickEncoderVideoCommonApplySet.1=2

//Change key name and script file name
SVAR vbrickFrontPanelUserFunctionDescription.1=Go-High
SVAR vbrickFrontPanelUserFunctionScriptFilename.1=use-high-bitrate.txt
SVAR vbrickFrontPanelApplySet=2
```

Username & Passwords

Use this page to define user names and passwords and their corresponding permissions with respect to the appliance. (Table 2 shows the default user names, passwords, and permissions.) It also lets you assign a Pin number that will allow direct access to the keypad and functions on the appliance front panel (if the appliance is configured with a front panel).

The screenshot shows a configuration interface with a left-hand menu and a main content area. The menu includes options like Home, System Configuration, Network, General, Unames & Passwords, Manage Configuration, Advanced Configurations, Video/Audio Configuration, Program Configuration, Monitor, Troubleshoot, Logout, and Help. The main content area is titled 'Administrator' and contains five sections, each with input fields for Username, Password, and Confirm:

- Administrator:** Username: admin, Password: [masked], Confirm: [empty]
- Operator:** Username: operator, Password: [masked], Confirm: [empty]
- Diagnostics:** Username: diagnostics, Password: [masked], Confirm: [empty]
- Public:** Username: public, Password: [masked], Confirm: [empty]
- Front Panel:** Pin: [masked], Confirm: [empty]

At the bottom of the main content area, there are buttons for 'Apply', 'Revert', 'Default', 'Save', and 'Finish Edit'.

User Name	Enter desired user name not exceeding 20 characters. It may include any combination of alphanumeric characters and only the following special characters: ~ ! # \$ ^ * + & [] { } - < > See Table 2 below for defaults.
Password	Enter password. Cannot exceed 20 characters. May include any combination of alphanumeric characters but only the following special characters: ~ ! # \$ ^ * + & [] { } - < > See Table 2 for defaults.
Confirm	Confirm new password entry. The appliance will then display a user message and reboot.
Pin	Default = 0000. Enter a four-digit numeric string that will allow direct access to the keypad and functions on the appliance front panel.
Confirm Pin	Enter the same numeric string from above to confirm.

Table 2. Default User Names and Passwords

User Level	Default User Name	Default Password	Permissions
Administrator	admin	admin	Read, diagnostics, edit, change password, network and routing.
Operator	operator	operator	Read, diagnostics, edit.
Diagnostics	diagnostics	diagnostics	Read, diagnostics.
Public	public	public	Read

Manage Configuration

This page lets you reset some or all of the parameters in the appliance configuration. It also lets you read and save the current configuration to an .xml file and restore that configuration if necessary. Manage configuration includes the following functions.

Reset System Configuration	19
Read System Configuration	19
Restore System Configuration	21
Auto Configuration	21
Feature License	22

Reset System Configuration

This menu lets you default some or all appliance configuration parameters.

Default All	Sets all parameters <i>except</i> Network DHCP, IP Address, Subnet Mask, Gateway IP, User Names, Passwords and System Date & Time.
Factory Defaults	Sets <i>all</i> parameters to factory defaults with the exception of System Date and Time.

Read System Configuration

This function lets you read configuration parameters from the VBrick appliance to a file, as well as write configuration parameters from a file to the VBrick. The file is an .xml file and Internet Explorer is the assumed browser. Note that the VBrick appliance the .xml file is read


from, and VBrick appliance the .xml file is written *to*, should be running the same version of code. Mismatched versions may work but are not supported or guaranteed.

Note .xml configuration files from VB6000 Series appliances are **not** compatible with VBrick 7000 Series models. Do not try to run VB6000 Series configuration files on VBrick 7000 Series appliances.

Use any text editor, preferably an .xml editor to make changes to the file. You can change the "values" field as well as delete objects as necessary. Make sure the right data types are used. For example if a parameter takes integer values, do not enter a string. Also IP Address parameters must have the right IP syntax. Enter "0.0.0.0" to enter a null IP address. Blanks and null strings are not valid IP Addresses.

You can read the configuration parameters from the VBrick by clicking the **Read** button on the page. After clicking on the button, an xml document with all the configuration parameters will pop up (see Figure 6). The .xml document can then be saved to your PC as an .xml file using **File > Save As**. To view this file offline, you must **download** the style sheet to the same directory as the saved file. Do not change the name of the style sheet. It should always be saved as `cfgdata.xsl` and the first line at the top of the configuration file must always be: `<?xml-stylesheet type="text/xsl" href="cfgdata.xsl"?>`

Note Firefox users – To view or save the configuration file, click Read. Then go to File > Save Page As and save the file as Web Page, XML only. Then download the stylesheet to the same folder and you can view the configuration file using the stylesheet.

Internet Explorer 9 users – To view or save the configuration file, you must click the compatibility button  on the Internet Explorer 9 menu bar *before* you "read" the file.

VBrick Configuration Data		
System Information		
1	System Model	7101 H
2	Application Code Revision	1.1.0b - 5/20/2009 10:17
3	User Information Version	User Info 1.0
4	Part Number	9202-4200-0000
5	System Serial Number	
6	MAC Address	00:07:df:01:07:54
Ethernet_Network Configuration		
1	Network DHCP	Enabled
2	IP Address	172.22.2.120
3	Subnet Mask	ffff0000
4	Gateway IP Address	172.22.1.5
5	Primary Server IP Address	172.16.1.100
6	Secondary Server IP Address	172.16.1.101
7	Default Domain Extension	com
8	VBrick Host Name	AndyStan-H264
9	NetworkTimeSync-Primary Server IP Address	172.16.1.100
10	NetworkTimeSync-Secondary Server IP Address	172.16.1.101
11	IPv6 Address	::
12	Gateway IPv6 Address	::
13	NetworkTimeSync-Enable	Disabled
14	NetworkTimeSync-Primary Server Address Mode	IP Address
15	NetworkTimeSync-Secondary Server Address Mode	IP Address
16	IPv6 Auto Config Enable	Enabled
17	Network Interface Speed	Automatic
18	Network Interface Type	Automatic
19	Network Max. Transmission Unit Size	1500
20	Subnet Mask	255.255.0.0
21	DHCP Retry Interval	15
22	vb Auto Negotiation Force On	Disabled
Management_SAP Configuration		
1	IP Address	224.2.133.134
2	Group Name	
3	Port	9876

Figure 6. Sample VBrick Configuration File

Restore System Configuration

This function lets you write configuration parameters from an .xml file to the VBrick appliance. On a successful restore, all parameters will be saved to flash and the appliance will reboot. Only administrator-level users and above have "write" privileges. Note that the VBrick appliance that the configuration file is read *from*, and VBrick appliance that the configuration file is written *to* should be running the same version of code. Mismatched versions may work but are not supported or guaranteed.

- ▼ To restore the system configuration from an .xml file:
 1. Click the **Browse** button and navigate to the configuration file you want to write to the appliance.
 2. Click on the **Restore** button to write the selected file to the VBrick appliance. If there are no validation errors the configuration parameters will be saved to flash memory and the appliance will reset.
 3. If the configuration has validation errors, the file is rejected and the errors are displayed. You will need to correct the errors and create a valid .xml "read" file as explained above.

Auto Configuration

Auto Configuration lets you perform a configuration via a URL script file. It is typically used for remote configuration and troubleshooting or to configure appliances behind a firewall. To

configure a parameter on an appliance (or more likely a set of parameters) you simply point the URL to a server with an .xml configuration file. This is useful, for example, to set the audio and video rates when the VBrick appliance is behind a firewall and cannot be accessed remotely.

The VBrick reads the URL field (e.g. www.myserver.com/config.xml) via HTTP protocol and executes the script depending on the `VBEXECUTE` tag. If a `VBEXECUTEFORCE` tag is present in the .xml file (see example below), the script runs every time at the poll interval even if it has not changed. If a `VBEXECUTEIFDIFF` tag is present the script runs only if it is different from the last executed file. **One of these tags is required.**

If the VBrick is in **Edit** mode, the script file will not run until the edit session is ended. The auto config script will run *before* any external event scripts. In **Edit** mode, you can press **Run Script** to execute the script on demand. After a reboot, the VBrick checks for a script URL and will run the script immediately, regardless of the `VBEXECUTE` tag value.

URL	Valid path to a URL script file, for example: www.myserver.com/config.xml . Default = blank.
Poll Rate	The rate at which the appliance checks the config file. 0–1440 minutes. Default = 0.
Auto Config Status	Shows auto config status including when the script was last run, URL connection errors, etc.
Run Script	Edit mode only. Run the script now.

Sample Auto Config Script

The auto config script file ([config.xml](#)) is an .xml file with the following syntax. It can set any VBrick parameters and force an "apply" as needed. This example shows how to set various recorder parameters. Note that a `VBEXECUTE` tag is required and all commands must be preceded by an `svar` (set variable) command.

```
<?xml version="1.0"?>
<?VBEXECUTEFORCE?>
<VBRICK>
    SVAR vbrickEncoderVideoCommonAspectRatio.1.1=2
    SVAR vbrickEncoderVideoH264Resolution.1.1=15
    SVAR vbrickEncoderVideoH264TargetBitRate.1.1=5000000
    SVAR vbrickEncoderVideoCommonApplySet.1=2
</VBRICK>
```

Note The script file must have DOS/Windows style line endings. Text files created on Windows machines have different line endings than those created on Unix or Linux machines. Windows machines use a carriage return and line feed (`\r\n`) whereas Unix machines use line feed (`\n`) only.

Feature License

Use these fields to enter license keys for specific add-on features purchased from VBrick. For example you can purchase a license for an HD-ready H.264 appliance that will enable HD resolutions.

Feature License Key	Cut and paste the license key you received from VBrick into this field.
Install Feature License	Use this button to actually install a license.
Installed Feature Licenses	Read-only. Shows all licenses currently installed.

Advanced Configurations

The functions in this section are generally used by system administrators to configure management parameters. These parameters should not be changed except by knowledgeable systems administrators. Advanced configurations include the following.

Management SAP	23
Security	24
Logging	27
Event Triggering	28
Passthrough	30
SNMPv3 Passwords	35
SNMP Traps	35

Management SAP

These parameters define information used in the management SAPs (session announcements) emitted by the VBrick appliance. These SAP announcements are received by the VBDirectory management tool and the VEMS Portal Server. See the *VBDirectory User Guide* for more information.

Configuration Menu

- Home
- System Configuration
 - Network
 - General
 - Usernames & Passwords
 - Manage Configuration
 - Advanced Configurations
 - Management SAP
 - Security
 - Logging
 - Event Triggering
 - Passthrough
 - SNMPv3 Passwords
 - SNMP Traps
 - Video/Audio Configuration
 - Video
 - Audio
 - Program Configuration
 - Global
 - Programs
 - Transmitters
 - Servers
 - Monitor
 - System
 - Network
 - Video/Audio
 - System Logs
 - Program Status
 - Programs
 - Transmitters
 - Servers
 - Troubleshoot
 - Ping Test
 - Traceroute Test
 - Device Tests
 - Logout
 - Help

Transmit Enable	Controls the transmission of the Management SAPs (Enable or Disable).
Group Name	Optional. This parameter defines the Group Name. It is included in the Management SAPs used by VBDirectory. It is used for organizing VBricks into groups to simplify use of VBDirectory.
Unit Number	Optional. The appliance unit number (range 0–2147483647) is used to identify each VBrick in a group.
SAP Timeout	Provides a configurable timeout, in seconds, for received management SAPs. If no SAP is received within the timeout period, the entry is removed. Default = 90 sec.
Retransmit Time	Defines the Management SAP Retransmit Time.
Time To Live	The number of hops (between routers) for which a Management SAP is valid on the network.
Type of Service	The TOS (Type of Service) can be configured in the IP header to establish packet priority in the network.
IP Address	Defines the Destination IP Address for Management SAPs.
Port	Defines the Destination Port for Management SAPs.

Security

The screenshot displays the VAdmin web interface for configuring security settings. The left-hand navigation menu includes sections for System Configuration, Advanced Configurations (with Security selected), Video/Audio Configuration, Program Configuration, Monitor, and Troubleshoot. The main configuration area, titled 'System Configuration --> Advanced Configurations --> Security', lists several external services and their status:

- External Telnet Server: Enabled
- External FTP Server: Enabled
- External VAdmin: Enabled (dropdown menu)
- External SNMP: Enabled
- External SNMPv1 and SNMPv2 Access: Enabled
- External SSH Server: Enabled
- No Login for Viewer Files: Enabled
- External Storage: Enabled
- Remote Support Poll: Enabled
- RTSP Server Port: 554
- VAdmin Server Port: 8080
- Secure VAdmin Server Port: 443
- H.264 Tunnelling Port: 80
- Generate Security Keys:
- Security Keys Status: Valid Keys

At the bottom of the page, there are five buttons: 'Apply', 'Revert', 'Default', 'Save', and 'Finish Edit'.

Note If you disable Telnet, FTP, VAdmin, the Front Panel, and SNMP, the only way to manage (and re-enable) these parameters is to connect a PC to the appliance with a serial cable and use the Command Line Interface. You should never disable all the network management interfaces if you are using the COM port for serial passthrough.

External Telnet Server	Default = Enabled. Disabled will prevent Telnet sessions to the VBrick appliance.
External FTP Server	Default = Enabled. Disabled will prevent FTP sessions to the VBrick appliance. Note that this feature must be enabled to upgrade the appliance firmware using VBDownload.
External VAdmin	<ul style="list-style-type: none"> • Enabled – Default. Lets you manage the appliance from a web browser using the VAdmin management application. Supports HTTP or HTTPS. • Disabled – Prevents you from managing the appliance using VAdmin. • HTTPS Only – Encrypts and secures the VAdmin pages using HTTPS.
External SNMP	Default = Enabled. Disabled will prevent you from using an external MIB browser to view or write parameters.
External SNMPv1 and SNMPv2 Access	Default = Enabled. You can use both SNMP v1/v2, and v3. For tightest security, set parameter to Disabled and use SNMPv3 only.
External SSH Server	Default = Enabled. SSH (Secure Shell) is a replacement for Telnet. It allows data to pass between two networked devices using a secure channel.
No Login For Viewer Files	Default = Enabled. If enabled the VBrick will serve a transmitter's SDP file without requiring a login with username and password. This allows any device (players, decoders, etc.) to acquire the SDP file directly from the appliance. If disabled you may need to provide another method for delivering the SDP file to the receiving device, such as copying the file to another server.
External Storage	Default = Enabled. Check to enable/disable an external hard drive connected via a USB port. See Using External (USB) Devices on page 80 for more about this option.
Remote Support Poll	Default = Disabled. The default enables continuous polling through the firewall. If desired, you can enable polling only when you need to establish a remote connection. <i>This will not reboot the appliance.</i> Remote Support Polling enables a unique built-in mechanism that allows VBrick Support Services to help configure or troubleshoot an appliance—even if it's behind a firewall. When this feature is enabled (and you provide the user name and password), Support Services can establish a secure, tunneled connection to the VAdmin interface of the appliance.
Remote Support Server	Default = remote.vbrick.com . Use the default if a DNS server is defined on the Network page. If a DNS server is not defined, you must enter an IP Address in this field. Contact Support Services for details.

RTSP Server Port	Default = 554. Sets the RTSP server port.
VAdmin Server Port	Specifies the listener port for management and HTTP connections. Default = 80. When the remote VAdmin user (client) specifies the http syntax, the port value is generally omitted. Typically port 80 is the default value used by browsers. As a matter of consistency, the VBrick default VAdmin Server Port value is also defaulted to 80. To access a different HTTP port, the remote VAdmin client user would specify the URL as follows: <code>http://IPaddress:port</code> where <code>IPaddress</code> = VBrick IP address or hostname, and port. This feature is often useful for a system where HTTP is used to traverse firewalls. The VAdmin server port is moved to another location (for example 8080) and the HTTP Tunneling port is set to 80.
Secure VAdmin Server Port	Specifies the listener port for management and HTTPS connections. Default = 443. When the remote VAdmin user (client) specifies the HTTPS syntax, the port value is generally omitted. Typically port 443 is the default value used by browsers. As a matter of consistency, the VBrick default Secure VAdmin Server Port value is also defaulted to 443. To access a different HTTPS port, the remote VAdmin client user would specify the URL as follows: <code>https://IPaddress:port</code> where <code>IPaddress</code> = VBrick IP address or hostname, and port.
H.264 Tunneling Port	Sets the port to be used to serve tunneled H.264 HTTP streams. Default is 8080 but if you are streaming HTTP directly from a VBrick via the Internet, it is common practice to change this to 80 and to set the VAdmin server port to something other than 80.
Generate Security Keys	The security keys used internally by HTTPS and SSH are factory-generated and should be replaced only if security is an issue. Note: Key generation is CPU-intensive and should only be performed when the appliance is idle. It will take 3–5 minutes if the appliance is idle (or much longer if the appliance is in use).
Security Keys Status	<ul style="list-style-type: none"> • Valid Keys – The existing security keys are valid. • Generating Keys – New security keys are being generated. • Reboot Required – New security keys have been generated and will take effect after a reboot.

Improving Security

You can improve security by (1) blocking unauthorized attempts to login and access a device and (2) by reducing exposure to malicious software attacks. The most common vulnerability is related to user accounts and passwords. After a successful installation, you should immediately change the default passwords. Many attacks come from within an organization and this helps to minimize the risk. The VAdmin login is generally secure since it utilizes encryption techniques to hide usernames and passwords from network spyware.

Malicious software covertly attaches itself to unsuspecting devices. These programs are generally designed to compromise personal information or to create system havoc. Since the VBrick appliance uses an industrial-grade operating system, it is less susceptible to malicious software and unlikely to be a target of programs designed to attack PC-based systems like Microsoft, Linux, and others. However, you can still take additional steps to minimize risk.

VBrick tries to make installation as simple and quick installation and many features are automatically enabled by default even though you may not need them. You can selectively disable unneeded features to reduce vulnerability. Another common problem is Denial of Service (DoS) attacks. A DoS sends floods of packets to an unsuspecting remote system in an attempt to disrupt or stop normal operation. These unsuspecting remote systems are typically discovered using ICMP or Ping. It is standard industry practice to block all ICMP and Ping requests from off-net foreign hosts. This is typically done in a centralized location using router/firewall technology which is more successful and cost effective than resolving the issue at each host.

Logging

Logging of certain events can be stored both locally (within the VBrick device) or externally (for example on a server). Local logs are stored in volatile memory. For preservation of information, it is recommended that remote logging be utilized. Remote servers generally offer ample storage and offer the additional benefit of collecting log information from several VBricks simultaneously. When logging externally, specify either the IP address or hostname of the actual server using the **Remote Event Log Destination** field. If remote logging is enabled, the log information is sent via SNMP traps. When you enable logging, be sure to set the system date and time (see [System Time](#) on page 13) or select a network time server in order to get accurate time stamps in the logs.

Configuration Item	Status
Log Time Zone	Local
Trap Log Local	<input checked="" type="checkbox"/> Enabled
Trap Log Remote	<input type="checkbox"/> Enabled
General Config Log Local	<input checked="" type="checkbox"/> Enabled
General Config Log Remote	<input type="checkbox"/> Enabled
Script Config Log Local	<input checked="" type="checkbox"/> Enabled
Script Config Log Remote	<input type="checkbox"/> Enabled
System Event Log Local	<input checked="" type="checkbox"/> Enabled
System Event Log Remote	<input type="checkbox"/> Enabled
Remote Event Log Destination	

Log Time Zone	The time for each logged event will be recorded in either Local time or GMT time.
Trap Log Local	Stores logs locally within the unit. The log file will wrap after 20 events.

Trap Log Remote	Sends log file to an external server.
General Config Log Local	Stores the log of user initiated configuration changes traps locally within the unit. The log file will wrap after 20 events.
General Config Log Remote	Sends the log of user initiated configuration changes to an external server.
Script Config Log Local	Stores the log of script generated configuration changes locally within the unit. The log file will wrap after 20 events.
Script Config Log Remote	Sends the log of the log of script generated configuration changes to an external server.
System Event Log Local	Stores the log of system events locally within the unit. The log file will wrap after 20 events.
System Event Log Remote	Logs systems events to an external server.
Remote Event Log Destination	Unicast IP address of remote event log server.

Event Triggering

You can create and run scripts to activate certain functions on a VBrick appliance. There are two ways to run scripts on an appliance. (1) You can run scripts for test purposes using the **Run Script** button in VAdmin or (2) you can use an external event trigger (see "Event Triggering" in the *VBrick Appliance Getting Started Guide*) to run a script. There are four event trigger scripts, with fixed names, that can be created and stored in flash memory in the `/scripts` folder. You write your own scripts and associate them with the file names shown below.

Note Do not confuse Event Trigger scripts with User Function scripts. User Function scripts are associated and run with the (F1–F4) buttons on the appliance front panel. See [Front Panel](#) on page 14 for more about User Function scripts.

The VBrick appliance can be set up to use serial (COM) Pins 7 and 8 as input events to trigger the appliance to run scripts. The script files execute a subset of the CLI commands ([SVAR](#) and [WAIT](#)) in order to activate specific functions on the VBrick appliance. There are a total of four possible input events (COM Pin8 Low, COM Pin8 High, COM Pin7 Low, COM Pin7 High) associated with four different scripts. *The script file names cannot be changed.*

- `/scripts/com1Pin8LowEventScript.txt`
- `/scripts/com1Pin8HighEventScript.txt`
- `/scripts/com1Pin7LowEventScript.txt`
- `/scripts/com1Pin7HighEventScript.txt`

Run Scripts Using VAdmin

You can run scripts using the **Run Script** button in VAdmin. This button is only available in **Edit** mode and is basically used for test purposes. See [Sample Script](#) below. Note that you cannot execute a script using an event trigger if VAdmin is currently running in **Edit** mode. If you run a script directly from VAdmin, it automatically exits **Edit** mode and terminates the active editing session.

Refresh Count and Status	Refresh entire page including Event Counts and Event Script Status.
Reset Counts	Reset Event Counts only.
Read or Write Script Files	Click the FTP Scripts button to login to the VBrick via FTP and manage script files. Requires a valid user name and password. Script files have explicit, predefined names as explained above.
Event Enable	Allows the user to Enable/Disable Event Triggering for each input event.
Event Stable Time	Allows the user to enter the amount of time in milliseconds that each input event has to be stable at the active level before the script will be executed.
Event Count	Displays the number of times each input event has occurred.
Event Script Status	Displays current status information for each event script.

Event Script Control	The Run Script buttons lets you run each script without needing the input event. Use this method to test the script.
----------------------	--

Run Scripts Using Event Triggers

The event triggering feature lets you use an external switch or power source to control the functions of the VBrick appliance. See "Event Triggering" in the *VBrick Appliance Getting Started Guide* for more information.

Sample Script

The following script sets a multicast transmitter destination and enables the transmitter. The extension .1.1 refers to the first program and the first transmitter.

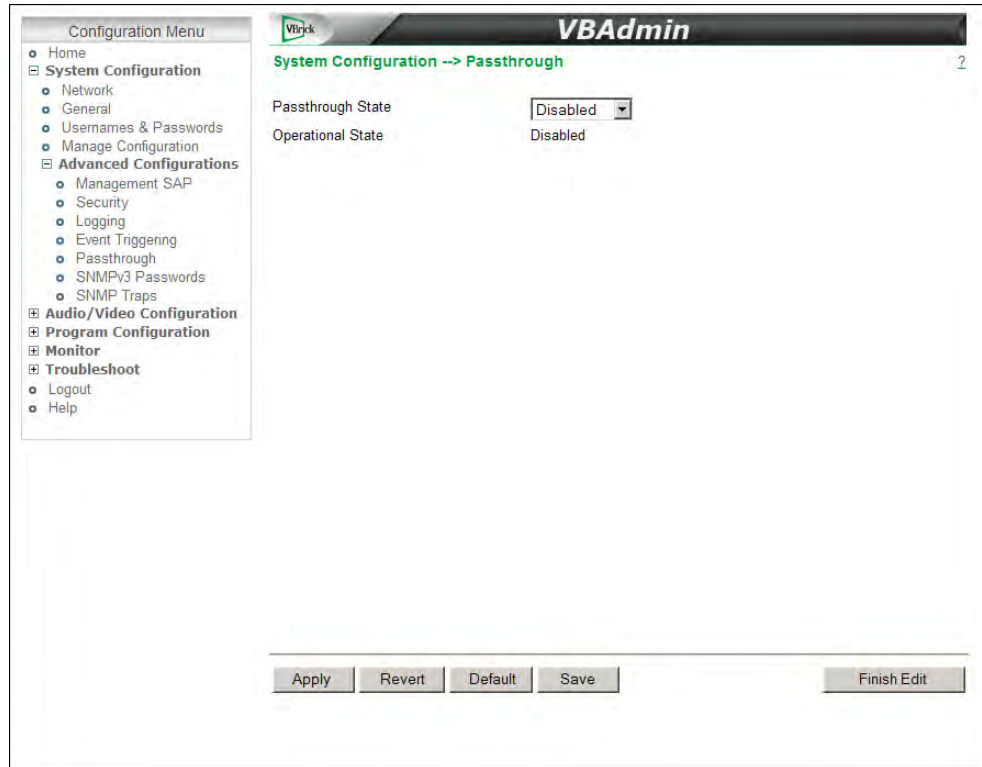
```
SVAR vbrickProgramTransmitterInetAddr.1.1=239.22.118.1
SVAR vbrickProgramTransmitterEnable.1.1=2
SVAR vbrickProgramTransmitterApplySet.1.1=2
WAIT 1000
```

Scripting Syntax

- Script commands must start in column 1.
- `svar` (set variable) must precede the variable name.
- Wait time is defined milliseconds. A value of 1000 = 1 second.
- Most variable changes require an apply set.
- There is no clear command.
- There is no chaining of scripts.
- Comments are not allowed on the same line as a command.
- All scripts are executed in a strictly serial manner by a single task.
- While executing a script it is possible to miss a double change of any event.

Passthrough

The TCP/IP network can serve as an intermediary between two VBrick appliances and their serial ports or between a PC application sending IP packets and an appliance's serial port. This feature supports a wide range of serial applications including KLV (Key-Length-Value) and CoT (Cursor on Target) applications. See [KLV Metadata](#) on page 107 and contact VBrick support for details and restrictions. End-to-end control is initiated by enabling or disabling Passthrough. For more about passthrough, and how it can be used, see the *H.264 Appliance Getting Started Guide*.



Passthrough State	<p>Used to enable/disable Passthrough. You must be the Active Editor to enter a Passthrough state. Three states are possible:</p> <ul style="list-style-type: none"> • Disabled – The VBrick will neither initiate nor respond to Passthrough setup requests. • Responder – In this case the VBrick will accept a connection request (up to 64 connection requests). • Initiator – In this case it will continuously attempt to automatically initiate a Passthrough connection to the remote destination. This mode also offers metadata destination options.
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Passthrough State: Responder

The screenshot shows the VAdmin configuration interface for the Passthrough State. The left sidebar contains a Configuration Menu with categories like System Configuration, Advanced Configurations, Video/Audio Configuration, Program Configuration, Monitor, Program Status, and Troubleshoot. The main area displays the following settings:

- Passthrough State: Responder
- Baud Rate: 9600
- Stop Bits: 1
- Parity: None
- Com Interface Type: RS232
- RTS Control: Automatic
- DTR Control: Automatic
- Operational State: Disabled

At the bottom of the configuration area, there are buttons for Apply, Revert, Default, Save, and Finish Edit.

Passthrough State	Responder – In this case the VBrick will accept a connection request (up to 64 connection requests).
Baud Rate	Rate of Passthrough port. Rate can be set to the following (Default = 9600): 110, 300, 600, 1200, 2400, 3600, 4800, 7200, 9600, 14400, 19200, 28800, 38400, 57600, 115200.
Stop Bits	Number of stop bits for Passthrough port (1 or 2).
Parity	None, Even, Odd.
COM Interface Type	Describes the COM interface connector. <ul style="list-style-type: none"> RS232 – standard RS-232 serial port connector. RS422/485 – RS-422/485 4-wire serial port connector.
RTS Control	Force Off, Force On or Automatic. If automatic, the control will be on when Passthrough is active. Under no conditions are RTS or DTR controls passed through end-to-end. All control handling is local. When using a VBrick VCC-3 or VCC-4 camera, set this control to Automatic; when using a VBrick VCC-50i camera, set this control to Force On.

DTR Control	Force Off, Force On or Automatic. If automatic, the control will be On when Passthrough is active. Under no conditions are RTS or DTR controls passed through end-to-end. All control handling is local. When using a VBrick VCC-3 or VCC-4 camera, set this control to Automatic; when using a VBrick VCC-50i camera, set this control to Force On.
Operational State	Describes the current status of a Passthrough connection, including error conditions, if any. Refer to the Monitor > Network page. This will display "Active" if in Passthrough mode.

Passthrough State: Initiator

The screenshot shows the VAdmin web interface for configuring Passthrough. The left sidebar contains a Configuration Menu with categories like System Configuration, Advanced Configurations, Video/Audio Configuration, Program Configuration, Monitor, Program Status, and Troubleshoot. The main content area displays the following configuration options:

- Passthrough State: Initiator
- Destination: KLV
- Baud Rate: 9600
- Stop Bits: 1
- Parity: None
- Com Interface Type: RS232
- RTS Control: Automatic
- DTR Control: Automatic
- Operational State: Disabled

At the bottom of the configuration area, there are buttons for Apply, Revert, Default, Save, and Finish Edit.

Passthrough State	Initiator – In this case it will continuously attempt to automatically initiate a Passthrough connection to the remote destination. This mode also offers metadata destination options.
Destination	<ul style="list-style-type: none"> Dedicated – Use when the destination is another VBrick appliance. Enter Host Name or IP Address in Dedicated Destination field below. KLV – The serial port accepts LDS (Local Dataset Packets) or CoT (Cursor on Target) metadata. For more about this topic, see LDS Passthrough on page 108.

Dedicated Destination	Shown if Dedicated is selected above. The VBrick appliance (whose serial port is the destination of this COM port) can be configured and identified using either an IP address or a Host Name. If Host Name is used, the Resolved Destination IP Address field shows the read-only IP address of the VBrick appliance.
Dedicated Port	Default - 4439.
Baud Rate	Rate of Passthrough port. Rate can be set to the following (Default = 9600): 110, 300, 600, 1200, 2400, 3600, 4800, 7200, 9600, 14400, 19200, 28800, 38400, 57600, 115200.
Stop Bits	Number of stop bits for Passthrough port (1 or 2).
Parity	None, Even, Odd.
COM Interface Type	Describes the COM interface connector. <ul style="list-style-type: none"> • RS232 – standard RS-232 serial port connector. • RS422/485 – RS-422/485 4-wire serial port connector.
RTS Control	Force Off, Force On or Automatic. If automatic, the control will be on when Passthrough is active. Note: DTR and RTS are not available for COM. Under no conditions are RTS or DTR controls passed through end-to-end. All control handling is local.
DTR Control	Force Off, Force On or Automatic. If automatic, the control will be On when Passthrough is active. See note above.
Operational State	Describes the current status of a Passthrough connection, including error conditions, if any. Refer to the Monitor > Network page. This will display "Active" if in Passthrough mode.

SNMPv3 Passwords

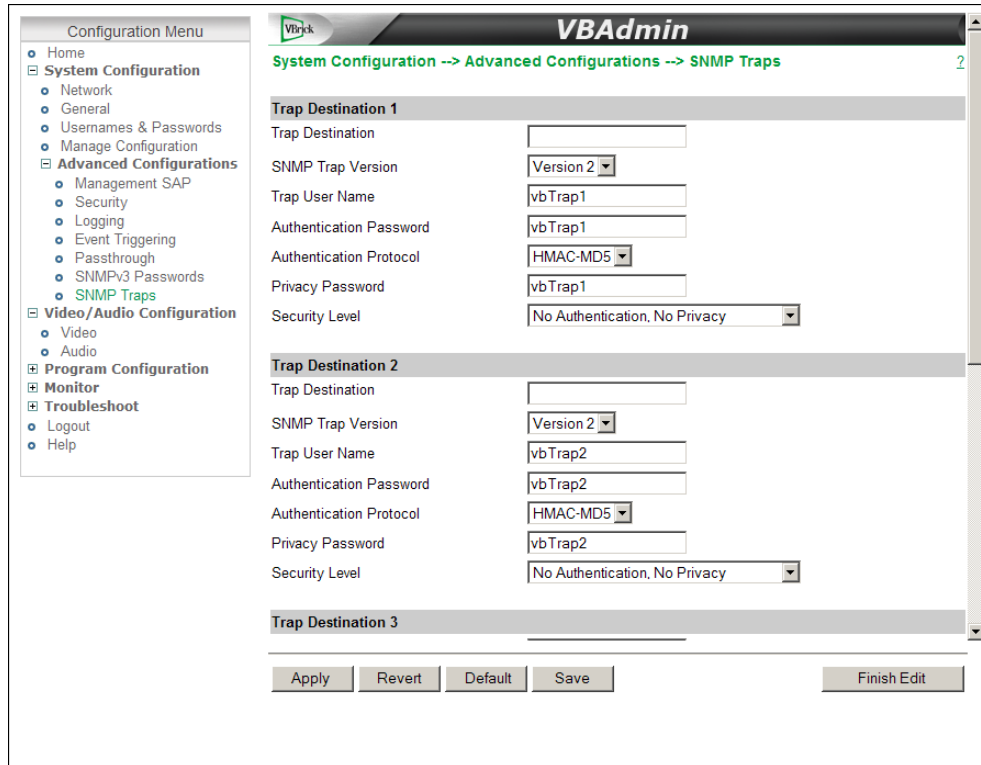
Use this page to manage SNMP passwords. The same fields are used to define passwords for all users.

User Name	Read-only. Set user name on Usernames & Passwords page.
Authentication Password	Enter password. Cannot exceed 20 characters. May include any combination of alphanumeric characters but only the following special characters: ~ ! # \$ ^ * + & [] { } < > See Table 2 for defaults.
Authentication Protocol	Select protocol: HMAC-MD5 or HMAC-SHA.
Privacy Password	Required.
Security Level	No Authentication, No Privacy (Default). Authentication. No Privacy. Authentication and Privacy (CBC-DES)

SNMP Traps

VBrick supports SNMP v2 and SNMP v3 traps. SNMP traps are a subset of the SNMP management component of the VBrick. Use of any element of the SNMP management system requires use of an SNMP browser or SNMP manager application (not supplied). The SNMP MIB, which formally defines the SNMP interface to the VBrick, is contained within the install directory of the VBrick release or from the [Downloads](#) page on the VBrick website. The SNMP MIB is located in `vbrickSystem.mib` and the default installation directory is:

Traps are SNMP base messages used by SNMP elements to report changes in status or alarm conditions to remote SNMP management entities. Traps are generally used to alert network administrators of potential equipment problems or other noteworthy events. Two types of information are conveyed in the trap mechanism: Events and Alarms. Events Traps are sent every time the monitored event occurs. Events have only one state. Alarms are events having two states, Active and Clear. When the alarm condition is first detected, an alarm active trap is emitted. Alarms are considered active until the condition cleared and the alarm clear trap is emitted.



Trap Destination (1-4)	The IP Addresses of SNMP management stations to which traps are to be sent. The SNMP management application should be active on these stations in order to receive a number of SNMP Traps, which are supported by the VBrick. Enterprise-specific traps listed in order of trap identification number are shown in Table 3.
SNMP Trap Version	Select Version 2 or Version 3.
Trap User Name	User defined string
Authentication Password	Enter password. Cannot exceed 20 characters. May include any combination of alphanumeric characters but only the following special characters: ~ ! # \$ ^ * + & [] { } < >
Authentication Protocol	Select protocol: MD5 or SHA to validate the transaction between a given host and client
Privacy Password	Required. Hides traffic using DES encryption.

Security Level	<ul style="list-style-type: none"> • No Authentication, No Privacy (default). • No Privacy. • Authentication and Privacy.
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Table 3. Trap Summary

Trap	Description
1	<code>vbrickSysTrapGroup</code> Sent whenever a significant event occurs within the VBrick. Each event provides details via the <code>vbrickSysRemoteEventLogType</code> , and <code>vbrickSysRemoteEventLogText</code> objects
2	<code>vbrickSysTrapStartupRunMode</code> The VBrick has started up in Run mode.
3	<code>vbrickSysTrapStartupDiagnosticsMode</code> The VBrick has started in Diagnostics mode.
4	<code>vbrickSysTrapStartupLimitedRunMode</code> The VBrick has started in Limited Run mode.
5	<code>vbrickSysTrapUserInitiatedReset</code> The VBrick has received a reset request from an administrator.
6	<code>vbrickSysTrapTemperatureOutOfRangeActive</code> The VBrick temperature is out of range.
7	<code>vbrickSysTrapTemperatureOutOfRangeCleared</code> The out of range VBrick temperature is recovered.
8	<code>vbrickSysTrapUnitOverloadedActive</code> The VBrick is configured to transmit and receive video streams beyond its capability.
9	<code>vbrickSysTrapUnitOverloadedCleared</code> The overloaded VBrick is recovered to normal.
10	<code>vbrickSysTrapPostFailure</code> The Power On Self Test (POST) failed.
11	<code>vbrickSysTrapNetworkTimeProtocolServerDown</code> There is loss of connection to the Network Time Protocol servers.
12	<code>vbrickSysTrapNetworkTimeProtocolServerUp</code> There is a connection available now to the Network Time Protocol servers.
13	<code>vbrickSysTrapVideo1InputAlarmActive</code> Input #1 has a loss of video.
14	<code>vbrickSysTrapVideo1InputAlarmClear</code> The loss of video on input #1 is recovered.
15	<code>vbrickSysTrapFanFailureActive</code> The fan failed.
16	<code>vbrickSysTrapFanFailureCleared</code> The fan failure is recovered.
17	<code>vbrickSysTrapAudio1InputAlarmActive</code> Input #1 has a loss of digital audio.
18	<code>vbrickSysTrapAudio1InputAlarmClear</code> The loss of digital audio on input #1 is recovered.
19	<code>vbrickSysTrapInitFailure</code> The system could not be initialized.
20	<code>vbrickSysTrapVideo1ProtectedAlarmActive</code> Input #1 has protected video.
21	<code>vbrickSysTrapVideo1ProtectedAlarmClear</code> The video on input #1 is no longer protected.
22	<code>vbrickSysTrapIntHddLowSpaceAlarmActive</code> Free space on the internal hard drive has fallen below 15%.

Trap		Description
23	<code>vbrickSysTrapIntHddLowSpaceAlarmClear</code>	Free space on the internal hard drive has risen above 15%.
24	<code>vbrickSysTrapExtHddLowSpaceAlarmActive</code>	Free space on the external hard drive has fallen below 15%.
25	<code>vbrickSysTrapExtHddLowSpaceAlarmClear</code>	Free space on the external hard drive has risen above 15%.
26	<code>vbrickSysTrapMemoryLowSpaceAlarmActive</code>	There is no free space in memory.
27	<code>vbrickSysTrapMemoryLowSpaceAlarmClear</code>	There is free space in memory.

Video/Audio Configuration

Topics in this section

Video 39
Audio 49

Note When viewing the screenshots in this manual, keep in mind that many of the configuration options for the appliance are mutually exclusive. This means that, depending on which options you select, you may see new fields or you may not see previously existing fields. Although the screenshots may not always show all options, they are explained in detail in the text.

Video

The VBrick H.264 encoder supports the Baseline profile and provides superior performance under a wide variety of network and application environments. H.264 video compression will typically provide the same quality as MPEG-2 at half of the bit rate or less, especially in high bit rate and high resolution environments.

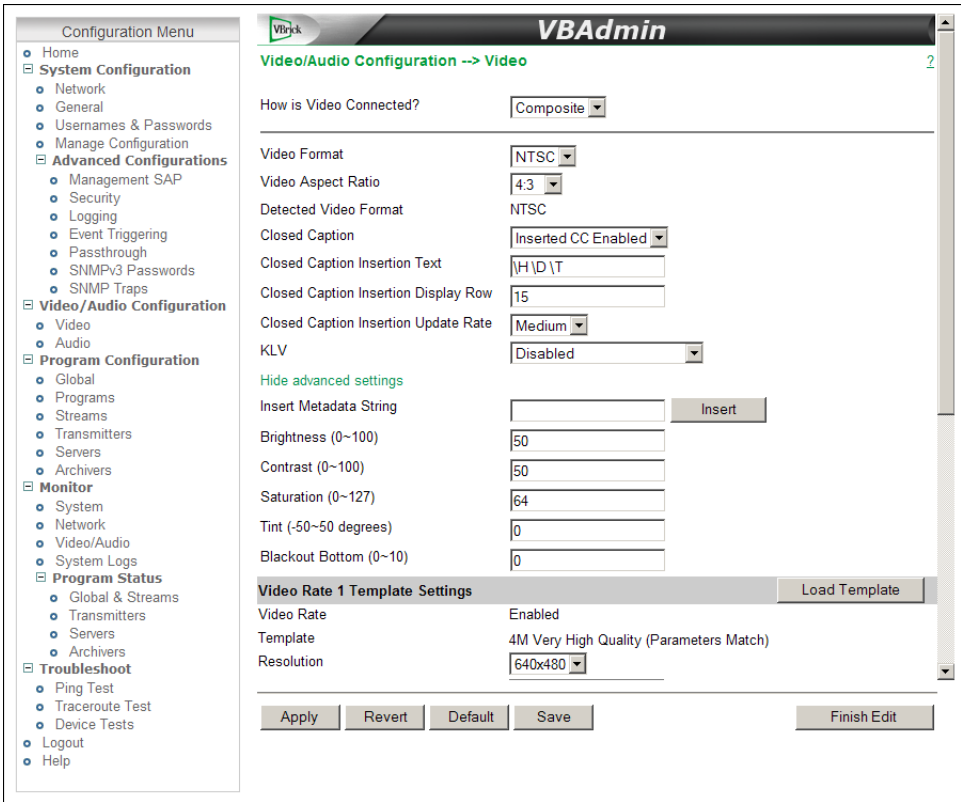


Figure 7. Video Configuration: Part 1 – Standard Definition Inputs

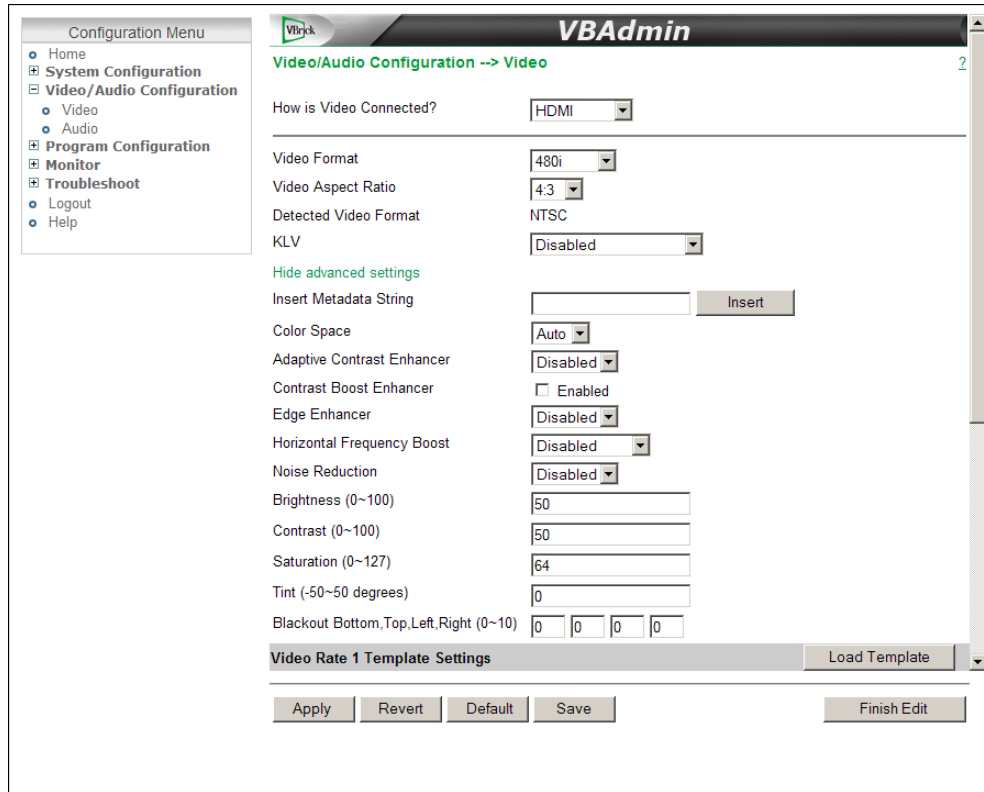


Figure 8. Video Configuration: Part 2 – High Definition Inputs



Figure 9. Enterprise Encoder with SD and HD Connectors

How is Video connected?	<p>Figure 9 shows the video input connectors on the rear panel. Select the option that matches your video input. If you have a Standard Definition input connector, use S-Video if possible. S-Video generally produces higher-quality input and correspondingly better compressed output than Composite.</p> <p><u>Standard Definition Inputs</u></p> <ul style="list-style-type: none"> • SVID – one S-Video connector (S-VID) with four pins. • Composite – one pin connector (COMP IN) for video. <hr/> <p><u>High Definition Inputs</u></p> <ul style="list-style-type: none"> • Component – three cables (Y, Pb, Pr) with BNC connectors. • HDMI – High Definition Multimedia Interface that transmits uncompressed digital data. • SDI – BNC input connector for: <ul style="list-style-type: none"> • SD-SDI – Standard Definition Serial Digital Interface is typically used for broadcast-grade video. Meets SMPTE 259M. • HD-SDI – High Definition SDI at bit rates of 1.485 Gbits/sec provides broadcast-grade video with greater fidelity and higher resolution options. Meets SMPTE 292M. • HD/3G-SDI – High Definition SDI to process 1080p at bit rates of 2.97 Gbits/sec. Meets SMPTE 424M.
Video Format	<p>It is important to configure the Video Format on the encoder so that it exactly matches the video source connected to the encoder. For some input connection types like HDMI and SDI, the encoder can sense the input format and report it in the "Detected Video Format" read-only field. For other types like Component, the encoder cannot sense the input format. But in all cases (whether there is a Detected Video Format or not) you must always select and apply a Video Format that exactly matches your video source. The options for Video Format shown below vary depending on how the input video is connected.</p> <ul style="list-style-type: none"> • SVID – NTSC (North America, Japan), PAL (Europe, Asia, Australia) • Composite – NTSC, PAL • Component – 480i, 480p, 576i, 576p, 720p/50/60, 1080i/50/60 • HDMI – 480i, 480p, 576i, 576p, 720p/50/60, 1080i/50/60, 1080p/50/60 • SD-SDI – 480i, 576i • 3G-SDI – 720p/50/60, 1080i/50/60, 1080p/50/60
Video Aspect Ratio	<p>Video Aspect Ratio is the ratio of the width of the image to the height of the image. Standard Definition video generally uses an aspect ratio of 4:3; High Definition video generally uses 16:9. Set this value to match the video input source, either 4:3 or 16:9.</p>
Detected Video Format	<ul style="list-style-type: none"> • S-Video/Composite: NTSC or PAL. • HDMI/SDI: Indicates what is actually connected. This is useful for determining configuration mismatches.

Closed Caption	<p>Use to enable closed captions and select embedded closed captions (from the video source) or user-inserted text. Embedded closed captions are supported for the following video inputs: Composite (NTSC only), SVID (NTSC only), and SDI. User-inserted text is supported for all inputs.</p> <ul style="list-style-type: none"> • Disabled – Default. Related Closed Caption fields not shown. • Video CC Enabled – Reads the embedded video closed caption text from the video source. • Inserted CC Enabled – Inserts the user-defined text set in the closed caption text field.
KLV	<p>For more information about this parameter see KLV Metadata on page 107.</p> <ul style="list-style-type: none"> • Disabled – KLV metadata is not embedded in the stream. • ESD to LDS – ESD metadata data is embedded in line 21 of the composite or S-Video stream and is converted to LDS and embedded into the transport stream. • Serial LDS Passthrough – LDS metadata is provided via the serial port and embedded into the transport stream. • SDI LDS Passthrough – LDS metadata is e provided via the SDI interface and embedded into the transport stream. • Network LDS Passthrough – LDS metadata is provided via the specified IP network port and embedded into the transport stream. • Serial CoT to LDS – CoT (Cursor on Target) data is provided via the serial port and is converted to LDS and embedded into the transport stream. • Network CoT to LDS – CoT data is provided via an IP network port and is converted to LDS and embedded into the transport stream.
Insert Metadata String	Typically used with VEMS presentations. Click Insert Now to insert up to 213 characters of metadata into the stream.
ESD Field	ESD to LDS only. Indicates in which of the line 21 fields the ESD information is located: Field One, Field Two (default), or Field Three.
KLV PTS	<p>Used if the KLV data source is Serial, SDI, or Network LDS Passthrough. Select the Presentation Time Stamp method:</p> <ul style="list-style-type: none"> • Capture Time – Uses the time of data reception to generate the metadata stream PTS. Defaults = System Time. • LDS Time – Uses the timestamp extracted from the LDS packets to generate the metadata stream PTS.
KLV Port	Used with Network LDS Passthrough and Network CoT to LDS.

Closed Caption Insertion Text	<p>Defines the text inserted into the closed caption field of the encoded stream (default is \h \d \t.) when Inserted CC Enabled is selected for Closed Caption above. Enter any string up to a maximum of 32 characters (including the Host Name, Date, and Time). No double quotes, less than <, or greater than > symbols are allowed. Special codes can be substituted for the text as follows:</p> <ul style="list-style-type: none"> • \h or \H – Host Name. • \d or \D – Current Date. • \t or \T – Current Time. • \c# or \C# – Set Color (where # = the number corresponding to color). 0 = White, 1 = Green, 2 = Blue, 3 = Cyan, 4 = Red, 5 = Yellow, 6 = Magenta
Closed Caption Insertion Display Row	<p>Displayed when Inserted CC Enabled is set. Sets the position on the screen where the text defined in the Closed Caption Text field will appear in the decoded video. Can be set from 1 through 15, where 1 indicates the top of the screen and 15 indicates the bottom of the screen (default is 15), when Inserted CC is enabled.</p>
Closed Caption Insertion Update Rate	<p>Sets the rate at which the closed captioning field is updated (default = Medium) when you select Inserted CC Enabled (see above).</p> <ul style="list-style-type: none"> • Slow – The inserted closed caption field is updated every 60 seconds. • Medium – The inserted closed caption field is updated every 20 seconds. • Fast – The inserted closed captioning field is updated every 5 seconds.
Color Space	<p>HDMI/Component. Override the default Color Space. Useful if connecting DVI from a PC over HDMI. The appliance autodetects and supports both YCrCb (commonly used by cameras or video players) and RGB (commonly used by computers) on the HDMI and Component inputs.</p> <ul style="list-style-type: none"> • Auto – Default. • RGB – represents color as red, green and blue. • YCrCb – represents color as brightness. <p>In most situations and with most video devices, the default setting to Auto detect the Color Space is recommended. However with some types of video equipment like DVI-to-HDMI convertors and general purpose image scalers, the encoder's automatic setting may not be able to choose correctly. If you see a pink or green tint on the encoded video there is a good chance the color space of your source and the encoder do not match.</p>
Video Time Stamp	<p>SDI only. Used for MPEG2TS Video PTS (Presentation Time Stamp):</p> <ul style="list-style-type: none"> • Capture Time – (default) the system capture time of the raw video frame • SMPTE Time Code – if present use the SMPTE Time Code converted to appropriate PTS units.

Adaptive Contrast Enhancer	HDMI/SDI/Component. Default = Disabled. Expands dark regions without over-enhancing or clipping brighter regions. Set to Low, Med, or High.
Contrast Boost Enhancer	HDMI/SDI/Component. Default = Disabled. Supplements existing Contrast setting. Check to enable.
Edge Enhancer	HDMI/SDI/Component. Default = Disabled. Sharpens edges in active video region for both Luma and Chroma. Set to Low, Med, or High.
Horizontal Frequency Boost	HDMI/SDI/Component. Default = Disabled. Amplifies the appropriate video frequency band. <ul style="list-style-type: none"> • Med – amplifies the middle frequency band of the displayed video. • High – amplifies the highest frequencies of the displayed video. • Med & High – amplifies the highest and middle frequencies of the displayed video.
Noise Reduction	HDMI/SDI/Component. Filters extraneous video artifacts from the stream.
Brightness	0–100. Default = 50. Brightness is information about the varying light intensity of an image which is best described as brightness.
Contrast	0–100. Default = 50. The contrast is the range of light-to-dark values of an image that are proportional to the voltage differences between the black and white levels of the signal.
Saturation	0–127. Default = 64. Saturation is the spectral intensity of a color. It operates on the PbPr chroma components of the color space by increasing or decreasing both components by the same percentage.
Tint	-50–50 degrees. Default = 0. The tint is the attribute by which a color may be identified within the visible spectrum. Tint refers to the spectral colors of red, orange, yellow, green blue and violet. <i>Note: Adding Tint reduces the saturation.</i>
Blackout Bottom (Top, Left, Right)	0–10. Default = 0. Top, Left, Right available only with HDMI/SDI/Component inputs. Some video signals include additional information that results in undesirable artifacts on some sides of the video frame. This option blacks out an <i>area</i> around the player window—not a specific number of lines. Be sure to test your results when using this option.

Video Rate Template Settings

As shown on the following page (Figure 10), the encoder supports multiple bit rate encoding (MBR). This means the appliance can encode live video (and audio) at up to three different rates for different devices (for example HD-TVs, PCs, and smartphones) with varying bandwidth requirements. There is no automatic stream selection: each stream must be configured with a specific video and audio rate subject to certain restrictions. The Video Rate Template Settings are selectable on a per rate basis and are subject to certain restrictions (Table 4). For list of all restricted combinations of Resolution and Frame Rate, see Table 7 on page 48.

Table 4. Video Rate/Frame Rate Restrictions

Transport Type	Restrictions
All Transport Types (RTP, MPEG2TS, RTMP, Smooth)	<ul style="list-style-type: none"> • Video Rate 1 and Audio Rate 1 must always be configured. • For any configuration that allows multiple rates, Video Rate 1 must have the largest horizontal and vertical resolution. • A higher Resolution and Target Frame Rate will limit the number of rates allowed. For example if Video Rate 1 has a Resolution of 1920x1080 at 30fps then no other rates are allowed.
Smooth Streaming	<ul style="list-style-type: none"> • All Video Rate(s) included in the Smooth Stream must have the same Frame Rate and IDR. • The IDR value must be 2 or lower.

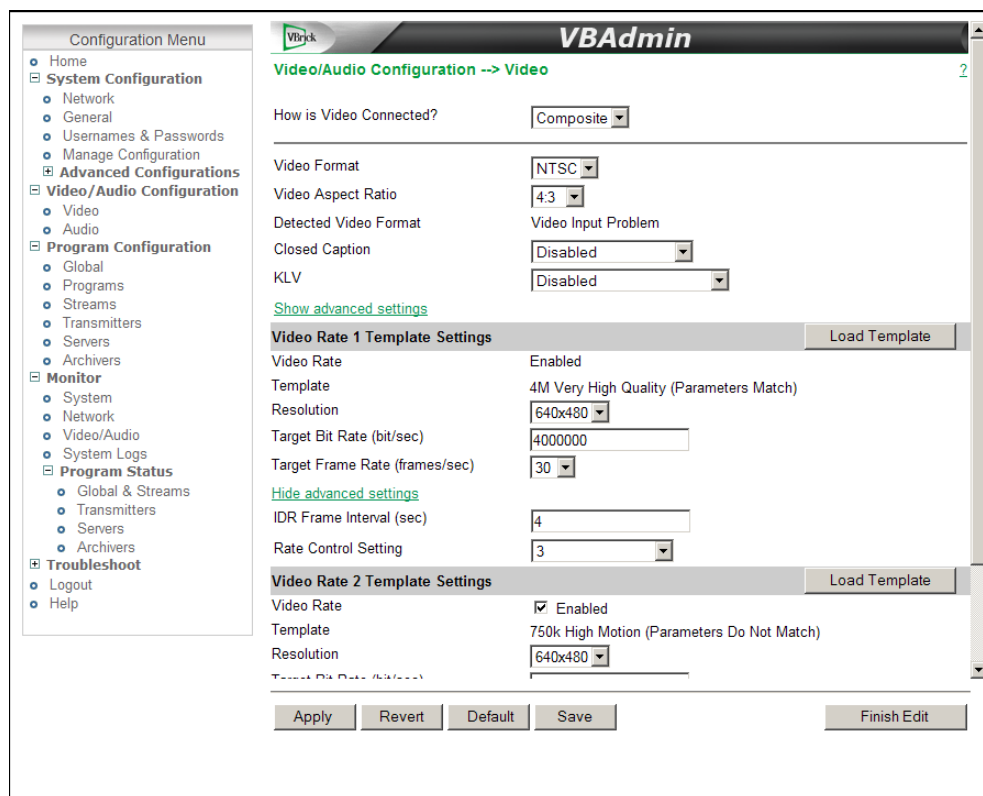


Figure 10. Video Configuration: Part 3 – Video Rate Settings

Video Rate 1, 2, 3	VideoRate 1 is enabled by default and must always be configured. Check to enable the configuration for VideoRate 2 and/or Video Rate 3. See Video Rate Template Settings above for constraints.
Template	This read-only field shows the template (if any) that is currently applied using the Load Template button. See Table 5 for a list of all templates and settings. If a template is applied it will display Parameters Match or Parameters Do Not Match (depending on whether or not changes have been made). Select Load Template > None to clear a "parameters do not match" message.
Resolution	Sets the video encoding resolution (the width and height respectively) of the compressed video stream. The VBrick encoder has high quality video downscaling built-in to let you choose from a wide range of standard encode resolutions regardless of the Video Format of your source video. For example, you can use a 1080p60 High Definition video input source and have the VBrick downscale the video to a Standard Definition resolution so it can be streamed with good quality at bit rates to match your network or to match the processing power and display resolution of your decoders, STBs or PC players. The VBrick automatically preserves the Aspect Ratio of the source video so you only are offered resolution choices that make sense for the configured Video Format and Aspect Ratio. See Table 6 below for all resolutions.
Target Bit Rate (bits/sec)	32,000–20,000,000 bits/sec. Constant bit rate. Default = 750,000. This number, in 1000 bits/sec increments, represents how much data the VBrick will send out each second to carry video to a player. The word target is used because the appliance can vary its bit rate slightly in response to the amount of detail in the movie or camera output. The more data the appliance sends in one second, the more clearly the details of the video will be seen on a player. It is not always desirable to send the most possible data, since that requires a large network "pipe" (connection). The trade-off is the level of detail in the video with the use of smaller network connections. The encoder tries to encode the video at a quality that will (on average) match the Target Bit Rate. <i>The larger the number, the better the quality but this can potentially limit the number of clients that can connect to the encoder.</i>

Target Frame Rate (frames/sec)	<p>The following options for Target Frame Rate vary depending on the Video Format selected above. There are specific Frame Rates associated with Standard Definition formats (NTSC or PAL) or with High Definition formats (all others).</p> <ul style="list-style-type: none"> • 60, 30, 24, 15, 10, 7.5, 6, 5, 3, 2, 1, 0.5. Default = 30. • 50, 25, 12.5, 5, 2.5, 1, 0.5. Default = 25. <p>This number represents how many frames the encoder will send out each second to carry the video to an H.264 player. The word target is used because the VBrick can vary its frame rate slightly in response to the amount of motion in the movie or camera output. See the Rate Control Setting parameter below for more details.</p> <p>Frame rate is the number of "frames" the VBrick sends in a second for an H.264 player to display. Moving pictures are made up of a rapid series of "still" pictures that move so fast that the "illusion" of motion is produced. A frame is one such "still" picture. Regular TV programs in the U.S. run at about 30 frames in a second, and the more frames presented in a second, the smoother the motion contained within the video will appear. Encoding and transmitting a frame requires the use of data, so that, when considering a particular bit rate, sending more frames demands that each frame contain fewer fine details.</p>
IDR Frame Interval (sec)	<p>0–30. Default = 4. The frequency in seconds at which IDR (Intra Dynamic Refresh) frames are inserted for Seek, Fast Forward and Rewind functionality. Higher values create fewer random access points and better compression efficiency. Lower values create more access points but with less compression efficiency. Zero means all frames are IDR frames. VBrick recommends you do not set to zero because video quality and stream bandwidth are not generally acceptable.</p>
Rate Control Setting	<p>1: Lowest Latency – 5: Best Quality. Default = 3. This parameter lets you trade-off video quality with how tightly rate control is imposed. A larger number increases the number of frames over which the target number of bits can be distributed. This means that the average bit rate, measured over small periods of time, can fluctuate more around the specified target bit rate. A smaller number will reduce the fluctuations around the target bit rate but will also reduce the ability of rate control to apply the bits to scenes which might be visually optimized by their application. In addition, when using the Custom transport mode (see Transport Stream Settings on page 63) and attempting to tune for lowest possible latency (minimal PTS-PCS Gap), it is useful to minimize the bit rate fluctuations by using a smaller value. <i>In bandwidth-restricted networks with little tolerance for bit rate fluctuations, or when tuning aggressively for minimum delay, a smaller value is recommended; otherwise, use a larger value or the default.</i></p>

The lower area of the Video page has a set of parameters that can be controlled by preconfigured templates. Use the **Load Template** button to populate the Video Template Settings with preconfigured video values (or select **None**). The video settings vary depending on the selected **Video Format** and **Video Aspect Ratio**. Choose a template based on motion and bandwidth. *750k High Motion is the default template.* All video encoder parameter defaults

will match these values. To read the following table, start in left column and read from left to right.

Table 5. Video Template Settings

Template Name	Best Quality	4M Very High Quality	1.5M High Quality	750k High Motion †	500k Low Motion	128k High Motion	128k Low Motion	Security and Surveillance ††
Bit Rate	8M	4M	1.5M	750k	500k	128k	128k	300k
Resolution †††	Resolution (px)							
1080/16:9	1920x1080	1280x720	960x544	656x368	656x368	256x144	256x144	656x368
720/16:9	1280x720	1280x720	960x544	656x368	656x368	256x144	256x144	656x368
NTSC/480 16:9	656x368	656x368	656x368	656x368	656x368	256x144	256x144	656x368
PAL/576 16:9	656x368	656x368	656x368	656x368	656x368	256x144	256x144	656x368
NTSC/480 4:3	640x480	640x480	640x480	640x480	640x480	320x240	400x304	640x480
PAL/576 4:3	640x480	640x480	640x480	640x480	640x480	320x240	400x304	640x480
Frame Rate	Frame Rate (frames/sec)							
NTSC inputs (30 or 60fps)	30	30	30	30	15	15	10	1
PAL inputs (25 or 50fps)	25	25	25	25	10	10	5	1
IDR Interval	4	4	4	4	4	4	4	0
Rate Control	3	3	3	3	3	3	3	3

† Default template.

†† Closed captions will not work with this template if the Target Frame Rate is set below 2 frames/sec.

††† HD encoded resolutions are only available on HD models. SD models will use 656x368.

Table 6. Video Encoding Resolutions

NTSC (16:9)	NTSC (4:3)	PAL (16:9)	PAL (4:3)	480 (16:9)	480 (4:3)	576 (16:9)	576 (4:3)	720 (16:9)	1080 (16:9)
720x480	720x480	720x576	720x576	720x480	720x480	720x576	720x576	1280x720	1920x1080
656x368	640x480	656x368	640x480	656x368	640x480	656x368	640x480	960x544	1280x720
352x240	400x304	512x288	400x304	256x144	400x304	512x288	400x304	720x576	960x544
256x144	352x240	352x288	384x288		320x240	256x144	384x288	720x480	720x576
176x128	320x240	256x144	352x288		192x144		320x240	656x368	720x480
	192x144		320x240		128x96		192x144	512x288	656x368
	176x128		192x144				128x96	256x144	512x288
	128x96		176x144						256x144
			128x96						

Table 7. Multiple Bit Rate Restrictions †

Restricted Combinations (Resolution and Frame Rate)	
<ul style="list-style-type: none"> • 720p at 50fps or higher • 1080p at 24fps or higher 	With these combinations only one Video Rate is allowed and MBR is not available.

Restricted Combinations (Resolution and Frame Rate)	
<ul style="list-style-type: none"> • 960x544 at 60fps • 720p at 30fps • 1080p at 15fps 	With these combinations only two Video Rates are allowed and only one of the unrestricted rates (shown below) can be used for the second rate.
Unrestricted Combinations	
<ul style="list-style-type: none"> • Standard Definition at any frame rate • 960x544 at 50fps or less • 720p at 25fps or less • 1080p at 12.5fps or less 	These combinations are "unrestricted." You can configure up to three Video Rates using any combination of Resolution and Frame Rate.

† Restricted combinations of Resolution and Frame Rate are not allowed. You will get an error message if you try to "apply" a restricted MBR combination.

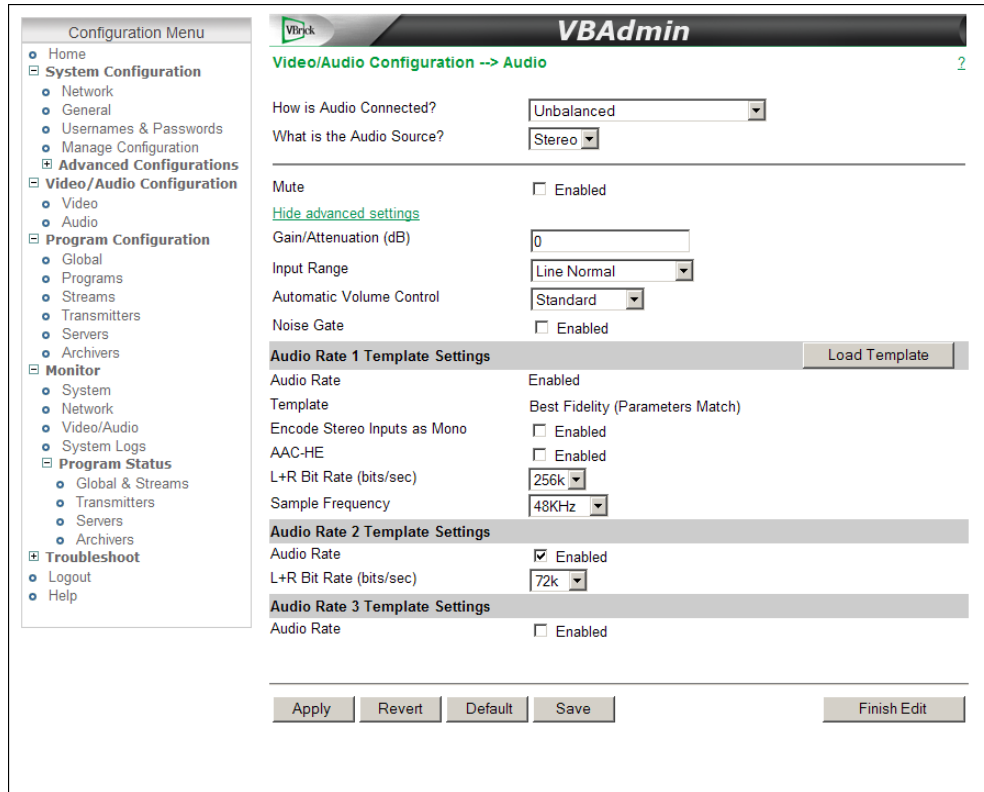
Audio

The audio circuit on the H.264 encoder uses mixed signal technology (a combination of analog and digital signals). The encoder has two audio input connectors labeled **Main** and **Aux**. The input signals can be either balanced or unbalanced and each has a usable voltage range up to 10 dBU. Various channel configurations and bit rates can be set on the Audio/Video Configuration > Audio page. The encoder supports multiple bit rate encoding (MBR) that includes three different video rates as well as three different audio rates. The encoder provides controls for mic level vs. line level balanced mode support, input gain/attenuation, automatic level controls, and other advanced audio features. The encoder supports three types of electret microphones:

- Electret Condenser, battery operated or plug-in power (SoundBlaster style)
- Dynamic type balanced or unbalanced
- Externally-powered phantom types and otherwise amplified types such as wireless.

The microphone input is automatically boosted by a preamplifier. The preamplifier provides a selectable 16 or 32 db of gain (boost). Various configuration parameters control how the input signals are conditioned as well as how the resulting audio is compressed. The audio input signal parameters define how audio is connected, what the signal ranges are, the style of electrical interfaces, and the number of channels connected to the device. Audio encoder parameters define how the audio will be compressed and are used to control the bit rate. The bit rate directly affects the audio quality levels and determines the range of audio content that can be handled.

Note In this release of the H.264 appliance there is one video source and one audio source. The audio source can be one of the audio jacks, both jacks, or the digital audio from HDMI or SDI.



How is Audio Connected?

The audio is connected using the input jacks (**Main, Aux, SDI, HDMI**) on the rear of the unit. Select one of the following depending on the electrical cable configuration of the input.

- Unbalanced – typically used with consumer devices, e.g. VCRs.
- Balanced – typically used with professional audio equipment.
- Unbalanced on Separate Jacks – (not available on some encoder models). Typically used with consumer devices that support two-jack stereo. In this mode, connect the right stereo channel to the Aux connector.
- Digital L+R (1–4) – use any pair of left and right channels with HDMI or SDI video input. For most common HDMI and SDI sources the audio will be available on Digital L+R 1. When using digital audio, the Advanced Settings (Gain/Attenuation, Input Range, Automatic Volume Control, and Noise Gate) are not displayed.

What is the Audio Source	<p>The audio output mode can be configured to 1 of 3 possible settings:</p> <ul style="list-style-type: none"> • Stereo – Stereo directs the input left channel to the left channel in the audio stream and the input right channel to the right channel in the audio stream. In this mode, the encoder expects that the two channels are <i>not</i> totally discrete and have audio components that are common to both the left and right channels. In Stereo mode, the encoder can compress the audio more efficiently and achieve higher performance with lower bitrates. Always select Stereo for DVD/VCR reproduction. • Mono (left to stereo) – Mono directs the left input channel to both the left and right channels. • Dual – Each channel is compressed independently. Two totally separated channels are compressed and decompressed. Dual is ideal for voice applications where the microphone input from two channels is separated to avoid crosstalk. <p>Note: There is performance benefit in bitrate efficiency when operating in Stereo rather than Dual mode. However if the original audio source has separate channels, you must use Dual.</p>
Mute	Mutes the audio signal (but does not stop audio encoding). Silent audio will be encoded and streamed.
Gain/Attenuation	This setting controls the audio attenuation (or gain) applied to the input signal of the encoder. Input levels can be gain-compensated to adjust for mismatched input levels. Range: -96 to 10 dB in 1 dB increments. Default = 0 dB.
Input Range	<p>This setting controls the amplitude (voltage range) of the input signal.</p> <ul style="list-style-type: none"> • Line Normal – Default. Use if the signal excursion will be above 0 dB. • Line High Headroom – Use if the signal excursion will be at or below 0 dB. • Mic Boost 16 dB – Low preamplifier. Sets microphone preamplifier to 16 dB. If not loud enough after performing a sound check, set to 32 dB and check for distortion. • Mic Boost 32 dB – High preamplifier. Sets microphone preamplifier to 32 dB. If distorted after performing a sound check, set to 16 dB and check sound quality.

Automatic Volume Control	<p>The volume is continually monitored and automatically adjusted to normalize audio levels as follows. Default = Standard.</p> <ul style="list-style-type: none"> • Standard – Default. Use for general content which may already be companded (compressed and expanded). • Light – Peak limiting. Best dynamic range. • Moderate – Peak limiting with expansion. Reduced dynamic range. • Aggressive – strong normalization, low dynamic range, most noticeable. • User-Defined – <i>Advanced users only</i>. User Defined values employ two thresholds (high level limit and low level boost) which define db threshold levels to which volume changes are applied. The low level boost threshold defines the threshold whereby lower signals lower will be amplified by gain. The gain is applied gradually until the audio level is higher than the configured threshold. The high level limit threshold defines the threshold whereby signals higher than this value will be attenuated until the audio level is reduced to a lower value than the threshold. <p><u>Attack Rate</u> – determines how quickly the volume is increased or decreased once a level threshold is crossed.</p> <p><u>Release Rate</u> – determines how quickly the encoder volume levels are relaxed to the normal position.</p> <p><u>Maximum Level</u> – the maximum (attenuated) audio level you wish to achieve after reaching the threshold.</p> <p><u>Minimum Level</u> – the minimum (boosted) audio level you wish to achieve after reaching the threshold.</p>
Noise Gate	<p>Used to suppress unwanted audio noises that are continuous and predictable (for example air conditioning equipment or traffic sounds). A noise gate allows a signal to pass through only when it is above a certain threshold. If the signal falls below the threshold no signal is allowed to pass.</p> <p>Note: The noise gate is particularly useful in AVC (automatic volume control) configurations to keep ambient, low-level noise from propagating with gain (i.e. being amplified).</p>
Noise Gate Level	Displayed only if Noise Gate is enabled. Range: -34 to -82 dB.

Audio Rate Template Settings

The appliance can encode live audio at up to three different rates for different devices (for example HD-TVs, PCs, and smartphones) with varying bandwidth requirements. The lower area of the Audio page has a set of parameters that can be controlled by preconfigured templates. Use the **Load Template** button to populate the Audio Template Settings with preconfigured audio values. The audio templates vary depending on the selected **Audio Source** (Stereo, Mono, or Dual). **Med Fidelity** is the default template. All audio encoder parameters defaults will match these values. The Audio encoder (like the Video encoder) supports Multiple Bit Rates (MBR). Audio Rates 2 and 3 can be enabled and their Bit Rates set independently. All other parameters for Audio Rates 2 and 3 are inherited from Audio Rate 1. The Audio Rate Template Settings are subject to the following constraints:

- All Audio Rates will have the same **Sample Frequency**.

- The only configurable parameter for Audio Rates 2 and 3 is **L+R Bit Rate**.

Table 8. Audio Template Settings

Template Name	Stereo as Mono?	AAC-HE	Sample Freq	Bit Rate †	
				Stereo/Dual	Mono
Best Fidelity	Off		48kHz	256k	84k
High Fidelity	Off		48kHz	160k	84k
High Fidelity – AAC-HE	Off	Enable	48kHz	64k	32k
Med Fidelity ††	Off		32kHz	72k	40k
Med Fidelity - AAC-HE	Off	Enable	32kHz	40k	24k
High Quality Voice	Off		24kHz	56k	28k
Standard Voice	Off		16kHz	32k	18k

† Based on Audio Source.

†† Default template.

Audio Rate 1, 2, 3	Audio Rate 1 is enabled by default and must always be configured. Check to enable the configuration for Audio Rate 2 and/or Audio Rate 3.
Template	This read-only field shows the template (if any) that is currently applied. If a template is applied, it will display Parameters Match or Parameters Do Not Match (depending on whether or not changes have been applied).
Encode Stereo Inputs as Mono	Any stereo source containing different audio material will be mixed down to mono. The net result is that the stereo effect is lost but the encoding efficiency is doubled thereby reducing network bandwidth while retaining sound quality.
AAC-HE	AAC-HE is a highly-efficient audio compression technology that uses spectral bandwidth replication (SBR). AAC-HE is optimized for better quality at lower bit rates.
L+R Bit Rate (bits/sec)	Defines the audio encoding bit rate of the audio stream. In general, higher bit rates provide better audio quality. The range of selectable values for this parameter is determined by (1) the Audio Source (Stereo or Mono), (2) the AAC-HE setting (enabled/disabled), (3) the Encode Stereo Inputs as Mono setting (enabled/disabled), and (4) the Sample Frequency. Valid entries range from 8K–84K for one-channel encoding and 18K–256K for two-channel encoding.

Sample Frequency	<p>Defines the frequency (or sampling rate) at which the audio is sampled at the encoder. In general, higher sampling frequencies provide better audio quality. Lower sampling frequencies however, use less CPU resources, support lower bit rates, and provide increased compression efficiency. The range of selectable values for this parameter is determined by the L+R Bit rate setting. With Digital audio, 32, 44.1, and 48kHz are the only sample frequencies allowed and you must configure the sample rate to match the sample rate provided by the source device. <i>With digital audio the configured Sampling Frequency must match the actual Sampling Frequency.</i></p> <p>When an HDMI or SDI source with digital audio is connected to the encoder and the audio connection is configured for a Digital L+R selection, you will also see a "Detected Sample Frequency" below the Sample Frequency to help you choose a matching setting. Note that all defined Audio Rates must have the same Sample Frequency.</p>
Detected Sampling Frequency	<p>HDMI/SDI. Indicates the measured Sampling Frequency (see above) when an HDMI or SDI source with digital audio is connected to the encoder and the audio connection is configured for a Digital L+R selection. This is useful for determining configuration mismatches.</p>

Program Configuration

A "program" is a way to group a video and/or audio source and define information common to the program. A "stream" is a way to group Video and Audio Rates and define the transport type. A stream can be pushed by a Transmitter, pulled from a Server, or stored by an Archiver. This software release supports one program.

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Global

The Global page is used to configure global parameters for the appliance.

The screenshot shows the VAdmin web interface for configuring global parameters. The left sidebar contains a 'Configuration Menu' with categories like System Configuration, Advanced Configurations, Video/Audio Configuration, Program Configuration, Monitor, Program Status, and Troubleshoot. The main content area is titled 'Program Configuration --> Global' and contains the following settings:

- Number of Programs Available: 1
- Number of Streams: 4
- Number of Transmitters: 4
- Number of Servers: 4
- Number of Archivers: 2
- Global Override: No Override
- Max Packet Size: 1452
- Shutdown on Video Input Problem: Enabled
- Closed Caption AUs per RTP Packet: 8
- Maximum RTSP Clients: 200
- Maximum RTSP Bandwidth: 200000000
- Enable UDP Checksums: Enabled
- Announce Settings**
 - IP Address for Transmitters: 224.2.127.254
 - IP Address for Servers: 255.255.255.255
 - Port: 9875
- [Hide advanced settings](#)
- Transmit Interval: 10
- IP Multicast Time to Live (TTL): 64
- IP Unicast Time to Live (TTL): 64
- IP Type of Service (TOS): 6

At the bottom of the configuration area are buttons for 'Apply', 'Revert', 'Default', 'Save', and 'Finish Edit'.

Figure 11. Program Configuration > Global: Part 1

Number of Programs Available	Read-only. This release supports one program.
Number of Streams	1–6. Default = 1. You can define up to six streams.
Number of Transmitters	0–25. Default = 1. You can define up to 25 transmitters.
Number of Servers	0–4. Default = 1. You can define up to four servers.
Number of Archivers	0–2. Default = 1. You can define up to two archivers.
Global Override	<p>This option overrides all individual transmitter and server "enable" settings. Use to quickly shutdown transmitters and/or servers.</p> <ul style="list-style-type: none"> • No Override – default. • Disable All – disable transmitters and servers. • Disable Transmitters – disable transmitters only. • Disable Servers – disable servers only.
Max Packet Size	<p>248–8000. Default = 1452. For high bit rate and CPU-intensive configurations, use the default packet size. Max Packet Size is used for both RTP and Transport Stream. For Transport Stream the UDP packet always contains an integral number of 188-byte Transport Stream packets. This number of 188-byte packets will equal the Max Packet Size divided by 188, rounded down to the nearest integral number. For example, if Max Packet Size = 1452, the number of Transport Stream packets in a UDP packet is 7: $1452 / 188 = 7.732$. Max Packet Size is also used for RTMP Chunk Size.</p> <p>Note: If FEC is enabled (on the Program Configuration > Streams page) the Max Packet Size allowed will be 1500 bytes in order to prevent fragmentation on the network.</p> <p>Note: When streaming to Quicktime players, a maximum packet size less than 1000 may cause audio dropouts. For optimum performance when using an AmiNET130 Transport Stream, Max Packet Size should not exceed 1480.</p>
Shutdown on Video Input Problem	If enabled, streaming is stopped when a video input problem is detected. Default = Disabled.
Closed Caption AUs Per RTP Packet	0–30. Default = 8. The number of closed caption frames (Access Units) placed in each RTP packet. Closed caption frames are small and multiple AUs can be placed in one RTP packet to improve bandwidth efficiency—at the cost of additional latency.
Maximum RTSP Clients	0–202. Default = 200.
Maximum RTSP Bandwidth	0–1000000000. Default = 20000000.
Enable UDP Checksums	This option is typically used with FEC Stream Configuration . It enables calculation of checksums for all transmitted UDP packets—but can also consume network bandwidth. Any change to this parameter will reset the appliance. Default = disabled.

Announce Settings

IP Address for Transmitters	Default IP address to which transmitter announcements are sent. This global announcement IP address is inherited by all other transmitters. Default = 224.2.127.254.
IP Address for Servers	Default IP address to which server announcements are sent. This global announcement IP address is inherited by all other servers. Default = 255.255.255.255.
Port	Default = 9875.
Transmit Interval	1–9999. Default = 10. Determines how often the announcement is transmitted.
IP Multicast Time to Live (TTL)	1–255. Default = 64.
IP Unicast Time to Live (TTL)	1–255. Default = 64.
IP Type of Service (TOS)	Type of Service settings control the level of priority a service or source receives while traveling through a network. VBrick supports setting the IP TOS (Type of Service) in accordance with RFC-791, RFC-1112 and RFC-2474 (Differentiated Services Field in the IPv4 Header). You can set the Type of Service field in the IP header to any value, decimal 0 to 255. See Table 9 below. Default = 0. <u>Example:</u> To set the Type of Service to all 0s enter 0. To set the Type of Service to all 1's, enter 255. IP Differentiated Services redefine how the historical TOS field is used. Diffserv allows IP networks to provide certain Quality of Service features. Note: If uncertain as to whether the network supports TOS or Diffserv, VBrick recommends setting the TOS to the default value of 0.

Table 9. TOS Settings

Priority Level	Type of Service
111	Network Control
110	Internetwork Control
101	CRITIC/ECP
100	Flash override
011	Flash
010	Immediate
001	Priority
000	Routine
Bit 3	0 = Normal delay 1 = Low delay

Bit 4	0 = Normal throughput 1 = High throughput
Bit 5	0 = Normal reliability 1 = High reliability
Bits 6–7	Reserved for future use.

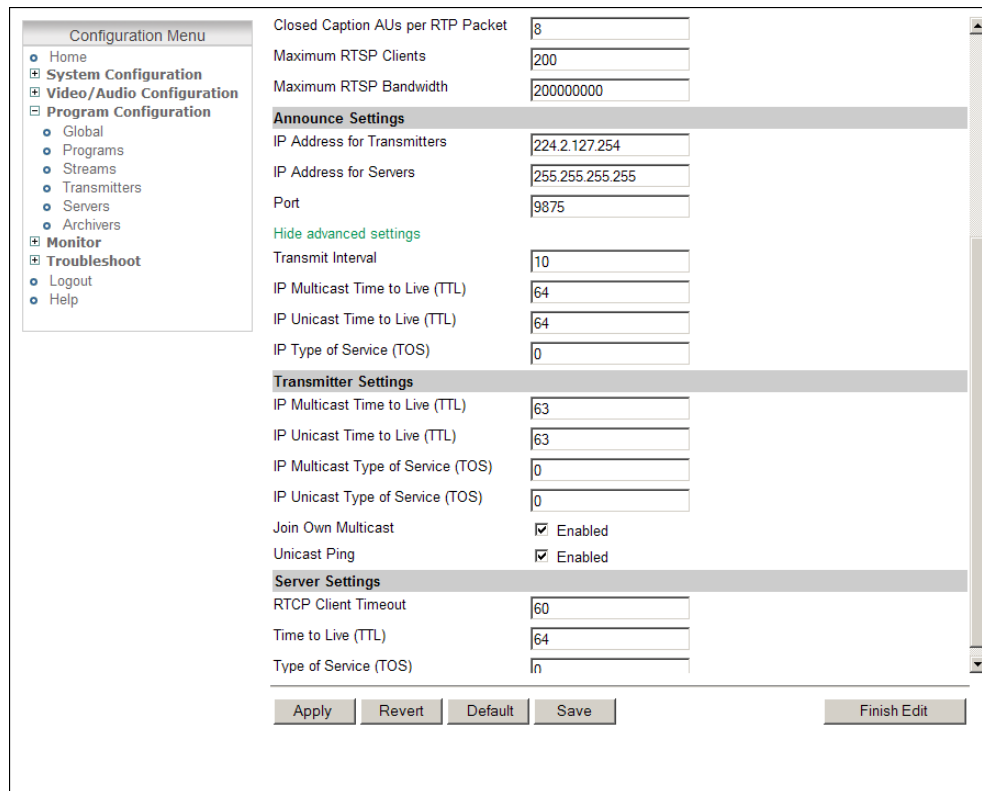


Figure 12. Program Configuration > Global: Part 2

Transmitter Settings

The transmitter settings defined here are used for all streams associated with a program.

IP Multicast Time to Live (TTL)	The number of hops (between routers) for which transmitter packets are valid on the network.
IP Unicast Time to Live (TTL)	The number of hops (between routers) for which transmitter packets are valid on the network.
IP Multicast Type of Service (TOS)	The TOS (Type of Service) can be configured in the IP header to establish packet priority in the network.
IP Unicast Type of Service (TOS)	The TOS (Type of Service) can be configured in the IP header to establish packet priority in the network.
Join Own Multicast	Some network equipment requires that a Multicast source (such as a VBrick encoder) join its own Multicast group. This feature is enabled by default and has no adverse affect on equipment that is fully Multicast-compliant.

Unicast Ping	This parameter is used to instruct the VBrick to ping the unicast destination periodically to test connectivity before sending the stream. If Unicast Ping is not enabled, and the destination goes offline, the unicast stream may be broadcast to all destinations on the network, flooding the network. Default = Enabled. This feature should only be disabled if the network has a particular requirement that makes it unworkable.
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Server Settings

The server settings defined here are used for all streams associated with a program.

RTCP Client Timeout	This is the number of seconds that the VBrick will wait before it decides that an H.264 player that was playing its video or audio is no longer viewing or listening. Zero means wait forever—no timeout. 0–99999. Default = 60.
Time To Live (TTL)	The number of hops (between routers) for which an IP packet is valid on the network.
Type of Service (TOS)	The TOS (Type of Service) can be configured in the IP header to establish packet priority in the network. See Table 9 TOS Settings .

Programs

As noted, this release supports one program. This page is used to define common, shared parameters for all transmitters and servers in a program. It is also used for RTMP metadata.

The screenshot shows the VAdmin web interface for Program Configuration. On the left is a 'Configuration Menu' with options: Home, System Configuration, Video/Audio Configuration, Program Configuration (selected), Monitor, and Troubleshoot. The main content area is titled 'Program Configuration --> Programs' and shows 'Number of Programs Available' as 1. Below this are several configuration fields: Video Source (Composite), Audio Source (Stereo), Program Name (My Program 1), Author (My Author), Copyright (My Copyright), Category (empty), Information (VBrick Streaming Video), Information URL (empty), Contact Email (empty), Contact Phone (empty), and Contact Name (empty). At the bottom, there are buttons for 'Apply', 'Revert', 'Default', 'Save', and 'Finish Edit'.

Number of Programs Available	Read-only. This release supports one program.
Video Source	Read-only. Set on Video/Audio Configuration > Video page.
Audio Source	Read-only. Set on Video/Audio Configuration > Audio page.
Program Name	Lets you define a descriptive name for the program which is added to the announcement. This announcement text is displayed in the Program Guide for other VBrick products. Default = <code>\H Program x</code> . Both Program Name and Session Information allow special character strings to be inserted automatically into these fields. <code>\H</code> or <code>\h</code> – Host Name of VBrick appliance. When the default entry is used, the program is identified by the default VBrick Host Name.
Author	A string in the announcement that can be used to identify the author. This string is shown in StreamPlayer. Default = "My Author."
Copyright	A string in the announcement that can be used to identify the copyright information. This string is shown in StreamPlayer. Default = "My Copyright."
Category	An encoder can have an announce Category string. This string consists of one or more keywords separated by spaces. Each category keyword represents a tag associated with the encoder's video stream. VBrick VEMS and players can be configured to display in their Program and Conferencing guides only video streams tagged by specific category keywords or those containing no keyword. The characters are ASCII and case sensitive. The maximum number of characters for all keywords in the string cannot exceed 36 including spaces. You can also use this field to filter the live streams shown in the VEMS Portal Server by source and client IP address by using the following string: <code>IPMask=xxx.xxx.xxx.xxx</code> where <code>xxx.xxx.xxx.xxx</code> represents a bit mask. (This string is simply another keyword you can use in addition to those described above.) The Portal Server will parse the bitmask and send the live stream only to clients with a masked IP address that matches the masked IP address of the source VBrick. For example, a stream with a category <code>IPMask=255.255.0.0</code> from a VBrick with an address of <code>172.22.6.67</code> will be available to a client with an IP address <code>172.22.3.4</code> but not to a client with an IP Address <code>172.16.3.4</code> . There is no admin interface to this feature on the Portal Server; you can use this filtering in addition to the standard authorization features provided by the Portal Server.
Information	String identifying VBrick announce Session Information that appears on Program Guide. Default = <code>VBrick Streaming Video</code> .
Information URL	Sets the URL advertised in announce URI field. It should be a pointer to additional information about the session. Maximum 64 characters.

Contact Email	Sets the e-mail address advertised in announce e-mail field. It should be the e-mail address of the person responsible for the session. Maximum 50 characters.
Contact Phone	Sets the phone number advertised in announce phone number field. It should be the contact number of the person responsible for the session. Maximum 20 characters.
Contact Name	Sets the contact name in announce contact name field. It should be the contact name of the person responsible for the session. Maximum 20 characters.

Streams

A "stream" is a bundled group of resources that describes the characteristics of the output bit stream. A stream specifies the Video Rate, Audio Rate, and Transport Type and can be transmitted, served, or archived. Once a stream is defined, it can be used by any combination of transmitters, servers, and archivers. The maximum number of different stream types you can enable is shown in Table 10 on page 63. (Note that adaptive streaming is only supported with [Smooth Streaming](#).)

Choose Stream	Select a stream from those defined on the Global page.
Used by Transmitters	Read-only. Shows which transmitters are using the selected stream.
Used by Servers	Read-only. Shows which servers are using the selected stream.

Used by Archivers	Read-only. Shows which archivers are using the selected stream.
Enable Stream	Enable the selected stream.
Stream Name	Enter a user-friendly name for the selected stream.
Transport Type	<ul style="list-style-type: none"> • RTP – Real Time Protocol. RTP is supported by most software decoders. • MPEG2TS – MPEG-2 Transport Stream. MPEG2TS is supported by most hardware decoders. • RTMP – Real Time Messaging Protocol. This is the multimedia streaming protocol used in Adobe Flash. • SMOOTH – <u>Smooth Streaming</u> is an IIS Media Services extension that enables adaptive streaming of media to clients over HTTP.
Select Video Rate	Select video rate (defined on Video/Audio Configuration > Video page) from dropdown list.
Video Rate Enable	SMOOTH only. Select one or more: Rate 1, 2, or 3. Note: <ul style="list-style-type: none"> • All Video Rate(s) included in the Smooth Stream must have the same Frame Rate and IDR. • The IDR Frame Interval (on Video/Audio Configuration > <u>Video</u> page) for rates assigned for Smooth Streaming streams must be 2 seconds or less.
Select Audio Rate	Select audio rate (defined on Video/Audio Configuration > Audio page) from dropdown list.
Estimated Bit Rate	Read-only. Shows the estimated bit rate with the configured options. The actual bit rate will vary based on the content.
Enable Closed Caption	RTP and MPEG2TS only. Check to enable closed captions for selected stream. Closed captions must also be enabled on the Video/Audio Configuration > Video page.
Metering	<p>RTP only. Default = Disabled. Metering is designed for RTP transport only and is configured for each encoder so that all RTP streams are treated as a group. When metering is disabled, video frames are sent as soon as they are encoded. This can result in substantial network traffic burstiness since certain encoded frames (i.e. key frames) are substantially larger than other frames. If desired, metering can be used to smooth the transmission of the video stream. This results in less burstiness, and can help to prevent packet loss on some networks, but it can also increase jitter and latency. VBrick recommends the use of metering only on bandwidth-constrained networks. When you enable metering, Metering Aggressiveness (see below) defaults to Medium.</p> <p>Note: To play metered RTP streams on StreamPlayer, the H.264 playback buffers must be set to 1200 msec or higher for UDP and 2000 msec or higher for TCP. In StreamPlayer go to Preferences > MPEG4/H264 > Buffer Size > UDP Playback/ TCP Playback.</p>

Metering Aggressiveness	RTP only. Low, Medium, High. Default = Medium. Low is least aggressive; High is most aggressive and will provide smoother transitions between frames. If Aggressiveness is too high it may result in impaired video and/or audio and you will see the Metering Buffer Full Count increment on the Monitor > Program Status > Global & Streams page. If this happens decrease the Metering Aggressiveness.
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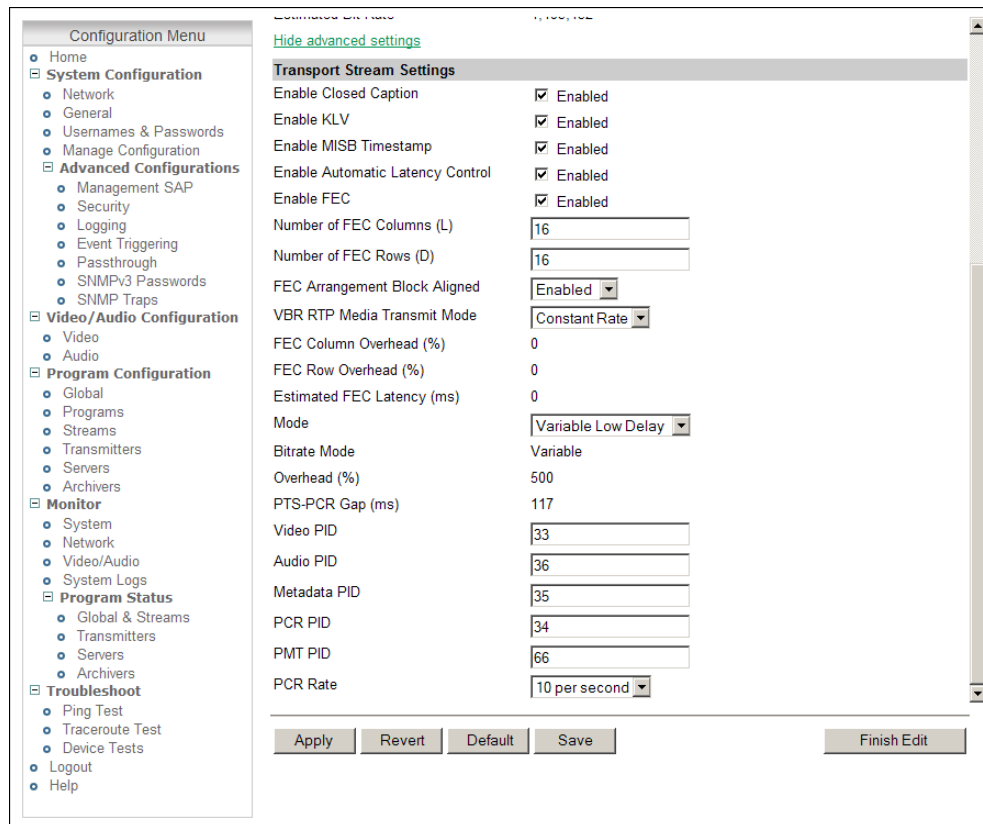
Table 10. Number of Stream Types Allowed and Usage †

Transport Type	Max Number Allowed	Where Used		
		Transmitters	Servers	Archivers
RTP	6 streams	x	x	
MPEG2TS	3 streams	x	x	x
RTMP	3 streams	x		
Smooth	1 stream	x		

† The total number of all stream types you can define is six. This means if you define six RTP streams you will be unable to define any MPEG2TS or RTMP streams.

Transport Stream Settings

The following parameters are shown when Transport Type is **MPEG2TS** and you click "show" advanced settings." To fine tune **Overhead** and **PTS-PCR Gap**, administrators should refer to [Advanced Transport Stream Settings](#) on page 111.



Enable Closed Caption	Check to enable closed captions for selected stream. Closed captions must also be enabled on the Video/Audio Configuration > Video page.
Enable KLV	MPEG2TS only. Check to enable KLV for selected stream. KLV must also be enabled on the Video/Audio Configuration > Video page.
Enable MISB Timestamp	Insert timestamps that meet MISB (Motion Imagery Standards Board) requirements. Timestamps help accurately align metadata with collected motion imagery for further analysis.
Enable Automatic Latency Control	Default = Disabled. This option offers an easy way to adjust the gap settings to minimize the latency for particular content and configuration parameters. The latency control values are set based on certain configuration parameters. For more information about this topic see Automatic Latency Control on page 112.
Enable FEC	Enable Forward Error Correction. For a detailed description of FEC parameters see FEC Stream Configuration on page 66.

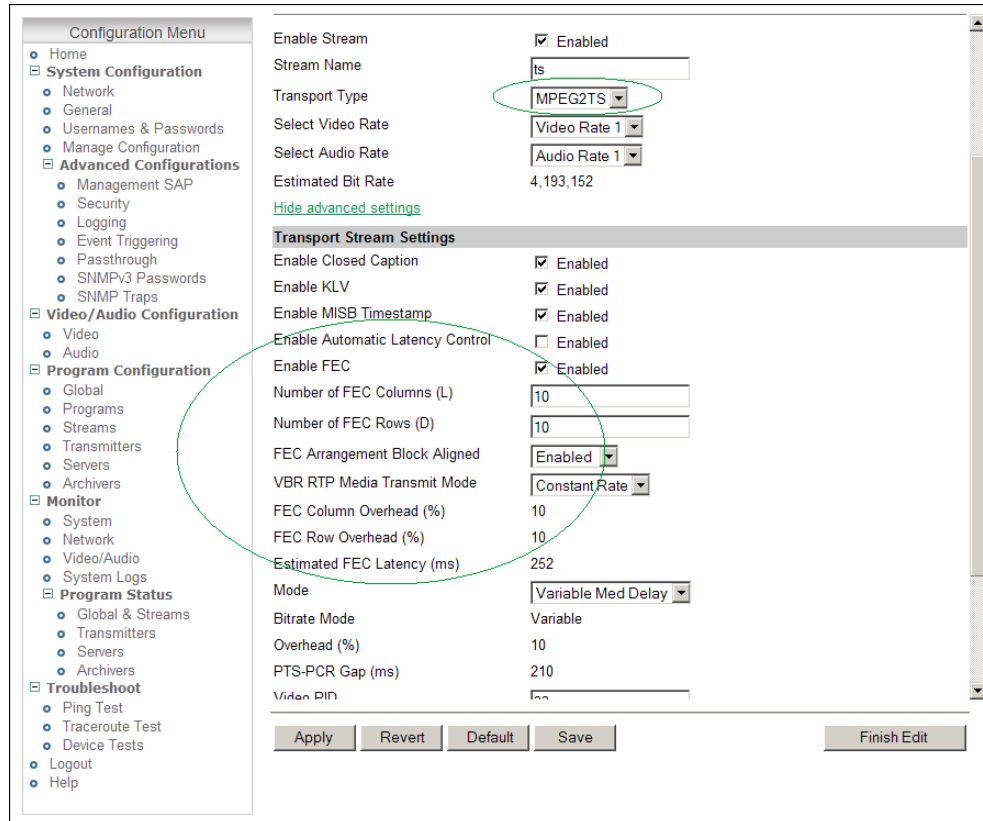
Mode	<p>Transport Stream only. Select from the following options. Note that each transport stream mode is optimized for different applications. In general a "variable" Transport Stream Mode (High, Med, or Low) is more efficient than "constant" for network bandwidth because transport stream null packets are not transmitted. If the variable stream is ingested to a VOD server, the stream is converted to a Constant bit rate file with null packets. As a result the storage requirements on the VOD-W are roughly the same regardless of the mode you select.</p> <p>In the Constant and Variable (High, Med, or Low) modes, Overhead and PTS-PCR Gap are automatically set to values that are optimized for the current Video Resolution, Video Bit Rate, Rate Control Setting, Audio Bit Rate, and Audio Sample Frequency. These auto-selected values are shown as read-only in VBAAdmin. In Custom mode you can choose your own settings for Overhead and PTS-PCR Gap but use caution because incorrect settings can result in poor quality and dropped video frames.</p> <ul style="list-style-type: none"> • Constant – This mode will most likely be handled by an arbitrary decoder and is the most universally recognized and utilized mode for transport stream transmission. To maintain constant bit rate over the network, null packets are added to the transport stream. • Variable High Delay – Caps the overhead at a minimal value thereby reducing maximum bursts at the cost of increased latency. • Variable Medium Delay – Caps the short term bandwidth at the same rate as a comparably configured constant bit rate stream but average bandwidth will be lower because there are no null packets. The latency is equivalent to the latency of a similarly configured constant bit rate stream. • Variable Low Delay – Provides a stream with the same average bit rate as Variable High Delay and the latency is reduced but the short term bit rate will have much higher bursts. • Custom – Lets experienced users tune the algorithm-balancing latency and delay for their individual stream characteristics and application using Bitrate Mode, Overhead, and PTS-PCR Gap. The values in the standard modes described above are relatively conservative and it may be possible to tune overhead and latency (PTS-PCR Gap) to lower values if content is low motion or if for example, low latency is more important than video quality. Another factor is Bitrate Mode: lower values for bitrate will allow more aggressive tuning of the Gap and Overhead at the possible cost of video quality (note that end-to-end latency is a function of network delay and decoder behavior and the gap value generally sets only a lower limit on overall latency). When switching to Custom mode, the current settings for Transport Stream Bitrate Mode, Overhead, and Gap are shown as starting points.
Bitrate Mode	Read-only unless "Custom" Transport Stream Mode defined above. Variable or Constant. Default = Variable.

Overhead (%)	Controls the padding packet overhead as a percentage. Read-only unless "Custom" Transport Stream Mode defined above. Range: 1–500. See Advanced Transport Stream Settings on page 111 for more information.
PTS-PCR Gap (ms)	Controls the PTS-PCR Gap delay in milliseconds. Read-only unless "Custom" Transport Stream Mode defined above. Range: 50–2000. See Advanced Transport Stream Settings on page 111 for more information.
Video PID	Range: 4–8190. Default = 33.
Audio PID	Range: 4–8190. Default = 36.
Metadata PID	Range: 4–8190. Default = 35.
PCR PID	Range: 4–8190. Default = 34.
PMT PID	Default = 66.
PCR Rate	<ul style="list-style-type: none"> • 10 per second (default). • 25 per second.

FEC Stream Configuration

Forward Error Correction (FEC) is available for MPEG2TS streams only. FEC is configured at the stream level and at the transmitter level. (This topic explains how to configure at the stream level; to configure at the transmitter level see [FEC Transmitter Configuration](#) on page 73.) FEC is a type of digital signal processing that improves data reliability by introducing a known structure into a data sequence prior to transmission or storage. This structure enables a receiving system to detect and possibly correct errors caused by noise and interference. As the name implies, this coding technique enables the decoder to correct errors without requesting retransmission of the original information. For detailed information about VBrick's implementation of FEC see [FEC Theory of Operation](#) on page 113.

Note If using FEC you may choose to **Enable UDP Checksums** and you will also need to set the **Max Packet Size** to 1500 bytes or less. Both of these parameters are located on the Program Configuration > [Global](#) page.



Enable FEC	Use to enable Forward Error Correction for streams with a Transport Type of MPEG2TS. Default = disabled.
Number of FEC Columns (L)	Range = 1–50. Default = 10. For Constant bit rate Mode, this value must be less than or equal to 20. For Variable bit rate Mode, this value must be less than or equal to 50. If FEC is enabled for this stream, you can configure the interval at which FEC packets will be sent on FEC Stream 2. In addition, it dictates whether or not FEC stream 2 can be enabled at the transmitter level. This setting must be greater than or equal to 4 in order for FEC Stream 2 to be enabled.
Number of FEC Rows (D)	Range = 1–50. Default = 10. For a Constant bit rate, this value must be less than or equal to 20. For a Variable bit rate, this value must be less than or equal to 50. If FEC is enabled for this stream, you can configure the length of the burst packet loss that this stream will be FEC-protected from. It also it dictates the interval at which FEC Stream 1 packets will be transmitted. For example, if FEC Arrangement Block Aligned is enabled, an FEC Stream 1 packet will be transmitted at an interval roughly equal to once for every Number of FEC Rows packets in each configured column in the FEC matrix. Note: If the stream is configured for a Variable bit rate Mode, the product of FEC Rows * FEC Columns must be less than or equal to 256. If the stream is configured for a Constant bit rate Mode the product of FEC Rows * FEC Columns must be less than or equal to 100.

FEC Arrangement Block Aligned	Specifies when the FEC Stream 1 packets are transmitted. Default = Enabled.
VBR RTP Media Transmit Mode	<p>If the MPEG2TS stream Mode is set to one of the variable settings (Low, Medium, or High), this parameter defines how the RTP encapsulated transport stream packets are sent over the network.</p> <ul style="list-style-type: none"> • Constant Rate – Default. With this option Media Datagrams are sent at a constant rate. The number of transport stream packets per Media Datagram varies from 0 to the max transport stream packets per RTP datagram to accommodate the variation in Bit Rate. Default value = 2. • Constant Datagram Size – With this option RTP Media Datagrams are sent with the Max Packet Size defined on the Program Configuration > Global page. The rate at which the RTP Media Datagrams are sent varies to accommodate the variation in Bit Rate. Note: VBrick Support Services can explain how to enable this option. It cannot be enabled from the VAdmin interface.
FEC Column Overhead (%)	Read-only. Shows the amount of overhead added to this stream as a percentage of the total number of RTP packets sent by the stream. The overhead is calculated as $(1 / \text{Number_of_FEC_columns} * 100)$.
FEC Row Overhead (%)	Read-only. Shows the amount of overhead added to this stream as a percentage of the total number of RTP packets sent by the stream. The overhead is calculated as $(1 / \text{Number_of_FEC_rows} * 100)$.
Estimated FEC Latency (ms)	Read-only. The amount of time (in milliseconds) that will be added due to the configured FEC settings. This latency is essentially the equivalent of a fixed network delay.

Transport Stream PIDs

The H.264 transport stream multiplexes the audio and video into a single synchronous bit stream; a demultiplexer then extracts the elementary streams in part by looking for packets with the same Packet ID. A PID is a 13-bit value in the transport packet header. All packets belonging to the same elementary stream have the same PID embedded in the stream that tells the receiver what to do with the packet. Transport Stream packets from the VBrick encoder have the PIDs shown in Table 11 as defaults.

Table 11. Transport Stream PIDs (VBrick H.264 Encoder)

PID	Value	Description
Video	33	Video stream.
Audio	36	Audio stream.
Metadata	35	Metadata stream.
PCR	34	Program Clock Reference.

RTP files may also be converted to transport stream files. As part of that conversion process, these transport stream files stored on the VOD-W will have the PIDs shown in Table 12.

Table 12. Transport Stream PIDs (RTP to Transport Stream Converter)

PID	Value	Description
Video	17	Video stream.
Audio	18	Audio stream.
PCR	137	Program Clock Reference.
PMT	16	Program Map Table.

Transmitters

A transmitter pushes the stream to a configured destination. The destination may be a single endpoint in the case of a unicast, or multiple endpoints in the case of multicast. The transmitter does not directly depend on a client to initiate the streaming but is always transmitting (in the case of multicast) and transmits if the client is reachable and listening (in the case of unicast). The streams are transmitted across the network via RTP, Transport Stream (MPEG2TS), RTMP, or Smooth streaming. A transmitter references a stream to determine Transport Type, Video Rate, Audio Rate, and other parameters. You can configure up to 25 transmitters. An "announce" can also be enabled for each transmitter.

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- Notes**
- In *transmitter* mode, a program stream is *pushed* by a transmitter. In this mode a transmitter pushes the stream to multiple destinations. It is a constant push and there is no client "request" for the stream.
 - In a unicast environment, individual copies of the stream are sent from the source to each configured destination. In multicast, the stream is sent from the source only once and a network router will transmit the stream to multiple destinations.
 - To avoid unnecessary network traffic, the transmitter will not send if the network socket fails to connect (has ICMP errors). In addition, Unicast destinations have a configurable Unicast ping option. See the Unicast Ping parameter on Program Configuration > Programs page.
-

SDP Files

RTP only. Decoders require knowledge of the stream from an .sdp (Session Description Protocol) file before it can be decoded. Each SDP description contains critical stream information such as profile, bit rate, addressing, transmission methods, and content. The decoder (for example StreamPlayer or QuickTime) will examine this file for all necessary configuration information relating to the stream. Upon power-up and service interruption, the decoder will re-establish stream decoding by relating back to information contained in the SDP file. SDP information may be requested via an RTSP request made from the client to the server whereby the server responds with the same information as contained in an SDP file. The SDP file may also be retrieved via an HTTP server residing either on the VBrick or on an external HTTP server. The URL address for the SDP file is based on the program and transmitter number, for example: <http://AAA.BBB.CCC.DDD/vbStreamXdY.sdp> where: *x* is the program number, *y* is the transmitter number and *AAA.BBB.CCC.DDD* is appliance IP address.

Announcements

RTP and MPEG2TS. For multicast applications, where the VBrick is operating in Transmitter Mode, the SDP information is periodically broadcast to a pre-defined address via multicast

announcements. For unicast announcements, a server can be configured to embed an RTSP URL within an announce message so a remote decoder can easily gain access to SDP information and subsequently initiate a Unicast RTP session. In some cases an H.264 stream may be sent to a third-party reflecting server which is not capable of emitting its own SDP announcements. Transmitters and servers can be configured to provide announcements advertising the URL of the reflected stream and/or required SDP information.

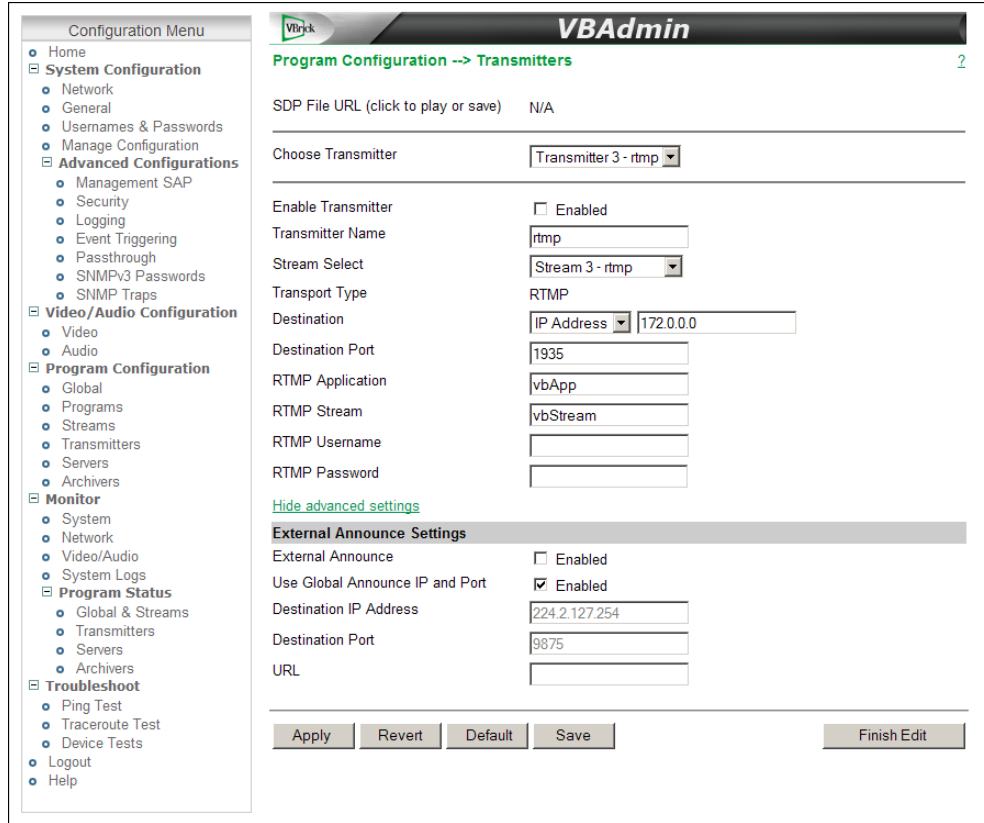


Figure 13. Program Configuration > Transmitters: Part 1

SDP File URL	RTP only. Click to play (open) or save the .sdp file. The .sdp file is retrieved via the HTTP server on the appliance. Paste this URL into a browser to launch the stream "out-of-band" using the .sdp file. The URL address for the .sdp file is based on the program and transmitter number, for example: http://AAA.BBB.CCC.DDD/vbStreamXdy.sdp where: <i>x</i> is the program number, <i>y</i> is the transmitter number and <i>AAA.BBB.CCC.DDD</i> is appliance IP address.
Choose Transmitter	Select from dropdown list. The number of transmitters is configured on the Program Configuration > Programs page.
Enable Transmitter	Use to individually disable a transmitter. Default = Disabled. The transmitter must be enabled for streaming to occur.
Transmitter Name	Enter a user-friendly name for the selected transmitter.

Stream Select	Select a configured stream.
Transport Type (read-only)	<ul style="list-style-type: none"> • RTP – Default. Realtime Transport Protocol provides end-to-end network transport functions suitable for video. Supported by most software decoders. • MPEG2TS – Multiplexes the digital video and audio into one bit stream. Supported by most hardware decoders. • RTMP – Real Time Messaging Protocol. Multimedia streaming protocol used in Adobe Flash. • SMOOTH – <u>Smooth Streaming</u> is an IIS Media Services extension that enables adaptive streaming of media to clients over HTTP.
Destination	<p>Select IP Address or Host Name from the dropdown. The actual IP address determines whether the stream will be multicast (e.g. 239.22.118.72) or unicast (e.g. 127.22.118.72). Default = 127.0.0.1 (loopback). If using a Host Name, you must configure a Domain Name Server on the System Configuration > Network page.</p> <p>If Auto Unicast, the following caveats apply: (1) this field is the Host Name or IP address of the streaming server; (2) this field does not support multicast IP addresses.</p>
RTCP Transmit	RTP and MPEG2TS. Allows RTCP sender reports (containing transmission and reception statistics for all RTP packets) to be sent from the VBrick appliance. Default = Enable.
RTCP Transmit Interval	RTP and MPEG2TS. When RTP Encapsulation is enabled, this parameter tells the appliance how often (in seconds) to send RTCP reports. Default = 10 seconds.
Destination Video Port	RTP only. Destination video port for this transmitter. Note that viewing a unicast and multicast stream (configured on different transmitters) on the same PC or the same decoder may not work if the transmitter ports are the same.
Destination Audio Port	RTP only. Destination audio port for this transmitter.
Destination Port	RTMP and MPEG2TS only.
Announce Session Name Override	<p>RTP and MPEG2TS. Lets you replace the Program Name (on Program Configuration > Programs page) with a new name to be used in session announcements, SDP files, and RTSP Describe responses. This is especially useful in multiple bit rate streaming.</p> <p>Rather than having all transmitters use the same Program Name for announcements, an administrator can optionally assign a unique name to each transmitter. Default = blank. This means the Program Name will be used.</p> <p>Note: There is no validation for unique names. If using this feature, the administrator is responsible for creating unique, individual names for each transmitter.</p>

RTMP

The Real Time Messaging Protocol is a multimedia streaming protocol used in Adobe Flash. To deliver streams smoothly and transmit as much information as possible, it splits streams into fragments and their size is negotiated dynamically between the client and server

RTMP Application	The RTMP Application name running on the Flash Media Server (FMS). Use any combination of up to 255 alphanumeric and special characters (no spaces).
RTMP Stream	RTMP stream name to transmit to the FMS. Use any combination of up to 500 alphanumeric and special characters (no spaces).
RTMP Username	Username for the FMS. Only used when the FMS requires authentication. Use a max of 20 alphanumeric characters and only the following special characters: ! # \$ % & * + < > [] ^ { } ~ -
RTMP Password	Password for the FMS. Only used when the FMS requires authentication. Use a max of 20 alphanumeric characters and only the following special characters: ! # \$ % & * + < > [] ^ { } ~ -

Auto Unicast

Auto Unicast Mode is a transmitter mode that allows the VBrick encoder to "automatically" establish and maintain a connection with a streaming server like Quicktime or Darwin. The stream is pushed to a configured publishing point location on an external server to which external clients can connect to retrieve the stream. For example, you can place a VBrick encoder inside a private network and configure it to Auto Unicast to a server on the outside Internet. External clients will then connect to this server via the Internet. Auto Unicast uses RTSP to control the session. It establishes a connection with the streaming server, negotiates media types and ports, and begins streaming to the server. Once established, the encoder will push this stream to the server until the session is terminated (typically by disabling the transmitter).

Table 13. Auto Unicast – Supported Features

Supported Feature	Description
Streaming Servers	<ul style="list-style-type: none">• Apple Darwin Streaming Media Server• Wowza Media Server Pro• QuickTime Streaming Server (QTSS)
Transport Types	RTP only.
Transport Protocols	<ul style="list-style-type: none">• UDP• TCP Interleaved
Security/ Authentication	Basic Digest Authentication (between the encoder and streaming server) is supported. Domain authentication is not supported.

▼ To enable Auto Unicast:

1. Go to Program Configuration > Streams page and set **Transport Type** to **RTP**.
2. Go to the Program Configuration > Transmitters page and select an **Auto Unicast Mode**.

3. Define the Auto Unicast configuration on the streaming server. The relevant parameters are explained in [Auto Unicast](#) on page 72.

The Auto Unicast parameters are only shown when **Transport Type** is **RTP**.

Auto Unicast Mode	<ul style="list-style-type: none"> Disabled – Auto Unicast is disabled. Auto Unicast (UDP) – Push streams to server via UDP. Auto Unicast (TCP) – Push streams to server via TCP.
Auto Unicast Dest Port	Port used for TCP RTSP control connection to streaming server.
Auto Unicast Dest Pub Point Name	Destination publishing point name on streaming server, for example: <code><server_ip_addr>:<port>/<publishing_point_name></code>
Auto Unicast Dest Username	User name for authentication on streaming server.
Auto Unicast Dest Password	Password for authentication on streaming server.

FEC Transmitter Configuration

The following FEC parameters are only shown when the stream **Transport Type** is **MP2TS** and **Enable FEC** is checked on the Program Configuration > [Streams](#) page.

Note For more about FEC see [FEC Stream Configuration](#) on page 66 and [FEC Theory of Operation](#) on page 113.

FEC Stream 1 (Columns) Enable	Use to enable FEC Stream 1. If the stream with which a transmitter is associated is FEC enabled, and the transmitter is enabled for RTP encapsulation, the transmitter will send column-generated FEC packets. Default = Enabled.
FEC Stream 2 (Rows) Enable	Use to enable FEC Stream 2. If the stream with which a transmitter is associated is FEC enabled, and the transmitter is enabled for RTP encapsulation, the transmitter will send row-generated FEC packets. Default = Enabled.
RTP Encapsulation Enable	Use to configure MPEG2TS transmitters to be RTP encapsulated before transmission. FEC requires RTP Encapsulation. Consequently when you enable FEC Stream 1 or FEC Stream 2 , RTP Encapsulation is auto-enabled and this parameter is hidden. Conversely, if you do not enable FEC Stream 1 or Stream 2, you still have the option to enable RTP Encapsulation if desired. Default = Disabled.

Smooth Streaming

Smooth Streaming is a transport type used by Microsoft's IIS (Internet Information Services) server. Smooth Streaming dynamically detects local bandwidth and CPU conditions and seamlessly switches the video quality of a media file a player receives. Smooth Streaming is "adaptive" in that multiple video rates are delivered in one stream and the IIS server decides which stream to serve to the client. This means that viewers with high-bandwidth connections can view high definition quality streaming while viewers with lower bandwidth

connections will receive a stream appropriate for their connectivity. With Smooth Streaming the video/audio is encoded into short segments that are hosted on an IIS HTTP web server.

VBrick Smooth Streaming supports up to three Video Rates and one Audio Rate. Smooth Streaming options are shown in VBAAdmin when the **Transport Type** (on the Program Configuration > [Streams](#) page) is set to **SMOOTH**. VBrick Smooth Streaming does not support serving, archiving, closed captions, or multicast.

Table 14. Smooth Streaming Requirements

IIS Web Server	Microsoft IIS (6.0 or higher) or compatible web server.
Streams Supported	1 stream (up to three configured video rates; one audio rate).
Transmitters Supported	1–25 transmitters (no serving, archiving, closed captions, or multicast).
Video Rate	IDR Frame Interval must be 2 seconds or less. All Video Rates included in the stream must have the same Target Frame Rate and IDR (configured on the Video/Audio Configuration > Video page).

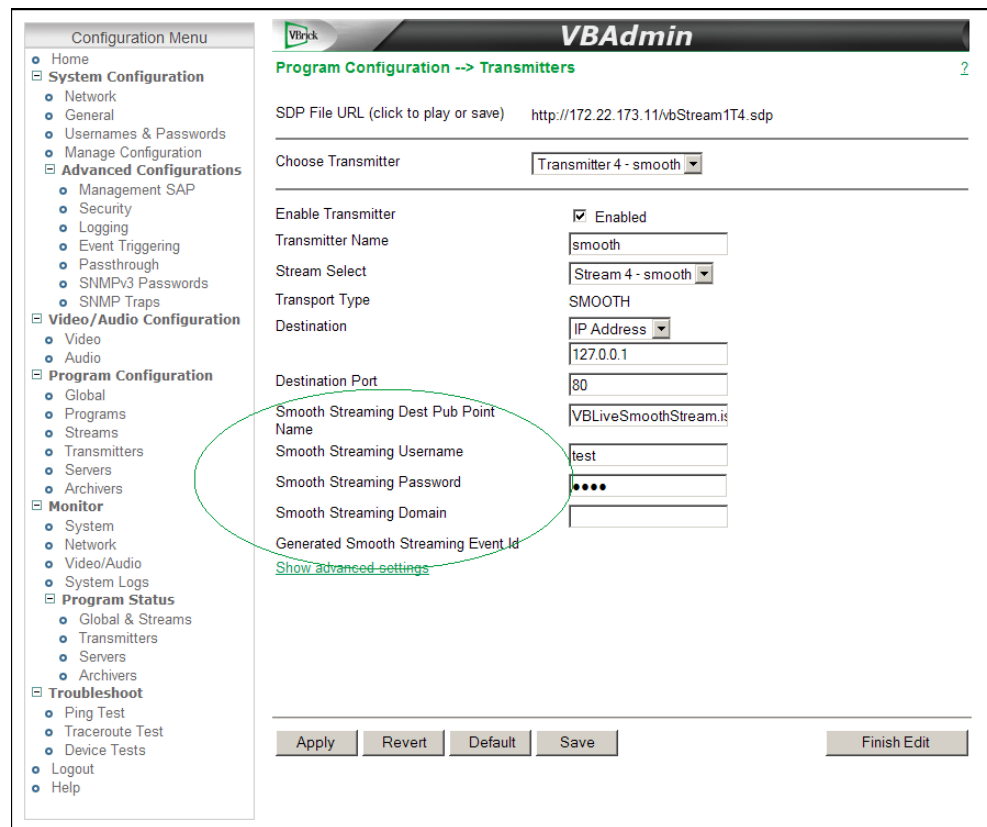


Table 15. Program Configuration > Transmitters: Part 2

Smooth Streaming Dest Pub Point Name	Destination publishing point on IIS server.
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Smooth Streaming Username	IIS username. Only used when IIS requires authentication. Use a max of 20 alphanumeric characters and only the following special characters: ! # \$ % & * + < > [] ^ { } ~ -
Smooth Streaming Password	IIS password. Only used when IIS requires authentication.
Smooth Streaming Domain	Use for authentication through a different domain controller. For example If the server is on a domain but a local name will be used for authentication, enter the server name.
Generated Smooth Streaming Event Id	Read-only. This auto-generated string is used to facilitate backup encoders streaming to the same IIS server.

Announce Settings

This section contains parameters that are used to modify announcements from the appliance. Announcements are advertisement packets that are transmitted by VBrick appliances to other VBrick appliances and VBrick applications such as the VEMS Portal Server or StreamPlayer. They are used to identify VBrick streams present in the network. **Announce Settings** are used with RTP and MPEG2TS; **External Announce** is used with all transport types.

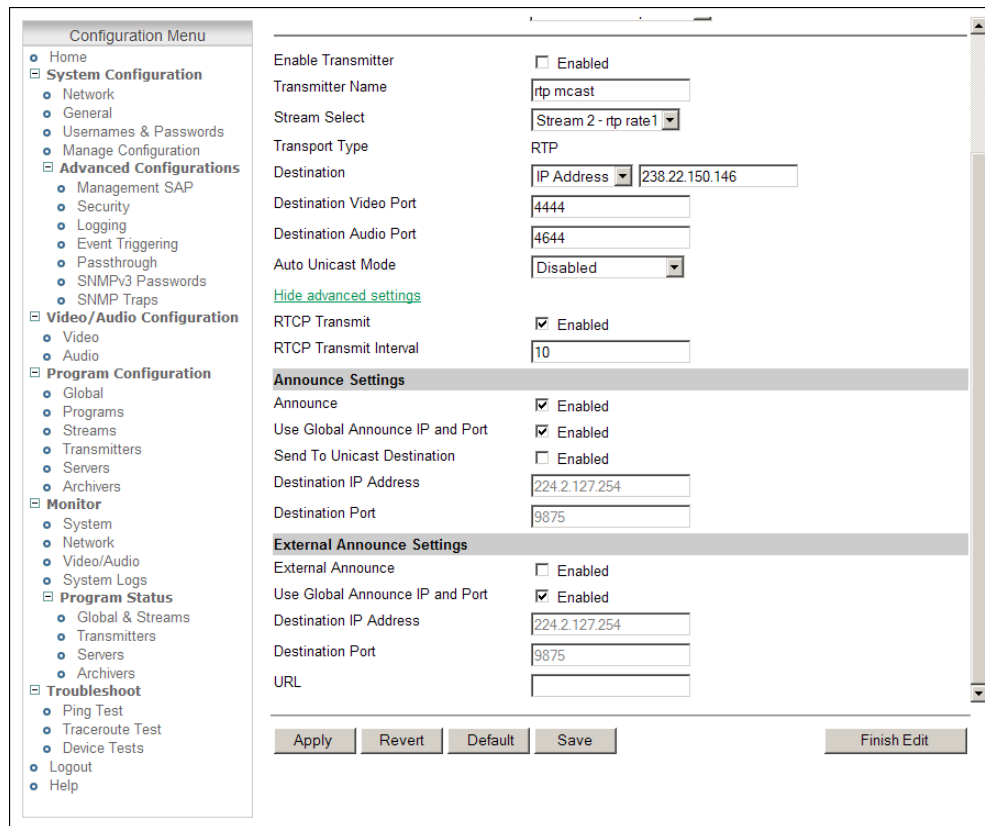


Figure 14. Program Configuration > Transmitters: Part 3

Announce	RTP and MPEG2TS only. This section is used to announce the stream to the local network allowing viewable announcements in programs like StreamPlayer or VBDirectory. The unit must be on the same segment of the network or the router must be configured to retransmit broadcast packets for the announcements to be accessible using the IP address 255.255.255.255.
Use Global Announce IP and Port	Use Announce IP Address for Transmitters and Announce Port defined on Program Configuration > Global page. If checked, the Destination and Port fields are greyed out.
Send to Unicast Destination	If enabled and the destination is unicast, the unicast IP address is used for the announcement and the Destination field is greyed out. Default = Disabled.
Destination IP Address	The destination IP Address or Host Name the announcement is sent to. By default, the announcement is sent to the multicast network. <i>If using an VEMS Portal Server, enter the Portal Server IP address.</i>
Destination Port	The destination port the announcement is sent to.

External Announce Settings

These settings configure an external announcement that can be used when the stream is reflected to a third-party server or a VBrick reflector.

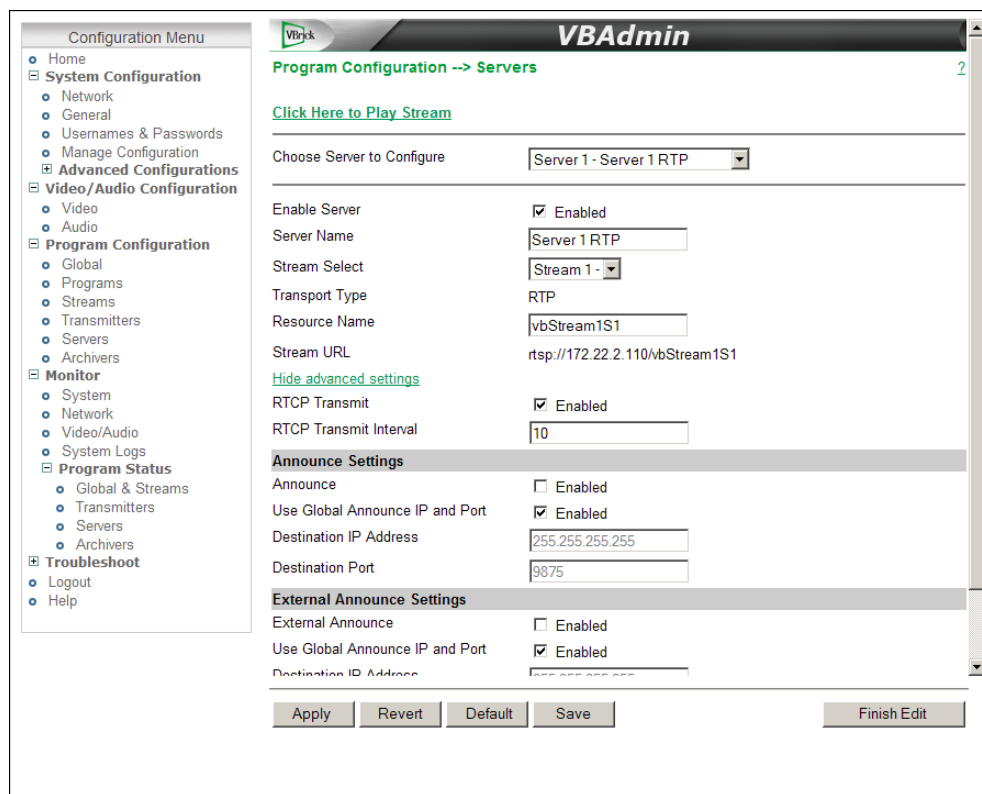
External Announce	RTP, MPEG2TS, and RTMP. This section is used to announce RTSP streams to a network device outside of the broadcast domain.
Use Global Announce IP and Port	Use Announce IP Address for Transmitters and Announce Port defined on Program Configuration > Global page. If checked, the Destination and Port fields are greyed out.
Destination IP Address	The destination IP Address or Host Name the announcement is sent to. If using an VEMS Portal Server, enter the Portal Server IP address. If using a reflector, enter the reflector server IP address.
Destination Port	The destination port the announcement is sent to.
URL	The URL of the reflector (i.e the source of the reflected stream). This URL is embedded in the announcement.

Servers

The H.264 appliance is also a streaming server and can be controlled by a remote decoder client via RTSP and RTCP protocols. In server mode, a served stream does not become

active on the network until requested by a client. The client may be a software player like StreamPlayer, or a QuickTime player on a PC or a Macintosh. The user requests a stream from the encoder by directing the decoder client to issue an RTSP request to the URL of the VBrick H.264 encoder. The client and the encoder then exchange a sequence of RTSP messages to direct the encoder to send the program to the client. Multiple servers are available. A server references a stream to determine Transport Type, Video Rate, Audio Rate, and other parameters. A server can be configured as RTP or MPEG2TS (Transport Stream). RTMP and Smooth are not supported. An RTP server also accepts RTSP interleaved and HTTP tunneled requests from a client.

Note In *server* mode, a program stream is *pulled* from a server. In this mode, a served program does not become active on the network until requested by a decoder client like StreamPlayer or QuickTime.



Click Here to Play Stream	Edit Mode/Read-only. Shown in Edit mode only if the server is enabled and RTP selected for Transport Type. Click once to launch the stream in the QuickTime plugin (using the SDP file). <i>This link will work only with QuickTime 7.0 or higher. If QuickTime is not installed, you will be prompted to download the application from Apple.</i>
Choose Server to Configure	Select from dropdown list. The number of servers is configured on the Program Configuration > Global page.
Enable Server	Check to enable the server. Default = enabled. The server must be enabled for streaming to occur

Server Name	Enter a user-friendly name for the selected server.
Stream Select	Select a configured stream from the dropdown.
Transport Type (read-only)	<ul style="list-style-type: none"> • RTP – Default. Realtime transport protocol provides end-to-end network transport functions suitable for video. • Transport Stream – Multiplexes the digital video and audio into one bit stream.
Resource Name	Defines the server URL. Default = <code>vbStreamxSY</code> where <code>x</code> is the program number and <code>y</code> is the server number.
Stream URL (read-only)	Use this URL in the decoder to view the stream via RTSP.
RTCP Transmit	RTP only. Enable allows RTCP sender reports to be sent from the VBrick appliance. Default = Enable.
RTCP Transmit Interval	RTP only. If RTCP Transmit is enabled, this setting tells the appliance how often (in seconds) to send the reports. Default = 10 seconds.

Announce Settings

This section contains parameters that are used to modify announcements from the appliance. Announcements are advertisement packets that are transmitted by VBrick appliances to other VBrick appliances and VBrick applications such as the VEMS Portal Server and StreamPlayer. They are used to identify streams present in the network.

Announce	This section is used to announce the RTSP streams to the local network allowing viewable RTSP announcements in programs like StreamPlayer. The unit must be on the same segment of the network or the router must be configured to retransmit broadcast packets for the announcements to be accessible using the IP address 255.255.255.255.
Use Global Announce IP and Port	Use Announce IP Address for Servers and Announce Port defined on Program Configuration > Global page. If checked, the Destination and Port fields are greyed out.
Destination IP Address	The destination IP address the announcement is sent to. By default, the announcement is sent to the multicast network. <i>If using an VEMS Portal Server, enter the Portal Server IP address.</i>
Destination Port	The destination port the announcement is sent to.

External Announce Settings

These settings configure an external announcement that can be used when the stream is reflected to a third-party server or a (future) VBrick reflector.

External Announce	This section is used to announce RTSP streams to a network device outside of the broadcast domain.
Use Global Announce IP and Port	Use Announce IP Address for Servers and Announce Port defined on Program Configuration > Global page. If checked, the Destination and Port fields are greyed out.

Destination IP Address	The destination IP Address or Host Name the announcement is sent to. If using an VEMS Portal Server, enter the Portal Server IP address. If using a reflector, enter the reflector server IP address.
Destination Port	The destination port the announcement is sent to.
URL	The URL of the reflector (i.e the source of the reflected stream). This URL is embedded in the announcement.

Archivers

Transport Streams only. An Archiver is used to store a local copy of a stream on existing internal or external hard drives. Archivers reference a stream which is basically comprised of a Video Rate, an Audio Rate, and a Transport Type. Archiving can be controlled locally using the **Start** and **Stop** buttons or it can be controlled from VEMS. VEMS can start and stop an archive and FTP files to and from the appliance. You can also set the start **Mode** to **Automatic Start** and the archiver will automatically start when you power on the appliance or insert an external storage device.

The encoder supports a variety of internal and external storage devices including a 500GB mechanical drive and a 160GB solid state drive. If the encoder is configured with a storage device, you can create an archive of any **MPEG2TS** transport stream. Once the archiving is complete, the file can be moved or FTPed to a VOD server, a file server, a Windows PC, or any FAT32 device. It can also be Auto-FTPed to an [External FTP Server](#) if present. The H.264 supports two archivers configured on the Program Configuration > Global page.

Note that any change in the configuration settings for an encoder will cause a brief interruption of the video and audio stream. If this happens all streams being sent from the encoders (including multicast) are interrupted and any active HTTP or RSTP clients are dropped. If an archive is in progress when an interruption occurs, the archiver will stop and the file will be saved and closed.

Note Although internal and external storage devices can store thousands of files, it is important to understand that each device has a finite capacity. For best results, periodically purge unnecessary files from your devices.

Archiving Batch Files

Batch mode records video in pieces. It allows a VBrick to transfer segments of a conference, event, training session, or any video, to a remote device, while continuing to record. Batch processing minimizes the delay inherent with store-and-forward video, providing video in near-real time. A batch file is one of a group of files that are handled as a single entity. The **Filename** is the base file name of the batch, for instance `filenamexxxx.ts`. Four digits are reserved at the end of the base file name to signify the index number of the batch file. Index numbers are assigned to the base file name as the files are recorded (for example `filename0000.ts` through `filename9999.ts`).

Note The maximum size of each batch file is 4GB. Be aware that if you configure the archiver to record the maximum number of batch files (9999), you can easily exceed the storage capacity of the hard drive (typically 500GB).

Batch Wrap Point and Record Duration

A batch **Wrap Point** sets the number of files to be recorded. When the specified number of files has been recorded, the previously recorded files will be deleted and recorded over, starting with the first file. For example, if the batch **Wrap Point** is set to 10, and the **Filename** is `test.ts`, the files will be recorded from `test0000.ts` to `test0009.ts`. After `test0009.ts` is recorded, the archiver will start recording again at `test0000.ts`.

When batch mode is enabled, **Archive Duration** controls the total time recorded (adding up all the files in the batch) and **Batch Duration** controls the amount of time recorded into each file in the batch. When batch mode is *disabled*, **Archive Duration** controls the time recorded into the (one) file and the **Batch Duration** setting is not used.

The **Archive Duration** can be set to a specific number of seconds or **Continuous**. For example, if the duration is set for 1800 seconds (1 hour), the archiver will start writing over the previously recorded files after an hour. If set to **Continuous**, the archiver will start writing over the previously recorded files when it reaches the **Wrap Point** (i.e. the maximum number of files).

Note If the archiver encounters an interruption in file transfer during batch recording, the file being recorded and the next file will both be affected. The file in the process of being replaced will be partially recorded. The next sequential file that was deleted to get ready for receiving data will be missing.

Using External (USB) Devices

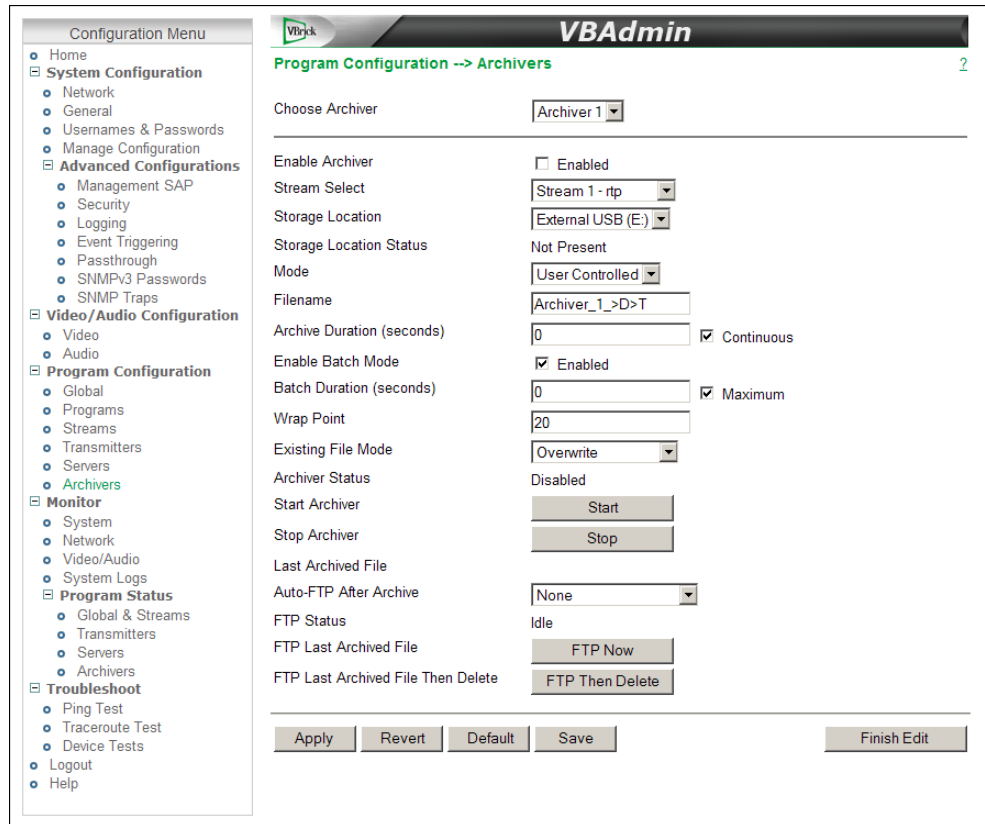
The external storage devices shown in Table 16 have been tested and verified by VBrick. Devices from other manufacturers may work but have not been tested and are not supported. USB devices are portable and can be easily moved to any compatible device with a USB port. *USB storage devices must be formatted before initial use and must be safely removed when done.*

Note The appliance only supports external drives with one partition. If you insert a drive with more than one partition, only the first partition will be used. This will not affect drive performance and you can safely ignore the "Failed to mount" or similar message.

- ▼ To attach and configure an external storage device:
 1. Connect a recommended external storage device to the USB port on the appliance (or to a blade in a rack mount shelf) using the vendor-provided cable.
 2. Go to the Monitor > System page in VAdmin and click **Edit**.
 3. Click **Format** in the External device column and wait for the status to change from **None** to **Formatted**. This may take a few moments depending on the size of the device.
 4. When ready you can enable the archiver and stream to the device as necessary.
 5. When done go back to the to the Monitor > System page, click **Eject**, and wait for a message before you can safely remove the device.

Table 16. Recommended External Storage Devices

Vendor	Model	Type	Capacity
LaCie	301898KUA	USB mechanical hard drive	2TB
Toshiba Canvio Plus	E05A100PBU2XK	USB mechanical hard drive	1TB
Corsair Voyager GTR	CMFVYA64GBGT2	USB thumbdrive	64GB



Choose Archive	Select a configured archive. Two archivers can be configured and enabled.
Enable Archive	Check to enable the specified archive.
Stream Select	Select a configured MPEG2TS stream from the dropdown.
Storage Location	<p>The appliance can be configured with a variety of internal and external storage devices. Select an option that matches your device. (The Monitor > System page shows the storage devices currently installed as well as the Total Space and total Free Space.)</p> <ul style="list-style-type: none"> External USB (E): Any user-provided USB drive not exceeding 2 TB. Table 16 shows recommended devices. Internal Drive (D): This includes a 500 GB (mechanical) drive, a 160 GB (solid state) drive, or a 16 GB (USB) drive (blade models only).
Storage Location Status	Ready Not Ready
Mode	<ul style="list-style-type: none"> User Controlled – Default. The user controls which streams to record using the Start and Stop buttons. Automatic Start – The archiver will automatically start when the appliance is powered on. If the archiver is an external USB drive, it will start or stop when drive is inserted or removed.

Filename	<p>The name of the file to be recorded. The default file name for the file is <code>Archiver_x_>D>T.ts</code>. The general format of the file name is <code>[/path/] filename.ext</code>. The default path will place the recorded files in the root directory of the hard drive.</p> <p>The H.264 encoder has a built-in FTP Server that lets you move files to or from the archiver via anonymous FTP. You can access the following public folders via FTP without the need for a user name or password:</p> <p><code>D:/Public</code> – public folder on internal drives. <code>E:/Public</code> – public folder on external drives.</p> <p>The archiver can automatically add current date, time, host name, etc. to the file name when it creates a new file by configuring it to contain any of the following special strings:</p> <p><code>\P</code> – full Program name <code>>P</code> – shortened program name. Strips all non-alphanumerics. <code>\H</code> – host name <code>\D</code> – Date long mm-dd-yy <code>>D</code> – Date short mmddyy <code>\Y</code> – not used “\” is ignored <code>>Y</code> – Date yyymmdd <code>>T</code> – Time hhmm <code>\R</code> – Release x_y_z <code>>R</code> – not allowed</p> <p>These special strings may be inserted anywhere in the filename and more than one string may be used. The following rules also apply:</p> <ul style="list-style-type: none"> • Limited to 24 characters (21 in batch mode) with a 3-character extension and a 25-character pathname. • Only extensions of .ts and .mpg are allowed. .ts is the default. • A period after the filename must be followed by an extension. • Spaces are allowed but leading spaces are stripped. • The following characters are <u>not</u> allowed: : " * ? < > []
Archive Duration (seconds)	<p>The length of the recorded file when batch mode is disabled, or the length of the entire batch when batch mode is enabled. Range 0–43200 (12 hours) or Continuous. The default (0) implies a manual Start/Stop and will auto-select Continuous. For best results and usable video, set the archive duration to 10 seconds or more.</p>
Enable Batch Mode	<p>Default = Enabled. If enabled, the recorder will create a series of files and the files will be numbered incrementally. To create a "forever archive," check Enable Batch Mode and set Existing File Mode to Overwrite.</p>
Batch Duration (seconds)	<p>Used only when batch mode is enabled to set the length of time recorded into each of the files in a batch. Range 30–7200 sec (12 hours) or check Maximum. Default = zero (no limit).</p>

Wrap Point	Used with Batch Mode. Default = 20. Sets the number of batch files (2–9999) that will be recorded before "wrapping over" the previously recorded files (from lowest to highest batch number).
Existing File Mode	<ul style="list-style-type: none"> • Overwrite – Default. The archiver will automatically overwrite an existing file with the same name. • Error on Duplicate – The archiver will display an error message and <u>not</u> overwrite an existing file with the same name. Not allowed if start Mode is Automatic Start.
Archiver Status	Archiving Stopped Disabled Error
Start Archive	Click to manually start archive.
Stop Archive	Click to manually stop archive.
Last Archived File	Read-only. Last archived file name.
Auto-FTP After Archive	<ul style="list-style-type: none"> • None – Do not FTP the file after archiving. • Auto FTP – Automatically FTP the file and save copy on appliance. • Auto FTP then Delete – Automatically FTP the file and delete from appliance.
FTP Status	Status of last FTP transfer. See FTP Status and Control on page 99 more about FTP status.
FTP Last Archived File	Click FTP Now to FTP the last file that was archived.
FTP Last Archived File Then Delete	Click FTP Then Delete to FTP the last file that was archived and then delete it from the Archiver's hard drive or USB drive.

Note Use the Monitor > System page (Figure 15) to format, reset, or safely remove a USB drive. Use the Monitor > Program Status [Archivers](#) page to check the current status of the archiver(s).

The screenshot shows the VBAAdmin web interface. On the left is a 'Configuration Menu' with categories like System Configuration, Advanced Configurations, Video/Audio Configuration, Program Configuration, Monitor, Program Status, and Troubleshoot. The main area is titled 'Monitor --> System' and contains two sections: 'System Information' and 'Storage Information'.

System Information

System Model	XPS 7101 H
Hardware Revision	33 - 1
Boot Revision	1.7 - 08/10/10 11:46
Application Code Revision	103.0.31 - 09/29/10 11:29
Current Operational Mode	Run
Temperature	26°C
Fan Status	On
Overloaded Count	0
CPU Utilization (%)	74, 60, 0, 0
System Up Time	01:14:31
Total System Up Time	01:004 20:24 (yr:day hr:min)
System Date & Time	10/5/2010 11:56

Storage Information

	Internal	External
State	Not Present	Ready
Type	N/A	FLASH - Drive AU_USB20
Total Space	0	2097091072
Free Space	0	1478459392
Format Status	None	Formatted
Format Storage	<input type="button" value="Format"/>	<input type="button" value="Format"/>
Reset	<input type="button" value="Reset"/>	<input type="button" value="Reset"/>
Safely Remove Device	Not Supported	<input type="button" value="Eject"/>
Check	You must be in Diagnostic Mode to perform a check	

At the bottom of the Storage Information section are two buttons: 'Refresh' and 'Finish Edit'.

Figure 15. Monitor > System > Storage Information

Monitor

These pages let you monitor the status of various system, network, and appliance components. They also provide access to the system logs and program status. All Monitor pages are read-only and cannot be edited.

Note Many of the parameters on the Monitor pages have counters that track dynamic system events (for example **Frames Processed** on the Monitor > Video/Audio page). On most pages, these counters are auto-updated every two seconds so that the current status is always shown—without refreshing the page.

Topics in this section

System	85
Network	89
Video/Audio	90
System Logs	92
Program Status	93

System

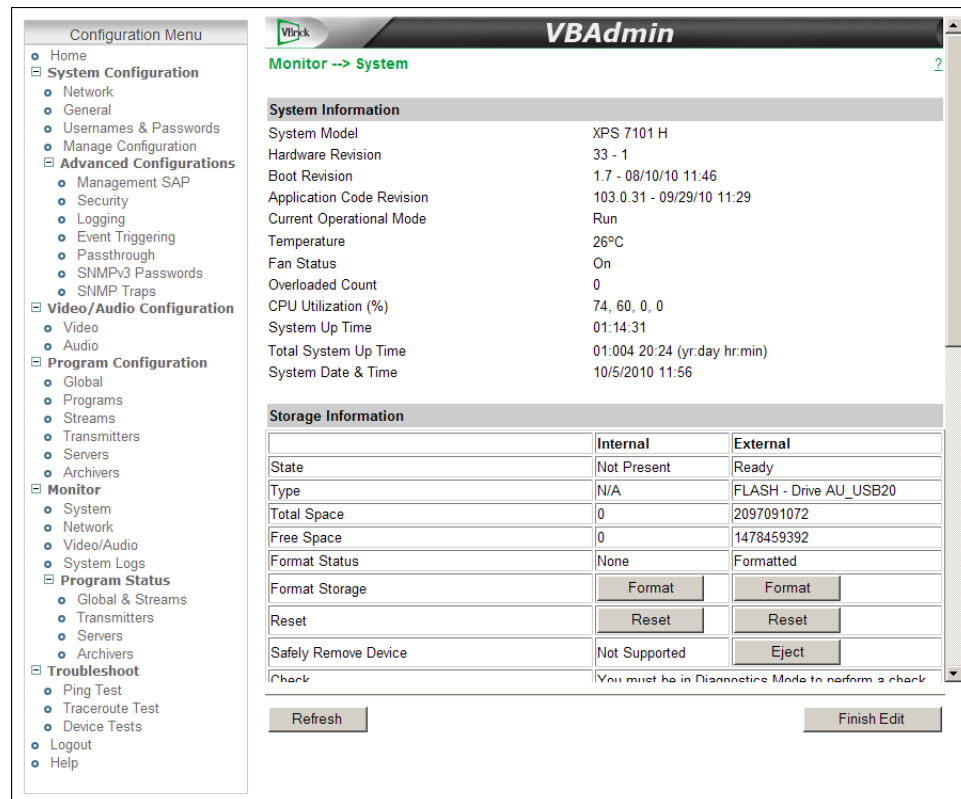


Figure 16. Monitor > System – Part 1

System Information

System Model	Displays the hardware model number of the appliance.
Hardware Revision	xx-yy. xx = Hardware Revision. yy = CPU Revision.
Boot Revision	Displays current boot revision.
Application Code Revision	Displays the revision number of the application code running on the appliance.
Current Operational Mode	<p>Indicates the current operational mode of the VBrick. The following modes are supported. See Operational Modes on page 104 for more information.</p> <ul style="list-style-type: none"> • Run – Normal operation. • Diagnostics – User selected mode for running certain VBrick diagnostics. See Device Tests on page 103. • Maintenance – Not selectable. Automatically launched when the software on the VBrick appliance does not load. • Limited Run – Not selectable. Normally occurs if a hardware problem exists within the VBrick but it can still partially operate. • Overloaded – Not selectable. This mode occurs when the VBrick is configured to handle more video than its operational capacity. If this occurs, the VBrick needs to be reconfigured to reduce the number of streams and/or data rates. Under this condition, the appliance temporarily reduces video traffic in order to maintain VAdmin functionality.
Temperature	<p>Displays the appliance temperature in Celsius (for example 50° Celsius = 122° Fahrenheit). A temperature exceeding 72° C will cause an alarm, a trap, and a log message; if the temperature drops below 70° C the alarm and trap will clear. When the temperature exceeds the maximum threshold, the appliance will reboot and come up in Limited Run Mode; when the temperature drops to an acceptable level, reboot the appliance to return to normal Run Mode. The temperature (in Celsius) determines the fan speed as follows:</p> <ul style="list-style-type: none"> • If temperature > 50° fan speed = Full 100% • If temperature < 50° fan speed = Low 10%
Fan Status	On Off Alarm.
Slot ID	Blade Server only. Indicates slot number of blade in server chassis. Blades are numbered 1–11 from left to right.
Overloaded Count	Provides a count of the number of times the box has entered the Overloaded Mode.
CPU Utilization (%)	Shows average CPU utilization over the previous 10 seconds for each CPU as follows: Host, DSP1, DSP2, DSP3.
System Up Time	Total up time since last power cycle.
Total System Up Time	Aggregate up time since customer delivery.

System Date & Time	Read-only. Set date and time on System Configuration > General page.
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Storage Information

This page has status indicators and controls in two columns for Internal and External storage media respectively if present.

State	<ul style="list-style-type: none"> Ready Not Ready Not Present Not Present. If you click Eject (see below) to remove a device, Not Present means it is safe to remove.
Type	Displays manufacturer information.
Total Space	Total space available on device.
Free Space	Total free space available on device.
Format Status	<ul style="list-style-type: none"> None – device has not been formatted. Formatted – device has been formatted.
Check Status	Diagnostics Mode only. Shows the results of Check device: None Successful Error
Partition Storage	Diagnostics Mode only. Do not use this debug tool except as directed by VBrick Support Services.
Format Storage	Click button and confirm to format the storage device for FAT32. Be aware that you will lose all data if you format the device.
Reset	Resets the storage device. This allows a drive that was ejected but not physically reseated to be recognized.
Safely Remove Device	External storage only. Click Eject and wait for message before removing external USB device.
Check	Performs a check of the drive and file system. The Operational Mode (see Configuration > General on page 13) must be set to Diagnostics to run this test.

Manufacturing Information

Configuration Menu

- Home
- System Configuration
 - Network
 - General
 - Usernames & Passwords
 - Management Configuration
 - Advanced Configurations
 - Management SAP
 - Security
 - Logging
 - Event Triggering
 - Passthrough
 - SNMPv3 Passwords
 - SNMP Traps
- Video/Audio Configuration
 - Video
 - Audio
- Program Configuration
 - Global
 - Programs
 - Stream Templates
 - Transmitters
 - Servers
 - Archives
- Monitor
 - System
 - Network
 - Video/Audio
 - System Logs
 - Program Status
 - Global
 - Transmitters
 - Servers
 - Archives
 - Troubleshoot
 - Ping Test
 - Traceroute Test
 - Device Tests
 - Logout
 - Help

Manufacturing Information

User Information Version: User Info 1.0
 Part Number: 9202-4200-0000
 System Serial Number:
 Customer Class:
 Manufacturing Date: 20081215
 Board Assembly Number: 6105-0000-0000
 Power Assembly Number:
 Lot Number:
 Board Serial Number:
 MAC Address: 00:07:df:01:07:54
 Upgrade Date:

Add-on Boards Information Table

Board Name	Version	Assembly #	Lot #	Unit Serial #	Board Serial #
Processor	User Info 1.0	6105-0010-0000			

System Restart

Start Time	Stop Time	Up Time	Restart Type
05/12/2010 10:08:03	Currently Running	00:000 05:55	POWER
05/11/2010 15:20:19	05/11/2010 17:12:27	00:000 01:52	RESET
05/11/2010 15:14:21	05/11/2010 15:19:35	00:000 00:05	RESET
05/11/2010 12:08:03	05/11/2010 15:13:07	00:000 03:05	RESET
05/11/2010 12:00:13	05/11/2010 12:06:43	00:000 00:06	POWER
05/10/2010 10:16:39	05/10/2010 17:36:33	00:000 07:19	POWER
05/06/2010 16:49:07	05/07/2010 17:11:31	00:001 00:22	RESET
05/06/2010 10:41:28	05/06/2010 16:48:30	00:000 06:07	RESET
05/06/2010 10:21:51	05/06/2010 10:40:56	00:000 00:19	POWER
04/23/2010 14:06:55	04/23/2010 16:52:57	00:000 02:46	POWER

Refresh Finish Edit

Figure 17. Monitor > System – Part 2

User Information Version	As displayed.
Part Number	VBrick part number of appliance.
System Serial Number	As displayed.
Customer Class	As displayed.
Manufacturing Date	As displayed.
Board Assembly Number	As displayed.
Power Assembly Number	As displayed.
Lot Number	As displayed.
Board Serial Number	As displayed.
MAC Address	Displays the appliance's Media Access Control address.
Upgrade Date	VBrick manufacturing data.
Add-on Boards Information Table	Use this table to find specific information about the add-on boards in the appliance assembly. Shelf data, if shown, is read from Slot 1 on an H.264 blade server.

System Restart

This table (see Figure 17) tracks the date, time, and restart type (power or reset) of all system restarts.

Network

The screenshot shows the VAdmin interface for Network configuration. The left sidebar contains a Configuration Menu with options like Home, System Configuration, Advanced Configurations, Video/Audio Configuration, Program Configuration, Monitor, Program Status, and Troubleshoot. The main content area is titled 'Monitor --> Network' and displays the following settings:

Network	
DHCP Status	Disabled
COM Passthrough Operational State	Disabled
MAC Address	00:07:df:01:07:43
Network Port Status	Link OK
Network Port Speed	1000Mbit
Network Port Mode	Full Duplex
Network Time Synchronization	
Last Successful Update	
Network Time Client State	Idle
Primary Network Time Server:	
Successful Update Counter	0
Failed Update Counter	0
Current Server Status	Server Standby
Secondary Network Time Server:	
Successful Update Counter	0
Failed Update Counter	0
Current Server Status	Server Standby

Buttons for Refresh and Finish Edit are located at the bottom of the page.

DHCP Status	Shows DHCP status from System Configuration > Network page.
COM Passthrough Operational State	The current operational state of COM serial Passthrough port. The possible values are: <ul style="list-style-type: none"> • Disabled • Active • Internal Error (many indicate a KLV configuration mismatch) • Rejected • No Dedicated IP Addr
MAC Address	Displays the appliance's Media Access Control address.
Network Port Status	Status of the Ethernet network interface.
Network Port Speed	Speed of transmission for the Ethernet network interface.
Network Port Mode	The mode of transmission for the Ethernet network interface.

Network Time Synchronization

Last Successful Update	The last time the appliance successfully acquired the time.
------------------------	---

Network Time Client State	Status of client.
Primary Network Time Server	
Successful Update Counter	The number of times the time was reset from the primary server.
Failed Update Counter	The number of times the appliance failed to read the time from the primary server.
Current Server Status	Status of primary server.
Secondary Network Time Server	
Successful Update Counter	The number of times the time was reset from the secondary server.
Failed Update Counter	The number of times the appliance failed to read the time from the secondary server.
Current Server Status	Status of secondary server.

Video/Audio

The screenshot shows the VAdmin web interface. On the left is a 'Configuration Menu' with options like Home, System Configuration, Video/Audio Configuration, Program Configuration, Monitor, Program Status, and Troubleshoot. The main content area is titled 'Monitor --> Video/Audio' and displays the following data:

Video	
How is Video Connected?	SD-SDI
Video State	Video Input Problem
Detected Video Format	Video Input Problem
Detected FPS	Unknown
Video Time Code	Not Available
Video Rate1	
Actual Bit Rate	2972
Actual Frames per Second	9
Frames Processed	1544
Frames Dropped by Congestion	0
Frames Discarded by Rate Control	0
Audio	
How is Audio Connected?	Unbalanced
Audio State	Running
Audio Rate1	
Actual Bit Rate	75526
Total Frames	5373
Frames Processed	5506

At the bottom of the interface are three buttons: 'Refresh', 'Reset Counters', and 'Finish Edit'.

Video

How is Video Connected	Shows video connection type from Audio/Video Configuration > Video page.
------------------------	--

Video State	Shows the state of the connected video source. <ul style="list-style-type: none"> Running – video connection is OK. Video input problem – video connection is not OK. Video mismatch – SDI or HDMI. The video input connection does not match the Video Format. <p>Note: If a video source is protected by HDCP (High-bandwidth Digital Content Protection) it cannot be streamed and this field will display "Video input problem." See "HDCP Support" in the <i>H.264 Appliance Release Notes</i> for more about HDCP.</p>
Detected Video Format	SDI or HDMI only. Indicates what is actually connected. This is useful for determining configuration mismatches.
Detected FPS	Shows the actual Frame Rate in decimal. This is useful for configuring some decoders including VBrick's H.264 decoder.
Video Time Code	SDI only. The SMPTE time code will be displayed if available.
KLV Bytes Received	Shown if "ESD to LDS" selected for KLV.
KLV Packets Created	Shown if "ESD to LDS" selected for KLV.
KLV Errors	As displayed.

Video Rate

Actual Bit Rate	Measured rate in bits per second of the encoded video stream being created by the appliance.
Actual Frames per Second	Measured rate in frames per second of the encoded video stream being created by the appliance. This rate is rounded down and may indicate 0 for frame rates less than 1 per second.
Frames Processed	Total video frames encoded and streamed by the appliance.
Frames Dropped by Congestion	Frames dropped due to congestion or overloading. If this happens you may need to lower the resolution or frame rate.
Frames Discarded by Rate Control	Frames discarded to limit the short term video bit rate. If this happens, increase the <u>Rate Control Setting</u> and/or the <u>Target Bit Rate</u> .
Total Frames	Total video frames received from connected video source.

Audio

How is Audio Connected	Shows audio connection type from Audio/Video Configuration > Audio page.
------------------------	--

Audio State	<p>Only audio from SDI or HDMI inputs can be monitored. Audio from the Main or Aux inputs is not monitored and will not generate an alarm.</p> <ul style="list-style-type: none"> • Running – no audio problems detected. • Digital Audio Input Problem – audio connection is not OK. • Audio mismatch – SDI or HDMI. The audio input connection does not match the configured Audio Source.
Detected Audio Sampling Frequency	Indicates the actual audio frequency. This field is shown only for HDMI input configured with digital audio.

Audio Rate

Actual Bit Rate	Measured rate in bits per second of the encoded audio stream being created by the appliance.
Total Frames	Total audio frames received from connected audio source.
Frames Processed	Total audio frames encoded and streamed by the appliance.

System Logs

System logs can give you more information about the status of your appliance. Each log can hold up to 20 of the latest informational messages. All logs are emptied when the appliance is powered down or reset.

The screenshot shows the VAdmin web interface. On the left is a 'Configuration Menu' with categories like System Configuration, Video/Audio Configuration, Program Configuration, Monitor, Program Status, and Troubleshoot. The main area is titled 'Monitor --> System Logs' and contains a list of log entries under the heading 'Configuration Log'. Each entry shows a timestamp and a configuration change, such as 'ProgramTxAutoUnicastMode.1 changed from disabled to autoUnicastUDP'.

Configuration Log	This log contains a list of the latest VBrick configuration changes.
SNMP Traps	This log contains all of the SNMP traps generated by the box whether or not the traps have been emitted.
System Events	This log contains reports of system events within the VBrick. These events may occur during normal operation and include some details of successful and unsuccessful attempts to access the HTTP and RTSP server as well as a some details concerning server push retries.
System Information	This log contains unexpected behaviors detected by the appliance software. Normally this log is used by VBrick Support Services to help debug system errors.

Program Status

The following pages have various counters that display realtime information about the encoder. Use the **Refresh** button to update the page; use the **Reset Counters** button to reset to zero.

Global & Streams	93
Transmitters	94
Servers	96
Archivers	98

Global & Streams

Configuration Menu

- Home
- System Configuration
 - Network
 - General
 - Usernames & Passwords
 - Manage Configuration
 - Advanced Configurations
- Video/Audio Configuration
 - Video
 - Audio
- Program Configuration
 - Global
 - Programs
 - Streams
 - Transmitters
 - Servers
 - Archivers
- Monitor
 - System
 - Network
 - Video/Audio
 - System Logs
 - Program Status
 - Global & Streams
 - Transmitters
 - Servers
 - Archivers
- Troubleshoot
 - Ping Test
 - Traceroute Test
 - Device Tests
- Logout
- Help

VBAAdmin

Monitor -> Program Status -> Global & Streams 2

Global

	Current	Maximum
System Bandwidth Used	17848739	26767894
Number of Served Clients	0	1

Streams

Stream Name	State	Actual Bit Rate	Video Buffer Full Count	Audio Buffer Full Count	Closed Caption Buffer Full Count	Metering Buffer Full Count
	Enabled	8502062	0	0	0	0
	Enabled	8502062	0	0	0	0
Stream 3	Enabled	8502062	0	0	0	0

Refresh Reset Counters Finish Edit

Global

System Bandwidth Used	<ul style="list-style-type: none">• Current – The actual bandwidth currently being sent to the network.• Maximum – The highest bandwidth sent to the network since the last time these parameters were Reset.
Number of Served Clients	<ul style="list-style-type: none">• Current – Current number of HTTP and/or RTSP clients connected to all servers.• Maximum – Highest number of HTTP and/or RTSP clients that were concurrently connected since the last time these parameters were Reset.

Streams

Stream Name	Defined on Program Configuration > Streams page.
State	Enabled Disabled.
Actual Bit Rate	Measured packetized bit rate.
Video Buffer Full Count	Increments when the stream's Video, Audio, or Closed Caption buffer overflows. This usually indicates an overload condition. If this happens reduce the load by lowering the video Target Bit Rate or reducing the number of transmitter-served clients or archivers.
Audio Buffer Full Count	
Closed Caption Buffer Full Count	
Metering Buffer Full Count	Increments when the metering buffer is full. If full, lower the Metering Aggressiveness value on the Video/Audio Configuration > Streams page.
Refresh	Refresh all counters.
Reset Counters	Reset all counters to zero.

Transmitters

This page shows the program status of all defined transmitters. Note that when more than 5 transmitters are configured, auto-refresh is disabled and you must use the **Refresh** button to manually refresh the page.

Configuration Menu

- Home
- System Configuration
- Video/Audio Configuration
- Program Configuration
- Monitor
 - System
 - Network
 - Video/Audio
 - System Logs
 - Program Status
 - Global & Streams
 - Transmitters
 - Servers
 - Archivers
 - Troubleshoot
 - Logout
 - Help

VBAAdmin

Monitor -> Program Status -> Transmitters

Transmitters

Transmitter Name	State	Destination	Video Port	Audio Port	Bytes Transferred	IP Packets Sent	Transport Type
j2	Disabled	live.justin.tv	1935	N/A	70035425	162457	RTMP
rtp mcast	Transmitting	238.22.150.146	4444	4644	1621934593	31900379	RTP
ts 1	Disabled	239.22.150.146	6444	N/A	0	0	MPEG2TS
ustream	Disabled	1.5832928.fme.ustream.tv	1935	N/A	0	0	RTMP

Refresh Reset Counters Finish Edit

Transmitter Name	Transmitter Name (from Program Configuration > Transmitter page).				
State	<ul style="list-style-type: none"> Transmitting – no transmitter problems detected. Disabled – transmitter has not been enabled. Ping Failed – ping to unicast destination failed. Ports Not Open – IP port failure. Loopback Address – destination address is a loopback address. Invalid Authorization – user name/password incorrect for AutoUnicast or RTMP. Rejected – AutoUnicast server connection issue. Video Problem – Video input error. Global Override – Global Override set. Invalid Application – RTMP error. Not FEC Protected – one or both of the FEC sockets are not operational. 				
Destination	Destination IP Address or Host Name (from Program Configuration > Transmitter page).				
	RTP	Transport Stream	Auto Unicast (UDP)	Auto Unicast (TCP)	RTMP
Video Port	Configured port.	Configured Transport Stream port.	Negotiated port.	Negotiated port.	Configured port.
Audio Port	Configured port.	N/A	Negotiated port.	N/A	N/A

Bytes Transferred	Use Reset Counters to reset to zero.
IP Packets Sent	Use Reset Counters to reset to zero.
Transport Type	<ul style="list-style-type: none"> • RTP • Transport Stream • RTMP • Auto Unicast (UDP) • Auto Unicast (TCP) • Smooth

Servers

This page shows the program status for all servers. Use the dropdown list box to select a specific server.

Note When CPU usage on the selected server is extremely high, auto-refresh is disabled but you can still use the **Refresh** button to manually refresh the page.

The screenshot shows the VAdmin web interface. On the left is a 'Configuration Menu' with options like Home, System Configuration, Video/Audio Configuration, Program Configuration, Monitor, Program Status, and Troubleshoot. The main content area is titled 'VAdmin' and 'Monitor --> Program Status --> Servers'. It features a 'Choose Server' dropdown menu currently set to 'Server 1'. Below this is a 'Server' table with two columns: 'Current' and 'Maximum'. The 'Current Bandwidth Used' is 10840544 and the 'Maximum' is 10848983. The 'Number of Served Clients' is 1. Below the server table is a 'Clients' table with columns: Session State, IP Address, Up Time (days hr:min:sec), Video Port, Audio Port, Video Packets Sent, Audio Packets Sent, Session Transport, Video Packets Dropped, and Audio Packets Dropped. One client is listed with Session State 'Play', IP Address '172.16.2.168', Up Time '0 2:00:36', Video Port '1980', Audio Port '1982', Video Packets Sent '6321843', Audio Packets Sent '339193', Session Transport 'UDP', Video Packets Dropped '0', and Audio Packets Dropped '0'. At the bottom of the interface are three buttons: 'Refresh', 'Reset Counters', and 'Finish Edit'.

Server

Choose Server	Select a defined server from the dropdown.
---------------	--

Current Bandwidth Used	<ul style="list-style-type: none"> • Current – Approximate calculated bandwidth being used by all currently connected clients on this server. • Maximum – Highest aggregate bandwidth used by all connected clients on this server since the last time these parameters were reset.
Number of Served Clients	<ul style="list-style-type: none"> • Current – Current number of HTTP and/or RTSP clients connected to the server. • Maximum – Highest aggregate number of HTTP and/or RTSP clients that were concurrently connected since the last time these parameters were reset.

Clients

Session State	Setup Play Pause Suspend.			
IP Address	As displayed.			
Up Time	The time (in hr:min:sec) since the last reset or power cycle.			
	UDP	RTSP Interleaved	HTTP Tunneled	Transport Stream
Video Port	Negotiated port.	Negotiated channel.	Negotiated channel.	Configured Transport Stream port.
Audio Port	Negotiated port.	Negotiated channel.	Negotiated channel.	N/A
Video Packets Sent	Video packets sent since session start.			
Audio Packets Sent	Audio packets sent since session start.			
Session Transport	UDP, RTSP Interleave, Http Tunneled, Transport Stream.			
Video Packets Dropped	Video packets dropped since session start.			
Audio Packets Dropped	Audio packets dropped since session start.			

Archivers

The screenshot shows the VAdmin interface with the following components:

- Configuration Menu:** A tree view on the left with categories like System Configuration, Advanced Configurations, Video/Audio Configuration, Program Configuration, Monitor, Program Status, and Troubleshoot.
- Header:** VAdmin logo and navigation path: Monitor --> Program Status --> Archivers.
- Archivers Table:**

State	Start Date/Time	Bytes Stored	Bytes Stored in Current File	File in Progress	Last Completed File	Buffer Full Count
Stopped	7/27/2011 12:59	1,996,267,520	0		E:/Archiver_1_07271112590000.ts	0
Disabled		0	0			0
- FTP Status and Control:**
 - Filename: E:/Archiver_1_07271112590000.ts
 - Add File To FTP Queue: Add File
 - Add File To FTP Queue Then Delete: Add File Then Delete
 - Remove File From FTP Queue: Remove File
 - Files in FTP Queue: 0
 - Last FTP Transfer Error: FTP Transfer Error
 - Last FTP Read Error: None
 - Last Transfer Error Filename: E:
- FTP Queue:** A table with columns for File Name, File Size, and File Time.
- Buttons:** Refresh, Reset Counters, and Finish Edit.

Archivers

State	<ul style="list-style-type: none"> • Disabled • Stopped (enabled but not archiving) • Archiving • Error
Start Date/Time	Start date and time of the currently active archive.
Bytes Stored	Total bytes stored for the current archive session. Not affected by Reset Counters .
Bytes Stored in Current File	Used with Batch mode. Total bytes in the current batch file.
File in Progress	File <name> currently in progress.
Last Completed File	File <name> of last completed archive.
Buffer Full Count	Indicates data may be lost. Increments when the Archiver buffer overflows. This usually indicates an overload condition. If this happens reduce the load by lowering the video Target Bit Rate or reducing the number of transmitter-served clients or archivers.

FTP Status and Control

This panel is typically used to manually FTP any files on the appliance's internal hard drive (or on an external USB drive) to the external FTP server defined on the System Configuration > [Network](#) page.

Filename	The fully-qualified path to a file. For example: D: / <code><filename>.ts</code> = the path to a file on the internal hard drive. E: / <code><filename>.ts</code> = the path to a file on an external hard drive.	
Add File To FTP Queue	Click Add File to add the specified file to the FTP queue.	
Add File To FTP Queue Then Delete	Click Add File Then Delete to add the specified file to the FTP queue and then delete from local hard drive.	
Remove File From FTP Queue	Click Remove File to remove selected file from FTP queue.	
Files in FTP Queue	The number files currently in the FTP queue.	
FTP Queue	File Name	Name of file.
	File Size	Size of file.
	File Time	Time the file was created.
Current FTP File Transfer	File Name	Name of file currently being transferred.
	FTP Start Time	Time the FTP transfer was started.
	Bytes Transferred	Number of bytes transferred so far.
	File Size	Size of file.
	FTP Transfer Status	Status (including errors) of transfer to FTP server.
	FTP Read Status	Status of read (i.e. "get") from file system.
Last FTP File Transfer	File Name	Name of last file transferred.
	FTP Start Time	Time the FTP transfer was started.
	FTP End Time	Time the FTP transfer ended.
	Bytes Transferred	Number of bytes transferred.
	File Size	Size of file.
	FTP Transfer Status	Status (including errors) of transfer to FTP server.
	FTP Read Status	Status of read (i.e. "get") from file system.



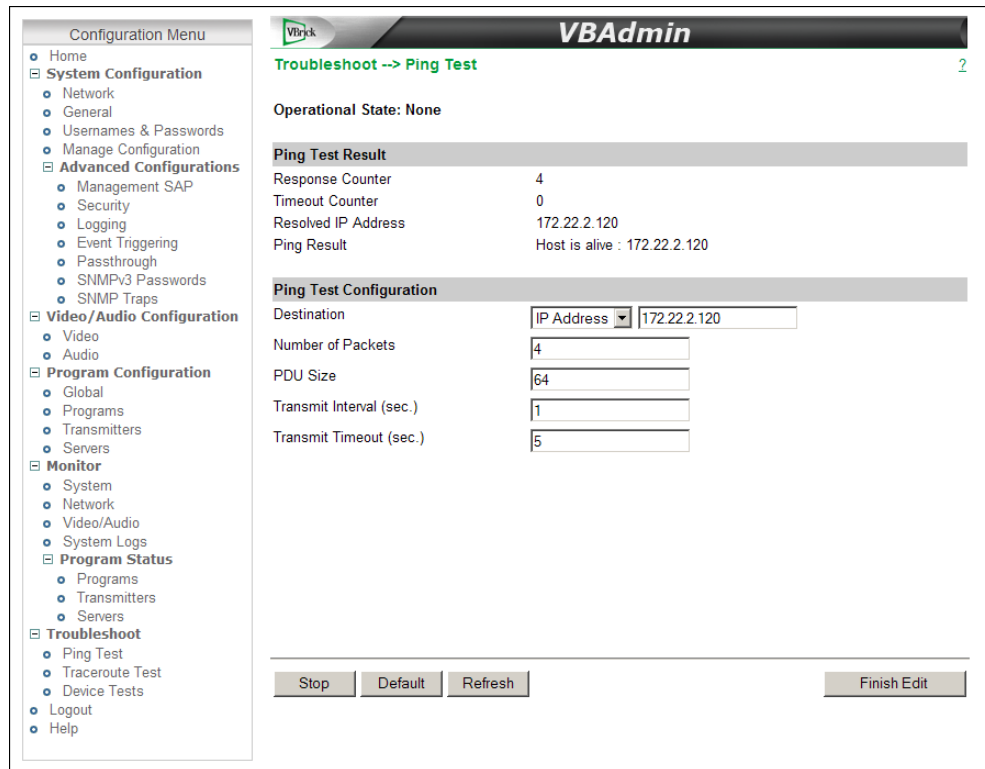
Troubleshoot

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Ping Test

This menu lets you initiate a data test from the VBrick appliance to another IP device. Enter the IP address and Test Settings and select the **Start** button. The Operational State will read **Ping Test**. The results of the test will be displayed in the top portion of the screen.



Ping Test Result

Response Counter	Counts the successful responses.
Timeout Counter	Counts the response timeouts.
Resolved IP Address	IP Address of destination.

Ping Result	Host is alive/not alive.
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Ping Test Setting

Destination	IP Address (IPv4), Host Name, or IPv6. Cannot be blank.
Number of Packets	Number of packets to send for the test (default = 4).
PDU Size	Protocol Description Unit size of packets, in bytes (default = 64).
Transmit Interval (sec.)	In seconds (default is sending the packets in 1 second intervals).
Transmit Timeout (sec.)	The length of time, in seconds, before the test times out, in the event the target device fails to respond.

TraceRoute Test

The Internet is a complex aggregation of network hardware connected by gateways. Tracking the route packets follow or finding a gateway where the packets are being discarded is difficult. The Trace Route test attempts to trace the route an IP packet follows to a specified Internet host. This test utilizes the Time To Live (TTL) field in the IP header to allow intermediate nodes to be "discovered" via Internet Control Message Protocol (ICMP). Intermediate hops are discovered by launching probe packets with a small TTL and then listening for an ICMP Time Exceeded reply from a gateway. Use **Refresh**, **Start/Stop**, and **Default** to run the test.

The screenshot displays the VAdmin web interface. On the left is a 'Configuration Menu' with a tree view including sections like System Configuration, Advanced Configurations, Video/Audio Configuration, Program Configuration, Monitor, Program Status, and Troubleshoot. The 'Troubleshoot' section is expanded to show 'Ping Test', 'Traceroute Test', and 'Device Tests'. The main content area is titled 'VAdmin' and 'Troubleshoot -> Traceroute Test'. It shows the 'Operational State: None'. Below this is the 'Traceroute Test Result' section, which displays 'Resolved IP Address: 172.22.2.120' and 'Traceroute Result: Traceroute: Test done'. A 'Summary:' section shows 'Hop= 1, Node=172.22.2.120 Probe delay= 4ms 1ms 0ms'. The 'Traceroute Test Configuration' section has a 'Destination' dropdown set to 'IP Address' with the value '172.22.2.120' and a 'Probe Count' input field set to '3'. At the bottom, there are buttons for 'Start', 'Default', 'Refresh', and 'Finish Edit'.

Trace Route Test Result

The results of the test appear at the top of the screen. The results include the **Resolved IP Address** of the Destination Host Name. When the test is finished or stopped, the **Overall Result** will display the result of the test, such as "Test Done," or "Max hops (=30) Finished," or "Test Stopped," etc. An entry shows the hop number, which is equal to the TTL, IP address (and Host Name if available) of the gateway, and round trip time of each probe. If the probe answers are received from different gateways, the address of each responding system will be shown. If there is no response within a 5 second timeout interval, a "*" is printed for that probe. If the result string exceeds 255 characters, the string will be terminated by ending it with "Too Long."

Resolved IP Address	IP Address of destination.
Traceroute Result	Displays "done" when finished.
Summary	Shows results summary including byte packet size and number of hops.

Trace Route Test Configuration

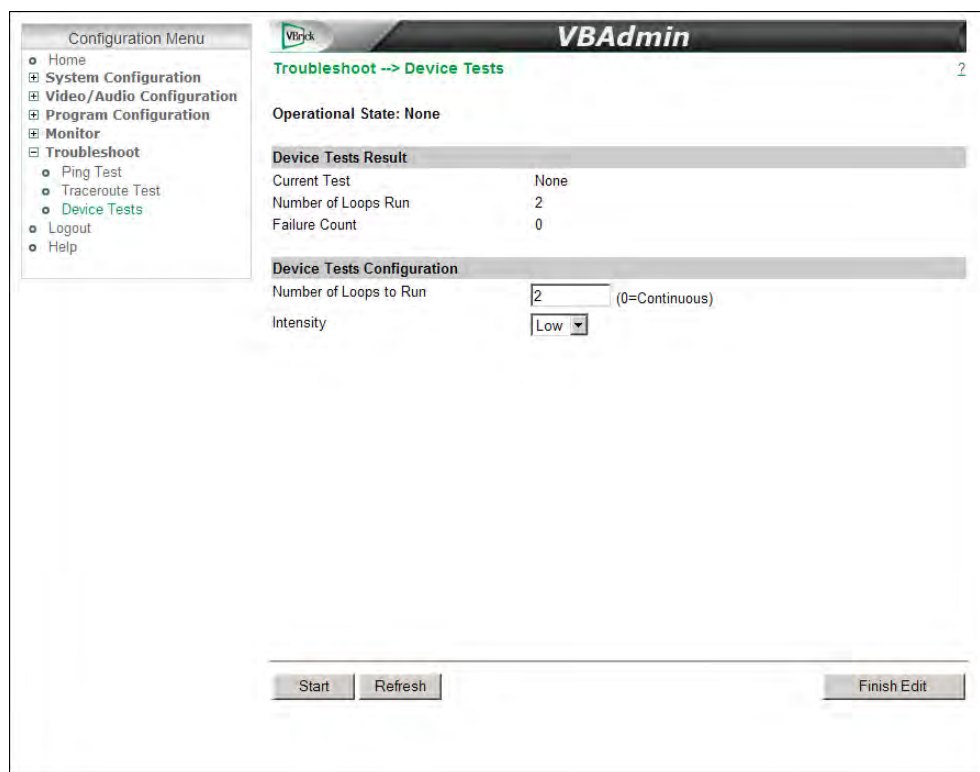
Destination	IP Address (IPv4), Host Name, or IPv6. Cannot be blank. Multicast IP Addresses are not valid.
Probe Count	Can be set from 3 to 20. Default = 3. This setting is the number of probe packets sent to a host at each hop.

Device Tests

The H.264 appliance automatically performs a full POST (Power On Self Test) hardware test whenever the unit is powered-on or reset. The Device Test runs the POST and displays the results. The **Operational Mode** (on the System Configuration > General page) must be set to **Diagnostics** to run this test. **When done, be sure to reset the appliance to Run mode or you will not be able to stream video.**

▼ To run the Device Test:

1. Go to System Configuration > General and set the **Operational Mode** to **Diagnostics**.
2. Go back to the Device Tests page and click **Edit**.
3. Set the test parameters (see below).
4. Click **Start** and wait a few seconds to see the test results.
5. When done go back to System Configuration > General and set the **Operational Mode** to **Run**.



Number of Loops to Run	Number of times to run the test.
Intensity	Low intensity is faster but runs fewer tests. High intensity runs all tests but may take up to 10 minutes.

Operational Modes

As described below, the appliance has five operational modes that reflect differing conditions. Run Mode and Diagnostics Mode are user-selectable on the System Configuration > [General](#) page. Maintenance Mode, Limited Run Mode, and Overloaded Mode are automatically launched when certain conditions occur.

Table 17. Operational Modes

Run Mode	This is the standard operating mode when the system is functioning normally. If you power up the appliance under normal conditions, the system will be in Run mode.
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KLV Metadata

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Inserting KLV Metadata

VBrick supports KLV and LDS metadata insertion in accordance with MISB (Motion Imagery Standards Board) standards. KLV (key-length-value) is a data encoding standard often used to embed information in video feeds. Items are encoded into key-length-value triplets where key identifies the data, length specifies the data's length, and value is the data itself. In a typical KLV/LDS application GPS (global positioning) or telemetry data is embedded in the video using one of the following supported methods:

Table 18. KLV Methods

KLV Method	Description
ESD to LDS	Exploitation Support Data (ESD) is accepted via CC, converted to Local Data Sets (LDS) packets and transported over Transport Stream as a Metadata AU.
LDS Passthrough	Local Data Set (LDS) is accepted through the following interfaces and transported in the Transport Stream as a Metadata AU. <ul style="list-style-type: none">• LDS over Serial port• LDS over SDI interface• LDS over IP network
CoT to LDS	Cursor on Target (CoT) converted to LDS and transported over Transport Stream as a Metadata AU. CoT is accepted over the following interfaces: <ul style="list-style-type: none">• CoT over Serial port• CoT over IP network

In all cases, the encoded video has embedded metadata—typically including the time and geographic location of the video stream. In all cases, the VBrick appliance remaps the metadata into KLV/LDS per MISB 601.3. This metadata can only be embedded in an MPEG2TS transport stream as defined on the Program Configuration > Streams page.

ESD to LDS

ESD (Exploitation Support Data) to LDS (Local Data Sets) uses line 21 (typically used for closed captions) of the video format as an in-band transport mechanism. The embedded text is limited to 120 characters per frame. Control and management of the LDS insertion parameters are available using the VAdmin web interface, the Command Line Interface, or SNMP. ESD is converted to LDS per MISB standard 0601 and MISB EG 0104.5. The LDS

metadata packets PTS (timestamp) source is the system capture time of the first byte of ESD data.

▼ To configure ESD to LDS:

1. Go to Video/Audio Configuration > [Video](#).
2. Set **KLV** to **ESD to LDS**.
3. Configure the data to be streamed in the **ESD Field** as Field One, Field Two (default), or Field One and Two.
4. Go to Program Configuration > [Streams](#).
 - a. Set Transport Type to **MPEG2TS**.
 - b. Check **Enable KLV**.
 - c. Configure other advanced settings as necessary.
5. When done the data present in the stream (defined by the ESD Field) will be encoded and delivered with the stream.
6. To view ESD throughput, go to Monitor > [Video/Audio](#).

LDS Passthrough

Serial LDS Passthrough

Serial LDS (Local Data Sets) Passthrough uses the encoder's serial (COM) port as an out-of-band mechanism to embed KLV data in the video stream at a significantly higher bit rate than ESD to LDS (and with no character limit). KLV data from a proprietary device is input via the standard RS232/422 interface on the encoder and is embedded in the transport stream as KLV metadata per MISB standard 601.3 and MISB Standard 0604 Section 6.2. The metadata PTS (timestamp) source is configurable as the LDS packet's capture time or the timestamp in the LDS packet.

▼ To configure LDS Serial Passthrough:

1. Connect an input device to the serial (COM) port on the encoder.
2. Go to System Configuration > Advanced Configurations > [Passthrough](#) page.
 - a. Set Passthrough State to **Initiator** and Destination to **KLV**. Set the Baud Rate, Stop Bits etc. to the values recommended by the input device manufacturer.
3. Go to Video/Audio Configuration > Video.
 - a. Set **KLV** to **Serial LDS Passthrough**.
4. Go to Program Configuration > Streams.
 - a. Set Transport Type to **MPEG2TS**.
 - b. Check **Enable KLV**.
 - c. Configure other advanced settings as necessary.

SDI LDS Passthrough

SDI LDS (Local Data Sets) Passthrough uses the encoder's SDI port as an out-of-band mechanism to embed KLV data in the video stream at a significantly higher bit rate than ESD to LDS (and with no character limit). KLV data from the SDI port is input to the encoder and is embedded in the transport stream as KLV metadata per MISB standard 601.3 and MISB Standard 0604 Section 6.2. The metadata PTS (timestamp) source is configurable as the LDS packet's capture time or the timestamp in the LDS packet.

- ▼ To configure SDI LDS Passthrough:
 1. Connect an input device to the SDI port on the encoder.
 2. Go to Video/Audio Configuration > Video.
 - a. Set **KLV** to **Serial LDS Passthrough**.
 3. Go to Program Configuration > Streams.
 - a. Set Transport Type to **MPEG2TS**.
 - b. Check **Enable KLV**.
 - c. Configure other advanced settings as necessary.

Network LDS Passthrough

Network LDS (Local Data Sets) Passthrough allows use of the encoder's IP interface as an out-of-band mechanism to embed KLV data in the video stream at a significantly higher bit rate than ESD to LDS (and with no character limit). KLV data from a proprietary device is input via the IP interface on the encoder and is embedded in the transport stream as KLV metadata per MISB standard 601.3 and MISB Standard 0604 Section 6.2. The metadata PTS (timestamp) source is configurable as the LDS packet's reception time or the timestamp in the LDS packet.

- ▼ To configure Network LDS Passthrough:
 1. Configure an LDS data source to send the LDS data to an IP port on the encoder.
 2. Go to Video/Audio Configuration > Video.
 - a. Set **KLV** to **Network LDS Passthrough**.
 - b. Set KLV Port to the IP port used for LDS data reception (default = 7777).
 3. Go to Program Configuration > Streams.
 - a. Set Transport Type to **MPEG2TS**.
 - b. Check **Enable KLV**.
 - c. Configure other advanced settings as necessary.

CoT to LDS

Serial CoT to LDS

In this method Cursor on Target (CoT) metadata input via the standard RS232/422 interface on the encoder. It is then converted to LDS per MISB EG 0805, MISB Standard 0601.3, and VBrick extensions, and is embedded in the transport stream as KLV metadata per MISB Standard 0604 Section 6.2.

- ▼ To configure Serial CoT to LDS:
 1. Connect a CoT data source to the serial (COM) port on the encoder.
 2. Go to Video/Audio Configuration > Video.
 - a. Set **KLV** to **Serial CoT to LDS**.
 3. Go to Program Configuration > Streams.
 - a. Set Transport Type to **MPEG2TS**.
 - b. Check **Enable KLV**.
 - c. Configure other advanced settings as necessary.

Network CoT to LDS

In this method Cursor on Target (CoT) metadata is provided to the encoder via IP packets. It is then converted to LDS per MISB EG 0805, MISB Standard 0601.3, and VBrick extensions, and is embedded in the transport stream as KLV metadata per MISB Standard 0604 Section 6.2.

- ▼ To configure Network CoT to LDS:
 1. Configure a CoT data source to send CoT data to an IP port on the encoder.
 2. Go to Video/Audio Configuration > Video.
 - a. Set **KLV** to **Network CoT to LDS**.
 - b. Set KLV Port to the IP port used for CoT data reception (default = 7777).
 3. Go to Program Configuration > Streams.
 - a. Set Transport Type to **MPEG2TS**.
 - b. Check **Enable KLV**.
 - c. Configure other advanced settings as necessary.

MISB Timestamps

Regardless of what other KLV options you select, an option exists to insert MISB timestamps into the video stream per MISB Standard 0604 Section 4.2.2. To enable this option go to Streams > Transport Stream Settings and check **Enable MISB Timestamp**.

Advanced Transport Stream Settings

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Transport Stream Overview

In VBrick's implementation of transport stream (MPEG2TS) the appliance administrator has unprecedented ability to configure the transport stream behavior optimally for the particular requirements of his network and application. Transport Stream "mode" (see [Transport Stream Settings](#) on page 63) can be configured for constant or variable. In constant mode, the transport stream is constrained to maintain a precise bit rate on the network at all times. In order to assure this, it is required to add some level of empty (NULL) packets to handle the inevitable bursts in bit rate generated by the encoding engine. In variable mode, empty packets are not sent, but in VBrick's implementation, the peak bit rate is still as tightly constrained as it would be in constant mode. Variable medium delay has precisely the same constraint on peak bit rate as constant mode, however, since in constant mode that peak bit rate is always maintained, the number of bits actually transmitted and averaged over time is increased for constant mode.

Overhead and PTS-PCR Gap

Variable Mode

The three variable selections (Variable High Delay, Variable Medium Delay, and Variable High Delay) differ in the peak bit rate permitted. All constrain the peak bit rate, however, Variable High Delay limits the peak bit rate considerably more than Variable Low Delay. In all cases, the bit rate averaged over time is the same. The peak bit rate is reflected in the Overhead setting which selects how much the peak bit rate is allowed to exceed the average bit rate on a percentage basis. Note that the average bit rate includes the video rate, the audio rate, and any additional overhead required by the transport stream algorithm. Generally this transport stream overhead tends to increase at lower bit rates. Selecting Variable High Delay selects an overhead of 5%, Variable Medium Delay and Constant select an overhead of 10%, and Variable Low Delay selects an overhead of 500%. *Variable Low Delay therefore results in very low latency, however, it is not appropriate for use in peak bandwidth constrained networks.*

If the peak bit rate is more constrained, the inevitable variability in the size of the frames output by video encoding algorithm will result in a longer time to transmit the larger frames, and hence will increase latency. This trade off latency (Gap) and peak bit rate (Overhead) desired by the user determines how the Mode, Overhead, and Gap should be set. It should be noted that the settings for these parameters can also interact with the video quality. The Rate Control Setting on the Video page allows you to decide if you wish to improve the latency at a given overhead by sacrificing some video quality. A Rate Control Setting of 1 limits the

variability of the encoded frame sizes allowing the latency to be reduced. A Rate Control Setting of 5 allows the encoding algorithm to create larger encoded frames when the content requires those larger frames to optimize quality—hence requiring larger latency. A Rate Control Setting of 3 is the default.

Custom Mode

Custom mode allows you to vary the presets for Gap (default = 620) and Overhead (default = 50) to correspond to your exact needs. The Gap setting when using any mode other than Custom are conservative numbers taking into consideration the starting template, specific changes in resolution and frame rate for high definition encoding, rate control settings, audio sample rate, and selected mode. It should be noted that low audio sampling rates will force higher latency (greater Gap).

It is also possible that for certain extremely challenging content, the Gap may need to be increased to allow high quality video on certain decoders. The need for higher Gap would be indicated by the decoder dropping frames resulting in a jerky effect on the display device. It is also true that if lower latency is required, and the content is not difficult or some video degradation is permissible, lower gap settings should be used. If you elect to deviate significantly from the video template settings, it may be necessary to change the mode to Custom and tune the Gap and Overhead settings to achieve high quality video output. Some general guidelines are:

- For a given resolution, higher bit rates will allow lower Gaps for a given Overhead.
- For a given bit rate, lower resolutions will allow lower Gaps for a given Overhead.
- For a given resolution and bit rate, higher frame rates will allow lower Gaps for a given Overhead.
- If the IDR interval is increased, quality will be enhanced, but the Gap may need to be increased for a given bit rate.

Automatic Latency Control

The **Automatic Latency Control** option offers an easy way to adjust the gap settings to minimize the latency for particular content and configuration parameters. The latency control values are set based on certain configuration parameters, notably the video template used. If the configuration does not correspond to standard template values, the latency control may be suboptimal—leading to dropped frames if too low and unnecessarily high latency if too high. In addition, since the required latency is variable depending on content, the standard latency control settings are relatively conservative.

The latency control feature may be used in two ways. First, it can be turned on after the final configuration changes, including the overhead setting, have been made and while typical content is being encoded. By observing the **PTS-PCR Gap** value reported on the configuration page, you can then disable the latency control option and utilize the **Custom** transport stream **Mode** to manually set the latency to a value which minimizes latency for a particular use case. A second choice is to simply leave the **Automatic Latency Control** setting enabled. In most cases this will lead to an excellent viewing experience with minimal latency. The disadvantage of using this setting is that if the content changes dramatically, it may take some time for the algorithm to respond to the change.

In order to better use this feature, it is useful to understand some details of its design. The algorithm reverts to the calculated latency whenever a relevant configuration parameter is changed. At this point it observes the timing of the encoding and transmission video frames

and determines an optimal value for the buffering required on the decoder to avoid dropped frames. This buffering value is measured in time and is the **PTS-PCR Gap**. The algorithm adjusts gap only—the overhead is set by the user either by utilizing the **Mode** selection or by setting via the **Custom** option. The algorithm seeks to reduce frame loss by increasing the gap value more rapidly than reducing the gap value. If the gap is too large, latency is increased, but video quality is retained. If the gap is too low, it is likely that frames will be dropped leading to reduced perceived quality.

The algorithm has the capability to adjust its behavior based on a number of factors. The algorithm may be "aggressive" in optimizing latency by reducing the gap to a minimum and accepting the possibility of a limited number of dropped frames. The algorithm may also be "conservative" by keeping the gap higher and thus reducing the likelihood of dropped frames at the cost of increased latency. To determine how to tune the algorithm the encoder software uses the transport stream **Mode** configuration, the template configuration, the video resolution, the video frame rate, the video connection (Standard Definition or High Definition), and the rate control setting. If the transport stream **Mode** is **Variable Low Delay** and the **Rate Control Setting** (on Video/Audio Configuration > Video page) is lowest latency, the administrator is primarily interested in low latency and so the auto gap algorithm is aggressive in controlling latency. On the other hand, if the transport stream **Mode** is **Variable High Delay** and the Rate Control Setting is best quality, the administrator is primarily interested in high quality and latency if of less interest so the latency control algorithm is conservative in controlling latency. The remaining factors are combined to tune the algorithm based on video input and output parameters. In general, if the variation in encoding time is more variable, in order to not drop excessive frames, the algorithm must be more conservative. Lower frame rates and lower resolutions lead to more variation in encoding and thus to higher latency and a less aggressive auto gap algorithm.

FEC Theory of Operation

Forward Error Correction (FEC) is in general a system of error control for data transmission whereby the sender adds systematically generated redundant data to its messages. The basic trade-offs that must be determined in configuring FEC is the bandwidth overhead and increased latency caused by FEC traded off against the level of error recovery provided by the algorithm. A deeper understanding of the statistics of errors in the network and the details of the FEC algorithm configuration will provide the ability to optimize these trade-offs.

A key concept with FEC systems on IP networks is that, because of the UDP checksums, channel bit errors get translated into packet losses. In addition to this, buffer and re-route issues cause burst packet losses. The combination of packet losses from the three sources—gross reordering, bit-error induced losses, and burst losses needs to be low enough so that the FEC scheme is not broken more than the negotiated error rate. Because any bit errors cause the packet to be discarded there is no requirement for an error correction scheme that can handle errored packets—every packet will either arrive correct or not at all.

An RTP payload format for Generic Forward Error Correction Packets has been defined in the RFC 2733 to enable error correction of realtime media. This standard allows the use of traditional error correcting codes. A major advantage of this scheme is that it can be used with any video format standards (MPEG, SDI, SDTI, etc.) as long as it is encapsulated in RTP packets. This specification was extended by the Pro-MPEG forum in Pro-MPEG Code of Practice #3 and later adopted by SMPTE as SMPTE Standard 2022-1. This standard has been further extended in SMPTE Standard 2022-2, and 2022-3. This is the algorithm VBrick

has implemented in the 7000 Series Appliances. Direct reference to these specifications is recommended, but a brief discussion of how to utilize the FEC capabilities follows.

The FEC algorithm can be viewed as providing additional XOR packets for a matrix of packets with L Columns and D Rows. FEC is provided as up to two separate streams which are received on separate UDP ports. One stream supports XOR for a row of the matrix - L adjacent packets. This XOR scheme provides for recovery from one single packet loss in a group of L packets. The second stream supports XOR for a column of the matrix - D packets. This second stream provides for recovery from a burst of lost adjacent packets. If the destination port for the media stream is N, then the first stream is sent to port N+2, and the second stream to port N+4.

It can be seen that the overhead added for the scheme is $1/L$ for the first stream and $1/D$ for the second stream. For both streams the overhead is $(L+D)/(L*D)$. Clearly as the matrix size is reduced, the overhead is increased and the ability to recover from random errors is increased. On the other hand, more overhead does not always lead to better recovery. If burst errors are expected, it is desirable to have L to be at least the length of the expected burst error. Whether you are better off with more rows or more columns depends on the statistics of the errors. Row FEC packets are good for protecting against single packet losses in a row. Column FEC packets protect against single packet errors in a column. So - if your errors are random, then rows are better, but if your errors tend to come in bursts, then the row FEC does not help you as much. You need to have at least as many columns in your matrix as the largest expected burst. If you knew your statistics were always going to come in a burst of 10 packets with the bursts being random and rare then you would turn off the row FEC and would create a matrix with at least 10 columns. In this case (for example) a 50 row and 10 column matrix would be better than a 5 row by 5 column matrix.

When determining the FEC configuration, potential limitations of the FEC receiver need to be understood. In the specific case of the VBrick VB7000 Series decoder, the limitations are: $L*D \leq 100$; $1 \leq L \leq 20$; $4 \leq D \leq 20$. In addition, since in order to recover a packet, both the row and column FEC packet must be received, an additional end-to-end latency equal to the time to receive LXD packets will be incurred. The Program Configuration > Streams page in VBAdmin shows the overhead and the latency incurred by each configuration.

Since the specifics of configuration are highly dependent on the expected packet loss statistics, and specific latency requirements of the application, it is not possible to provide guidelines that will work in all situations. It is, however, possible to provide some examples. Note that for random bit errors, each bit error will cause loss of an entire packet so that (for example) if utilizing 1500 byte packets, a bit error rate of 1 in 1,000,000 will translate to a packet loss rate of 1.2% and a bit error rate of 1 in 100,000 will translate to a packet loss rate of 12%. In these cases, a 10x10 matrix is adequate to recover from virtually all errors. The overhead in this case is $20/100$ or 10%.



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