



XVC High Definition Encoder

User Guide

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Preliminary

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Trademarks

XVTEC Ltd	XVC™
HDMI Licensing LLC	HDMI™
Microsoft Corporation	Microsoft®, Internet Explorer®, Windows®, EDGE
USB Implementers Forum, Inc	USB®
VideoLAN	VLC™
Google Inc.	Chrome , YouTube
Akamai	Akamai wave logo

Overview

This user guide contains information about the XVC encoder as follows:

- Product Description
- Applications
- XVC management tool.
- Setting network configuration
- Setting the video, audio encoding and streaming parameters
- Upgrading the XVC firmware
- Enabling additional feature through the license manager
- Streaming from the XVC encoder to VLC media player.
- Restoring the unit (Maintenance)
- Performance and limitations

1 Product Description

1.1 Introduction

The XVC encoder is a high quality HD H.264 encoder capable of encoding 3G-SDI/HDMI content at any resolution up to 1080p60. With low latency and advanced video pre-processing functionality, the XVC achieves exceptional video quality while maintaining low bit rates.

1.2 Main features of the XVC-Encoder

- 1080p60 Blu-Ray quality video
- **Ultra-Low latency encoding/decoding*** (and decoding, Glass to Glass latency < 80ms)
- Dual input, 3G-SDI or HDMI
- High quality 3D noise reduction
- Region based encoding
- High quality Up/Down scalar
- Multi-protocol streaming including RTP, RTP/RTSP, MPEG2TS*, RTMP*

(*)- Licensable feature

1.3 Single or Dual Input

The XVC encoder is available in two variation single and dual inputs, 3G-SDI or HDMI. Each video input is in independent and can be compressed with a different set of encoding parameters. The encoder is capable of encoding a single channel at 1080p60 or two channels at 1080p30 each.

XVC architecture is scalable, enabling future feature enhancements.

1.4 Specifications

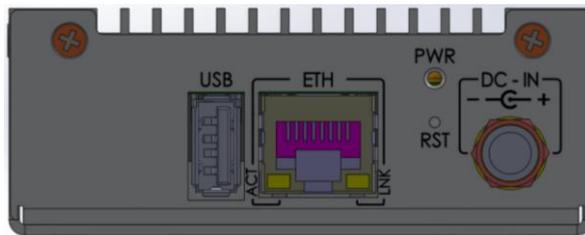
Table 1: XVC Specifications

Type		Specification
Video Inputs		<ul style="list-style-type: none"> ▪ 3G/HD/SD-SDI ▪ HDMI 1.4a
Video Pre-processing		<ul style="list-style-type: none"> ▪ Advanced noise filter support ▪ HQ up/down scalar
Codec	Standards	<ul style="list-style-type: none"> ▪ ISO/IEC14496-10 (H.264/AVC), base line, high and main profile up to level 4.2
	Features	<ul style="list-style-type: none"> ▪ All parameters dynamically modified

		<ul style="list-style-type: none"> ▪ Configurable GOP size, FPS, BPS Supports force IDR and IDR frequency ▪ Supports progressive and field based interlaced coding with different controls ▪ Supports 8x8 and 4x4 transform size ▪ Bitrates: From 64Kbps to 30Mbps ▪ Dynamic ROI support
	Resolution	<ul style="list-style-type: none"> ▪ Input: <ul style="list-style-type: none"> • 1920x1080p 60/59.94/50/30/29.97/25 Hz • 1920x1080i 60/59.94/50 Hz • 1280x720p 60/59.94/50/30/29.97/25 Hz • Common PC resolutions (HDMI only) up to WUXGA (1920x1200 60fps) ▪ Output: <ul style="list-style-type: none"> • Arbitrary resolution from 96x80 to 1920x1200
	Performance	<ul style="list-style-type: none"> ▪ Up to a single 1080p60 or a dual 1080p30 ▪ Frame rate: Configurable from full frame rate down to 1 fps
Audio Input		<ul style="list-style-type: none"> ▪ 3G-SDI embedded audio ▪ HDMI embedded audio
Audio Compression	Format	<ul style="list-style-type: none"> ▪ AAC-LC
	Sample Rate	<ul style="list-style-type: none"> ▪ Extracted from the input (auto-detect)
	Bitrates	<ul style="list-style-type: none"> ▪ From 80 Kbps to 320 Kbps
Communication Ethernet		<ul style="list-style-type: none"> ▪ RJ45 connector ▪ 10/100 Base-T Ethernet, auto-detect
Network Protocols		<ul style="list-style-type: none"> ▪ Streaming: <ul style="list-style-type: none"> • RTP/RTSP (unicast/multicast) • RTP streaming (unicast/multicast) • RTMP (licensable) • MP2-TS over UDP (licensable) ▪ Other: <ul style="list-style-type: none"> • HTTP • IGMP V1/V2 • Telnet client and DHCP client
Encoder Control		<ul style="list-style-type: none"> ▪ WEB interface ▪ HTTP API ▪ F/W upgradable ▪ XVC Management tool
External Storage		<ul style="list-style-type: none"> ▪ USB (Recording license required)
Physical/Environmental	Dimensions (LxWxH)	<ul style="list-style-type: none"> ▪ XVC-HDMI: 142x85x38 mm ▪ XVC-SDI: 142x85x38 mm
	Weight	<ul style="list-style-type: none"> ▪ XVC-HDMI: 390g ▪ XVC-SDI: 390g
	Operational Temperature	<ul style="list-style-type: none"> ▪ (0) - (50) C
	Storage Temperature	<ul style="list-style-type: none"> ▪ -30 to 70 C
	Humidity	<ul style="list-style-type: none"> ▪ Up to 95% non-condensing
	DC Voltage	<ul style="list-style-type: none"> ▪ 10 - 12V DC
	Power Consumption	<ul style="list-style-type: none"> ▪ 8-10W, Depending on the channel count and video input resolution
Certification		<ul style="list-style-type: none"> ▪ FCC CFR 47 Part 15 Subpart B ▪ EN 55024:2010, 55022:2010/AC:2011

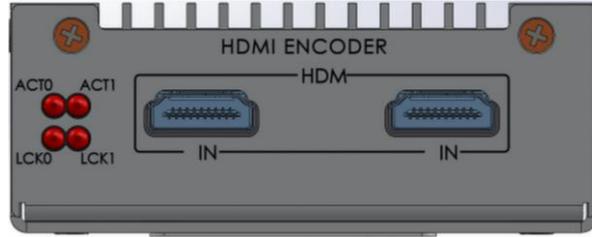
1.5 Front and Back panel

- USB - A USB port to connect a storage device for recording (requires license)
- ETH - 10/100Mbit Ethernet connection
- PWR LED - Multi function LED. [Refer to section 6](#)
- RST - Multi-function Reset switch. Used also to load factory default to the unit. [Refer to section 6](#)
- 10-12VDC power jack



Back panel

- LCK1, LCK2 - Video lock status for each video input. When the XVC encoder detects a valid video standard the relevant LED will turn on
- ACT1, ACT2 - Activity LED. When the video channel is enabled the LED blinks
- Two HDMI or SDI inputs
- GoLive button - configurable button, used to start streaming.



Front Panel

1.6 Applications/Industries

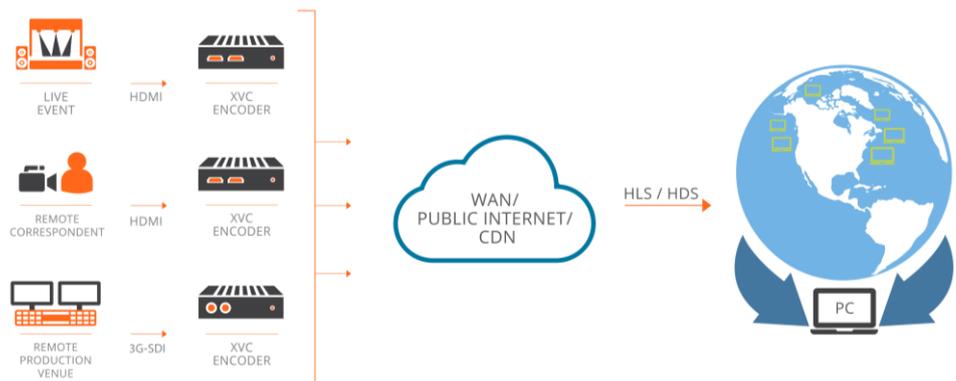
There are many applications for the XVC encoder, as the following examples illustrate:

- Broadcast
- Education
- Medical
- Defense

1.6.1 Broadcast and Live events streaming

The XVC encoder enables event broadcasting of the highest audio and video quality, so that your spectators don't miss a thing. Benefits include:

- Portable coverage in real time
- RTMP streaming directly to CDN
- MP2TS streaming to IP set-top boxes and broadcast equipment



1.6.2 Education

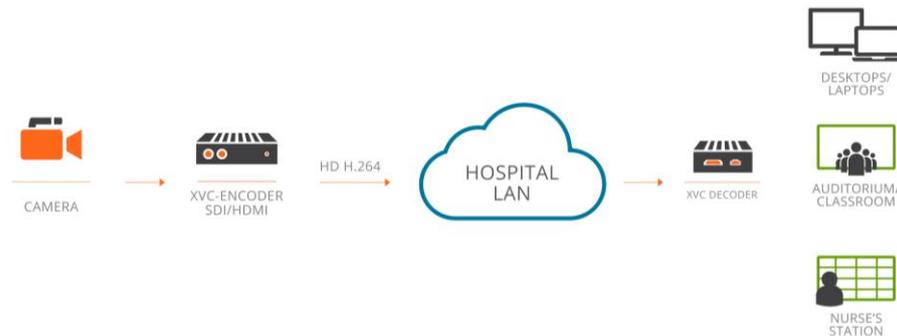
The XVC encoder delivers a rich media experience to the education environment in a number of different configurations, bringing together teacher and student and connecting remote classrooms in real time. Possible applications:

- Skills assessment, in which a student demonstrates, learned skills to professionals at a distance.
- Distance learning, providing people around the world the opportunity to study at top-notch institutions.

1.6.3 Medical

The XVC encoder helps the medical industry by augmenting precision and collaboration, as in the following ways:

- Collaboration of surgeons, with two way, low latency, high quality imaging, to facilitate reliability in the operating room
- Monitoring of one surgeon by others, with low latency to ensure the highest level of confirmation in high-risk operations
- Reviewing procedures for educational purposes, with high quality imaging for the most accurate learning material



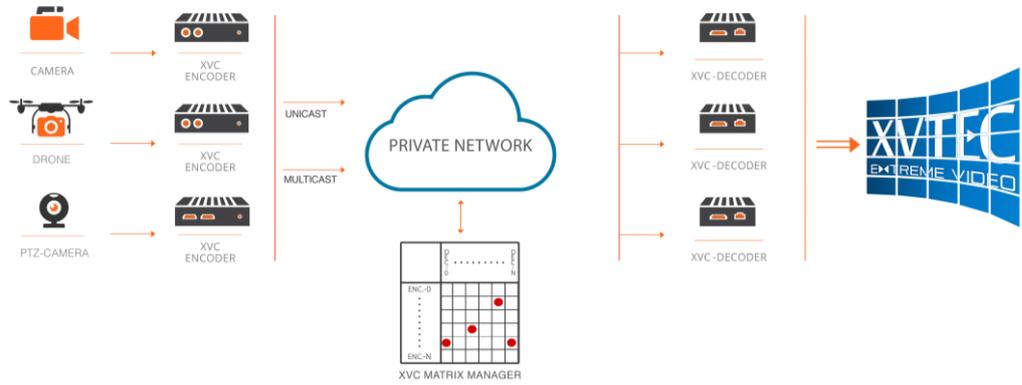
1.6.4 Defense

The XVC encoder is compact, low power consumption, with no moving parts.

Defense applications include:

- Intelligence, surveillance, and reconnaissance, with high quality video and audio required for accurate response
- Command and control, with low latency required for quick decision making

- Situational awareness, with multi-infrastructure solutions for staying in the loop



2 XVC Management Tool

2.1 XVC management tool overview

The XVC Management Tool is a GUI utility providing basic discovery and configuration functionality for the XVC encoders on the network. The utility was tested on the following operating systems:

- Windows 7
- Windows 8
- Windows 10

With the following browser:

- Google Chrome
- Microsoft explorer 8 and above
- Firefox
- Microsoft Edge browser

By default, the XVC encoder is configured with an IPv4 IP address in the 169.254.0.0/16 address block.

The following parameters can be configured with the XVC Management Tool:

- Assigning an IP (static/DHCP) address
- Rebooting the XVC Encoder
- Toggling the power LED for identification
- Setting date and time
- Setting a user/password for a XVC encoder

2.2 Installing the Discovery and Configuration Tool

To install the Discovery and Configuration Tool:

1. Download the discovery setup tool from <http://www.xvtec.com/software-update/>
2. On the network in which the XVC encoders lie, run the setup file, and then follow the instructions.
3. Disable windows firewall.

2.3 Launching the XVC management tool

1. Execute the XVC management tool. The tool will discover units on the same network and display as shown below.

The screenshot shows the XVTEC Management Tool interface. At the top, there are tabs for 'Device', 'Advanced', and 'About'. Below the tabs, there is a 'Filter By' section with a dropdown menu set to 'Encoder' and an 'IP Address range' section with 'From: 192.168.1.1' and 'To: 192.168.1.100'. A 'Last Discovered Time' field shows '11:37:04' and a 'Refresh device list' button. The main area contains a table with the following columns: Device, Device Name, IP Method, IP Address, Subnet Mask, Default Gateway, MAC Address, State, FW version, Bitrate, and Video Input. The table lists several devices, including decoders and encoders, with their respective configurations and status.

Device	Device Name	IP Method	IP Address	Subnet Mask	Default Gateway	MAC Address	State	FW version	Bitrate	Video Input
decoder	xvc100	static	192.168.1.195	255.255.255.0	192.168.1.1	84:7e:40:f8:11:10	online	FW_DEC_V2...		
decoder	xvc100	static	10.0.0.181	255.255.255.0	10.0.0.138	84:7e:40:f7:b3:84	online	FW_DEC_V2...		
encoder	xvc1003z5	static	10.0.0.180	255.255.255.0	10.0.0.138	84:7e:40:eb:77:d4	online	FW_ENC_V5...	1000 1000	HDMI1 HDMI2
encoder	xvc100	static	10.0.0.222	255.255.0.0	10.0.0.1	84:7e:40:ef:0b:b0	online	FW_ENC_V6...	9500 9500	HDMI1 HDMI2
encoder	xvc100	static	10.0.0.220	255.255.0.0	10.0.0.138	84:7e:40:ed:49:d0	online	FW_ENC_V6...	4000 2000	SDI1 SDI2
encoder	xvc100	static	10.0.0.111	255.255.0.0	10.0.0.138	d0:39:72:68:c7:44	online	FW_ENC_V6...	1500 750	HDMI1 HDMI2
encoder	xvc100	static	10.0.0.212	255.255.255.0	10.0.0.138	d0:39:72:68:c7:10	online	FW_ENC_V6...	2000 2000	HDMI1 HDMI2

Number of managed devices: 7 Status: OK

2. The following fields will appear in the management tool. Some of the fields are Read Only and some are configurable (Read/Write)
 - a. **Device (RO)** – Encoder or Decoder
 - b. **Device Name (RO)**– The name assigned to the device through the WEB page (under Administration/Network Configuration) or the API.
 - c. **IP Method (R/W)**– Display IP mode (Static or DHCP)
 - d. **IP Address (R/W)**– The IP of the unit
 - e. **Subnet Mask (R/W)** – The subnet mask of the unit
 - f. **Default gateway (R/W)** – The default gateway of the unit
 - g. **MAC address (RO)** – The MAC address of the unit
 - h. **State(RO)** – Display the unit’s state, (Online/Offline/Rebooting/FW upgrading)
 - i. **FW version (RO)** - Unit’s firmware version
 - j. **Bitrate (RO)** – Display the configured bitrate of each channel in the encoder

2.4 Assigning an IP (static/DHCP) address

The screenshot shows the XVTEC Management Tool interface. At the top, there are tabs for 'Device', 'Advanced', and 'About'. Below the tabs, there is a 'Filter By' section with a 'Device Type' dropdown set to 'Encoder' and an 'IP Address range' section with 'From: 192.168.1.1' and 'To: 192.168.1.100'. A 'Last Discovered Time' of '12:09:40' and a 'Refresh device list' button are also visible.

Device	Device Name	IP Method	IP Address	Subnet Mask	Default Gateway	MAC Address	State	Fw version	Bitrate	Video Input
decoder	xvc100	static	169 . 254 . 17 . 16	255 . 255 . 0 . 0	169 . 254 . 1 . 1	84:7e:40:f8:11:10	online	FW_DEC_V2...		
decoder	xvc100	static	10 . 0 . 0 . 181	255 . 255 . 255 . 0	10 . 0 . 0 . 138	84:7e:40:f7:b3:84	online	FW_DEC_AK...		
encoder	xvc100	static	10 . 0 . 0 . 222	255 . 255 . 255 . 0		ef:0b:b0	online	FW_ENC_V6...	9500 9500	● HDMI1 ● HDMI2
encoder	xvc1003zz5	static	10 . 0 . 0 . 180	255 . 255 . 255 . 0		eb:77:d4	online	FW_ENC_V5...	1000 1000	● HDMI1 ● HDMI2
encoder	xvc100	static	10 . 0 . 0 . 220	255 . 255 . 255 . 0		ed:49:d0	online	FW_ENC_V6...	4000 2000	● SDI1 ● SDI2
encoder	xvc100	static	10 . 0 . 0 . 111	255 . 255 . 255 . 0		68:c7:44	online	FW_ENC_V6...	1500 750	● HDMI1 ● HDMI2
encoder	xvc100	static	10 . 0 . 0 . 212	255 . 255 . 255 . 0		68:c7:10	online	FW_ENC_V6...	2000 2000	● HDMI1 ● HDMI2

A 'Set Device IP' dialog box is open over the table. It contains the following fields:

- IP Method: Static
- IP Address: 169 . 254 . 17 . 16
- Subnet Mask: 255 . 255 . 0 . 0
- Default Gateway: 169 . 254 . 1 . 1

Buttons for 'Apply' and 'Cancel' are at the bottom of the dialog box.

At the bottom right of the tool window, it says 'Number of managed devices: 7' and 'Status: OK'.

1. Select the unit
2. Right click the units, a dialog box will appear. Select **Set IP**
3. Enter the requested parameters.
4. If DHCP is selected, and a DHCP server is not available, the unit will revert to its default address (APIPA address – 159.254.x.x)

2.5 Configuring the XVC encoder through the WEB interface

Double click a device in the XVC management tool. A WEB browser will be launched with the IP of the selected unit. The user will have to enter user name and password (the defaults are admin/admin)

2.6 Rebooting the XVC Encoder

XVTEC Management Tool

Device Advanced About

Filter By

Device Type **Encoder** IP Address range From: 192.168.1.1 To: 192.168.1.100 Last Discovered Time: 12:14:24 Refresh device list

Device	Device Name	IP Method	IP Address	Subnet Mask	Default Gateway	MAC Address	State	FW version	Bitrate	Video Input
decoder	xvc100	static	169.254.17.16	255.255.0.0	169.254.1.1	84:7e:40:f8:11:10	online	FW_DEC_V2...		
decoder	xvc100	static	10.0.0.181	255.255.255.0	10.0.0.138	84:7e:40:f7:b3:84	online	FW_DEC_AK...		
encoder	xvc100	static	10.0.0.222	255.255.0.0	10.0.0.1	84:7e:40:ef:0b:b0	online	FW_ENC_V6...	9500 9500	● HDMI1 ● HDMI2
encoder	xvc1003zz5	static	10.0.0.180	255.255.255.0	10.0.0.138	84:7e:40:eb:77:d4	online	FW_ENC_V5...	1000 1000	● HDMI1 ● HDMI2
encoder	xvc100	static	10.0.0.220	255.255.255.0	10.0.0.1	84:7e:40:ed:49:d0	online	FW_ENC_V6...	4000 2000	● SDI1 ● SDI2
encoder	xvc100	static	10.0.0.111	255.255.255.0	10.0.0.1	0:39:72:68:c7:44	online	FW_ENC_V6...	1500 750	● HDMI1 ● HDMI2
encoder	xvc100	static	10.0.0.212	255.255.255.0	10.0.0.1	0:39:72:68:c7:10	online	FW_ENC_V6...	2000 2000	● HDMI1 ● HDMI2

Launch web browser
Set web interface User/Password
Set IP
Set date and time
Locate - toggle blink LED
Reboot
Remove from List

Number of managed devices: 7 Status: OK

1. Select the unit for reboot
2. Right click and select **Reboot**

3 Web Configuration Interface

3.1 Web Interface Overview

The Web Interface is the means of configuring the XVC encoder. The web interface is compatible with the following browsers:

- ◆ Internet explorer 8 and above
- ◆ Chrome
- ◆ Firefox 36 and above
- ◆ Microsoft EDGE

The following procedures describe how to configure the XVC encoder using the Web Configuration Interface:

- Setting network parameters
- Auto detection of video
- Setting the 3D Noise Filter parameters
- Setting video encoding parameters
- Setting audio encoding parameters
- Setting streaming parameters
- Setting Date and Time
- Updating the firmware

3.2 Configuring the XVC Encoder

This procedure describes how to configure the XVC encoder from the Web Interface.

The order of this procedure, and the inclusion of all the steps, is recommended but not mandatory.

To configure the XVC encoder:

1. Assign the XVC encoder an IP address, by using the XVC Management tool or through the WEB interface. Refer to [Network settings](#)
2. Set the video input parameters (optional, video and audio standard are automatically detected). Refer to [video input parameters](#)
3. Set encoding parameters. Refer to [Channel parameters settings](#)
4. Set streaming parameters. Refer to [Streaming settings](#)

3.3 Network settings

This section describes how to setup the network parameters of the XVC encoder

3.3.1 Assigning a static IP/DHCP Address

This procedure describes how to assign a permanent IP address to the XVC encoder from the Configuration tool.

To assign a static IP address:

1. From the XVC navigation tree, select the **Network Configuration** page.
The **Network Configuration** page appears (Figure 1).

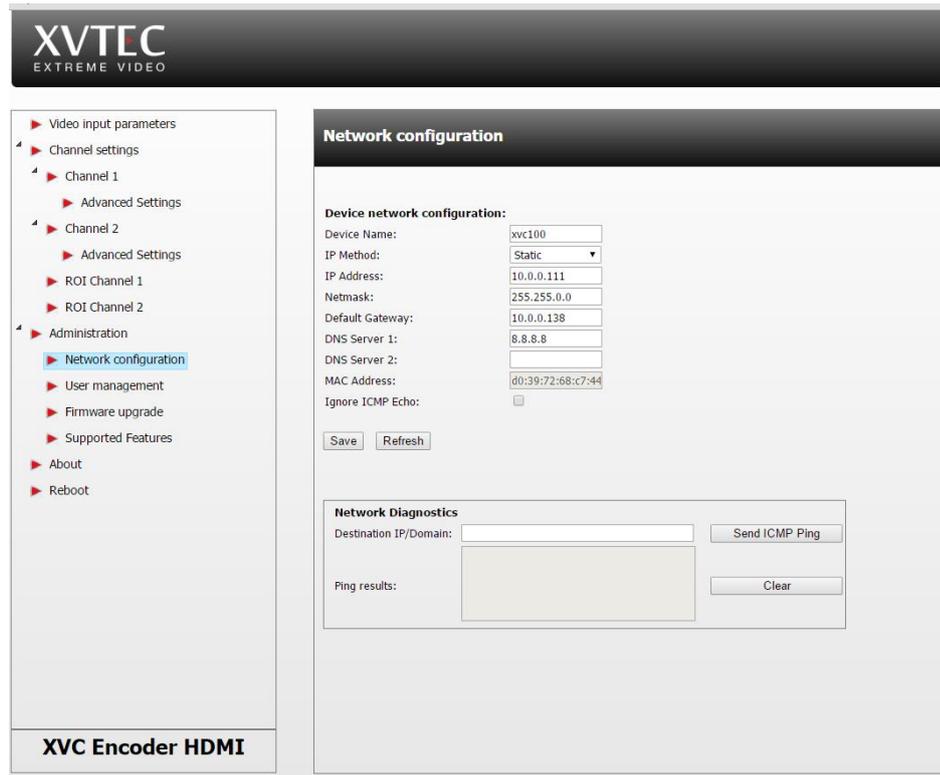


Figure 1: Network Configuration Page (Static IP Method)

- a. Set the **encoder name** (hostname)
- b. From the **IP Method** dropdown list, select **Static or DHCP**.
- c. In the case of **STATIC** configuration, complete the **IP Address, Net mask, and Default Gateway** fields with the correct information.
- d. In the case of **DHCP**, the unit will send a DHCP request. If a DHCP server is active, the unit will receive all network parameters from the server. If a DHCP is inactive, the unit will fall back to default IP after approx. 5secs.
- e. Select the check box 'Ignore ICMP Echo' if ping requests should be ignored
- f. Click **Save**.

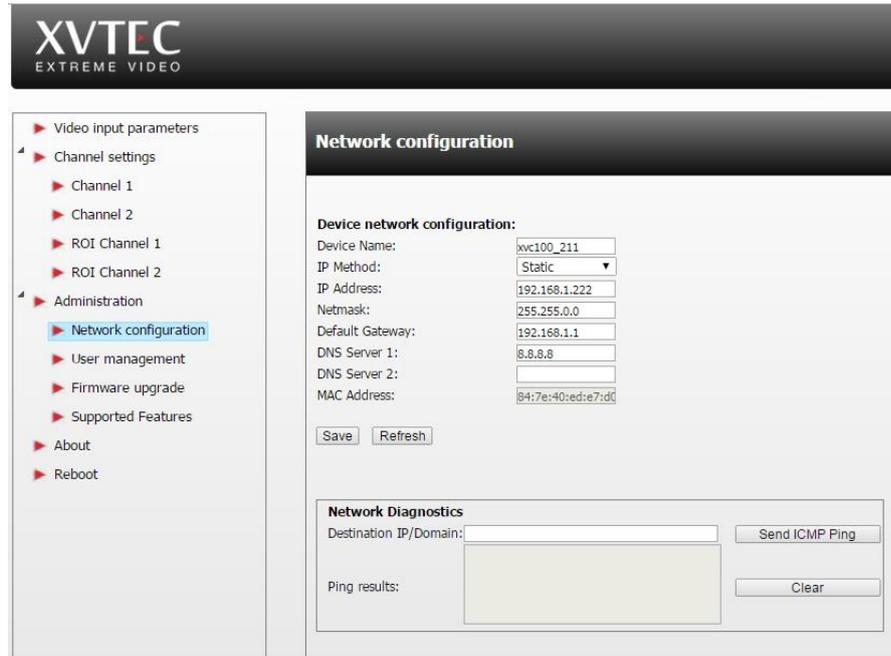


Figure 2: Network Configuration Page

3.4 Video Input parameters

This section describes how to setup the video input settings.

3.4.1 Video standard detection

The XVC encoder automatically detects the video and the audio standard. Refer to fig 3. *Note for interlaced sources the height shown is of a field so for 1080i60 the following parameters will be displayed: Width – 1920, **Height – 540**, Framerate – 60, Scanning mode – Interlace.*

3.4.2 3D noise reduction

Noise reduction uses an advance algorithm to clean the image from noise while maintaining a crisp image. Each video channel can have a separate noise filter with the following parameters:

- a. **None** - disable noise filter
- b. **Spatial** - 2D noise filter
- c. **Temporal** - Uses previous frames to reduce noise
- d. **Spatial +Temporal** - 3D noise filter

The **Video Settings** page appears (Figure 3).

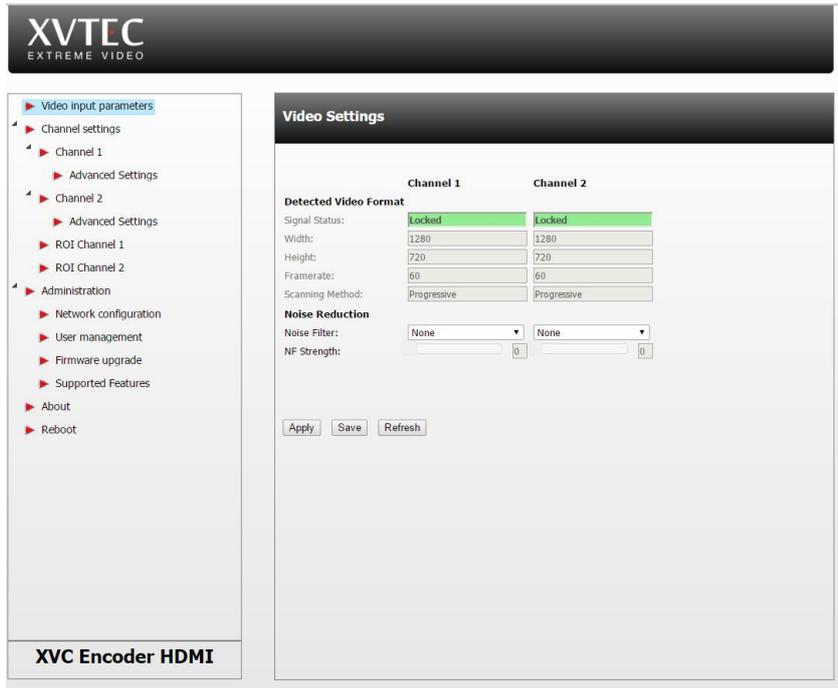


Figure 3: Video Settings Page

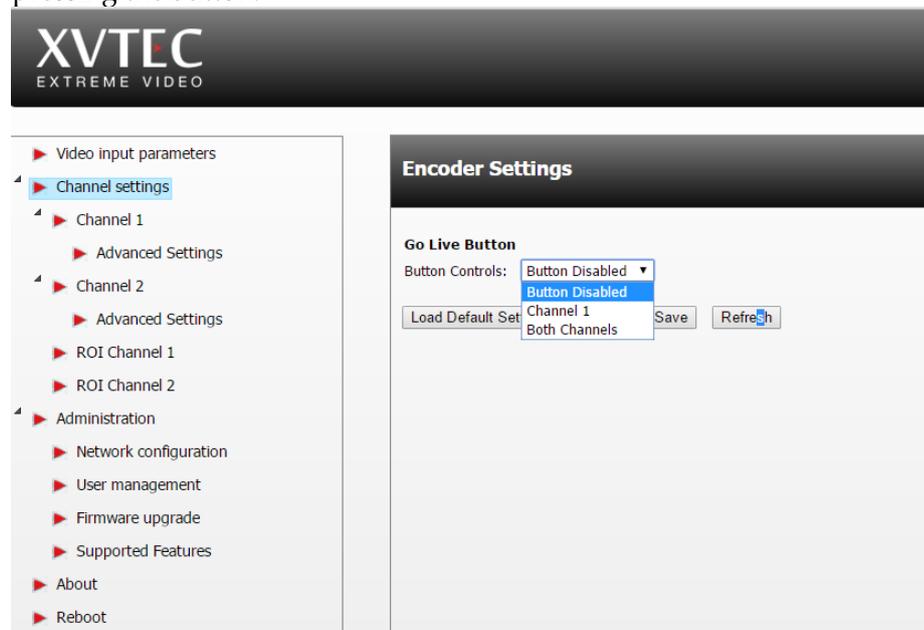
3.5 Channel parameters settings

This procedure describes how to set:

- Go Live button functionality
- Video encoding parameters
- Audio encoding parameters
- Streaming parameters

3.5.1 Go Live button

The GO-LIVE button serves as a Start/Stop streaming control, where the user can pre-configure the streaming parameters and initiate streaming in the field by pressing the button.



The button's function is configurable through the web interface.

Go Live button is active in the following streaming modes

- a. RTP
- b. MP2TS
- c. RTMP

Note: in RTSP Go Live button is always inactive

By default, the button is disabled, pressing it has no affect.

In order to configure the button:

- a. In the WEB interface select **Channel Settings**
- b. From the pull down menu select
 - i. **Button disabled** – Button has no affect
 - ii. **Channel 1** – Button is enabled and effects only channel 1. Pressing the button will initiate streaming based on the streaming protocol configured. The Activity LED of channel 1 will blink indicating streaming is active
 - iii. **Both channels** – Button is enabled and effects both channels. Pressing the button will initiate streaming on both channels based on the streaming protocol configured. The Activity LEDS will blink indicating streaming is active

To set video encoding parameters:

1. From the XVC navigation tree, select the **channel** whose encoding you want to set.

The **Channel Settings** page appears for that channel (Figure 4).

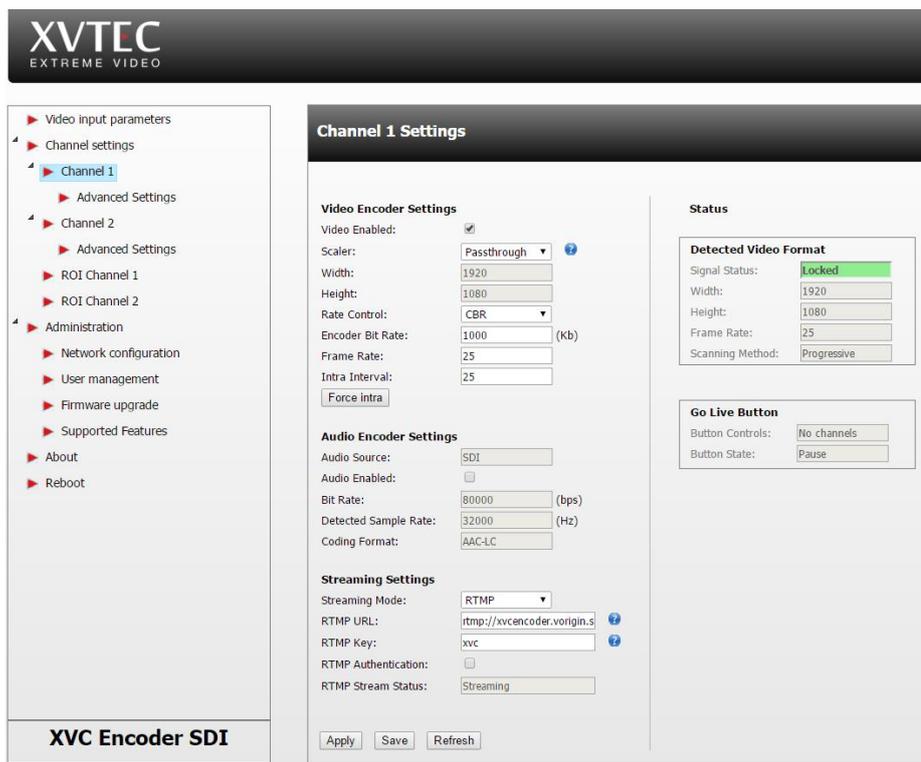


Figure 4: Video Encoding Page (Native Encoding Selected)

3.5.2 Scaler

Scaler selects the pre-processing algorithm applied to the video input.

- Select **Pass-through** to pass the video source directly to the encoder without scaling it. The **Video Width and Height** fields becomes disabled (Refer to figure 4).
- Select **Normal-Quality** to up/down scale the video input, in normal quality.
- Select **High-Quality** to up/down scale the video input, in high quality.

HQ scaling produces high quality scaled video but will slightly effect performance of the encoder, especially in the dual input encoder.

Encoding bit rate sets the amounts of bits per second allocated for compression in Kbs. For example, setting this field to 1000Kbps will produce approximately 1000K bit per second. The value selected depends on the application. For high quality video streaming and complex scenes at a resolution of 720p30 it is recommended to set the encoding bit rate to 4000-8000Kbps.

Note: A higher value yields better quality and consumes more bandwidth.

3.5.3 Rate Control

Rate control selects the internal algorithm of the encoder to maintain the target bit rate (Encoder bit rate).

- Select **CBR** (Constant Bit Rate) for encoding the video at a constant bit rate. The encoder will try to reach the target bit rate at all scenes
- Select **VBR** (Variable Bit Rate) for encoding the video at variable bit rate. The encoder will allocate more bits for complex scenes and less for static scenes. The overall bit rate will be equal or less the desired bit rate

3.5.4 Video Frame Rate

The frame rate (target frame rate) selects the encoding (output) frame rate. The target frame rate is achieved by skipping input frames. For optimal viewing experience (smooth video movements) the target frame rate should be set to a divisible value of the input frame rate. For example, for a 60 fps input, target frame rates such as 30,15,20,10 will work fine. Setting the target frame rate to 50 will produce jaggy video

3.5.5 Intra Interval

Sets the interval in which the encoder will produce an I/IDR (Intra/Instantaneous Decodable Refresh). Setting this field for example to 20 will send an INTRA frame every 20 frames. The value selected depends on the application and the network condition. For low bitrates, the **Intra Interval** should be high, causing the encoder to send most of the time P (Predictive) frames.

Note: High values of Intra Interval can cause degraded picture quality in the decoder side in the event of packet loss due to a non-optimal network performance

3.5.6 Enabling/Disabling the Video Output of a Channel

This procedure describes how to enable/disable a video channel. When both channels are enabled, both channels can stream video with a maximum performance of 1080p60 (e.g. 2x1080p30). In order to reach 1080p60 on a single channel, the other channels must be disabled.

To enable/disable the video output of a channel:

1. In the **Channel settings**, check the **video enabled** check box to enable video, or un-check it to disable video (refer to figure 4)

3.5.7 Forcing an Intra Frame

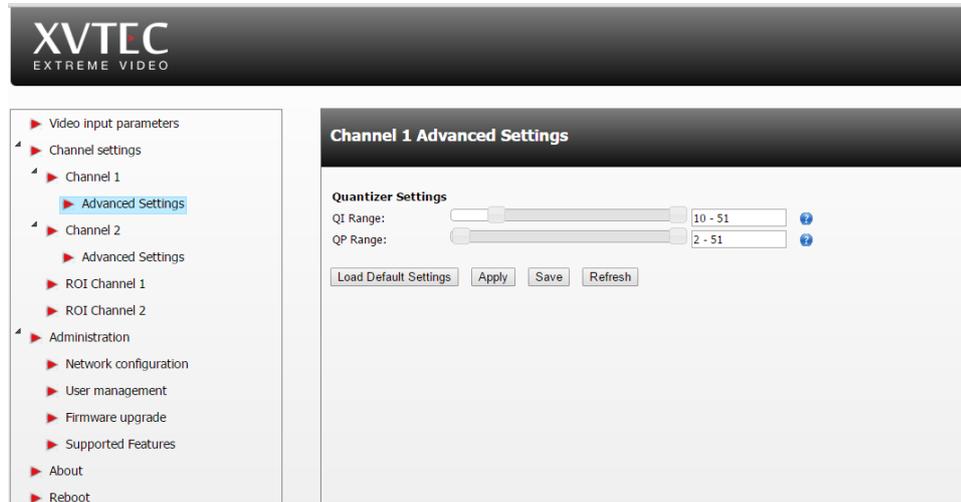
This procedure describes how to force the channel to send an Intra frame, which is helpful if the video stream was disrupted.

To force an Intra frame:

1. In the **Channel settings**, click the **Force Intra** button. (figure 4)

The channel sends an Intra frame.

3.5.8 Advance Settings



The user can configure quantizer minimum and maximum values for I and P frames. These values are used by the encoder's rate control to produce the target bit rate. Changing the default values may degrade video quality or may cause the encoder to exceed the target bit rate

To change the quantizer values:

- a. Enter **Advanced settings** under the desired Channel (1/2)
- b. Move the sliders to set the Qmin and Qmax values for I and P frames
- c. Press Save or Apply

3.6 Audio setting

Most of the audio parameters are static or automatically detected. The only configurable field is the audio bitrate.

The audio streaming if enabled is always compressed in AAC-LC.

Channel 2 Settings

Encoder Settings

Video Enabled:

Encoding Pipe:

Encoder Bit Rate: (Kb)

Rate Control:

Frame Rate:

Intra Interval:

Width:

Height:

Audio Settings

Audio Source:

Audio Enabled:

Audio Bit Rate: (bps)

Detected Audio Sample Rate: (Hz)

Coding Format:

Streaming Settings

Streaming Mode:

RTMP URL: ?

RTMP Key: ?

RTMP Authentication:

RTMP Stream Status:

Status

Detected Video Format

Signal Status:

Width:

Height:

Frame Rate:

Scanning Method:

Go Live Button

Button Controls:

Go Live State:

- a. Audio sample rate is detected automatically
- b. Set Audio Enable to checked if audio is required
- c. Set the audio bit rate (bps), Valid values are between [80,000 .. 320,000] bps.
- d. Compression method is always AAC-LC

3.7 Streaming settings

The XVC encoder supports the following streaming protocols:

1. RTSP
2. RTP
3. MP2TS
4. RTMP

RTMP is used to push mainly live streams to, Wowza Media Server, or any of the popular Content Delivery Networks (CDNs), such as YouTube Live, Akamai and others.

The following procedure describes how to set the streaming parameters. Refer to section 5 (Viewing the Video Stream Using VLC) for detailed examples.

Please note, switching to a different streaming protocol requires to the user to **save the settings and reboot the unit.**

- **RTP** - Streams video to an IP, PORT in RTP protocol. Set the **Video RTP port, Audio RTP port and RTP destination IP**. No negotiation/session is required. An SDP file should be downloaded from the encoder.

The screenshot shows the 'Streaming Settings' interface for the RTP protocol. The 'Streaming Mode' is set to 'RTP'. The 'Video RTP Destination Port' is 9000, and the 'Audio RTP Destination Port' is 9004. The 'RTP Destination IP' is 192.168.1.233. There is a 'Download SDP file' button. At the bottom, there are 'Apply', 'Save', and 'Refresh' buttons.

- **RTSP** - Stream video through RTSP protocol. Set the **RTSP port and RTSP stream name**. A RTSP client such as VLC may be used to view the video

The screenshot shows the 'Streaming Settings' interface for the RTSP protocol. The 'Streaming Mode' is set to 'RTSP'. The 'RTSP Port' is 554, and the 'RTSP Stream Name' is h264_2. The 'RTSP Stream URL' is rtsp://10.0.0.111:554/h264_2. At the bottom, there are 'Apply', 'Save', and 'Refresh' buttons.

- **MP2TS** - Stream video in Mpeg2 TS protocol directly to IP set-top boxes and television broadcast equipment to an IP, PORT. Set the **MP2TS destination port, MP2TS destination IP** (License required)

The screenshot shows the 'Streaming Settings' interface for the MP2TS protocol. The 'Streaming Mode' is set to 'MPEG2TS'. The 'MPEG2TS Destination IP' is 224.0.0.1, and the 'MPEG2TS Destination port' is 1234. The 'MPEG2TS Stream URL' is udp://@224.0.0.1:1234. At the bottom, there are 'Apply', 'Save', and 'Refresh' buttons.

- **RTMP** - Stream video in RTMP protocol, mainly used in web-casting and pushing content to CDNs such as YouTube live, Akamai and others (License required).

Your CDN will provide you a **RTMP URL**, a **RTMP Key** and optional a **RTMP user name and password**.

If all RTMP parameters are correct, the **RTMP status** will change to **streaming** state.



The screenshot shows a configuration window titled "Streaming Settings". It contains the following fields and controls:

- Streaming Mode: A dropdown menu with "RTMP" selected.
- RTMP URL: A text input field containing "rtmp://a.rtmp.youtube.com" with a help icon to its right.
- RTMP Key: A text input field containing "dfks.fkjsdk" with a help icon to its right.
- RTMP Authentication: A checkbox that is currently unchecked.
- RTMP Stream Status: A text input field containing "Streaming".
- At the bottom, there are three buttons: "Apply", "Save", and "Refresh".

Do one of the following:

- Click **Apply** - the parameters are applied until the next reboot.
- Click **Save** - the parameters are saved.

3.8 Setting Date and Time

This section describes how to set the time locally and through NTP.

3.8.1 Local time setting

1. From the XVC navigation tree, select **Administration**.

The **Administration** page appears (Figure 5).

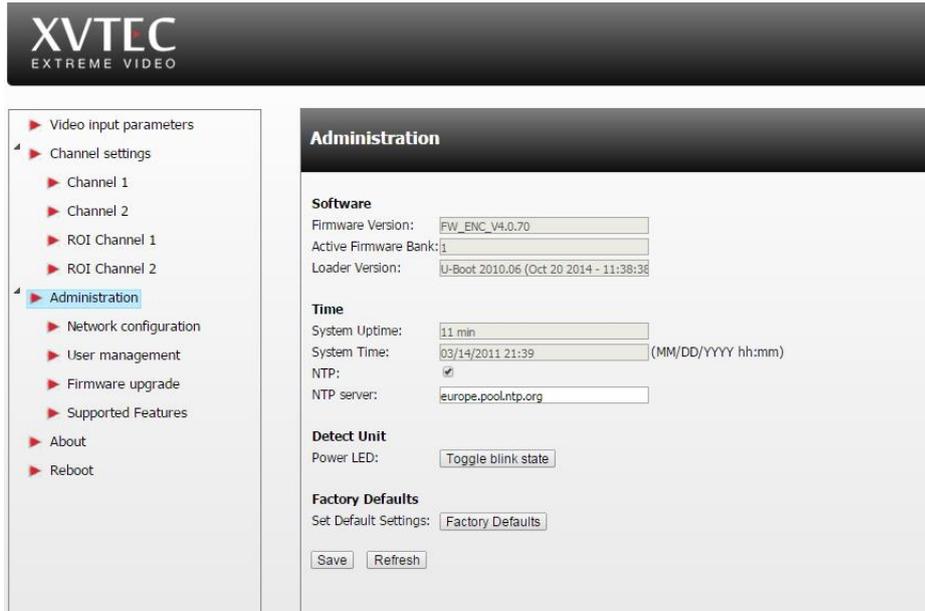


Figure 5: Administration Page (NTP Selected)

In the **Time** area, clear the **NTP** option.

The **System Time** field becomes enabled (Figure 6).

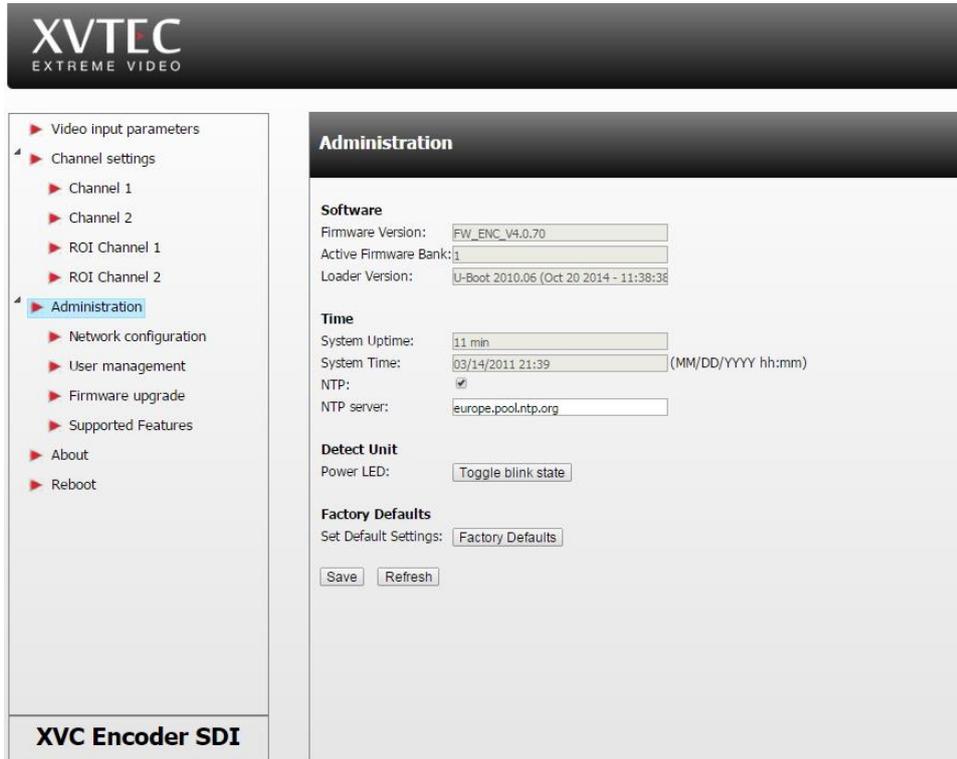


Figure 6: Administration Page (NTP Cleared)

System Time field, will pop-up time/ date selector

Click **Save**.

The parameters are saved, and the time in the **System Time** field is enabled.

Related Procedures:

- Syncing Date and Time to an NTP Server
- Identifying the XVC Encoder

3.8.2 Syncing Date and Time to an NTP Server

This procedure describes how to sync the date and time to an NTP server.

To sync the date and time with the NTP:

1. From the XVC navigation tree, select **Administration**.

The **Administration** page appears (see Figure 6).

In the **Time** area, select the **NTP** option.

The **NTP Server** field becomes enabled (see Figure 5).

In the **NTP Server** field, type the **NTP** server.

The default NTP server is **ntp.pool.org**, which is the industry standard.

Click **Set**.

The parameters are saved, and the time in the **System Time** field is enabled.

3.9 Identifying the XVC Encoder

This procedure describes how to physically identify the XVC.

To identify the XVC encoder:

1. From the XVC navigation tree, select **Administration**.

The **Administration** page appears (see Figure 5).

In the **Detect Unit** area, click the **Toggle Blink State** button.

The power LED of the selected XVC encoder blinks.

To stop the blinking, click the **Toggle Blink State** button again.

3.10 Rebooting the XVC Encoder

This procedure describes how to reboot the XVC encoder from the web page.

Rebooting returns settings to the last time they were saved.

To reboot the XVC encoder:

1. From the XVC navigation tree, select **Reboot**.

The **Reboot** page appears along with a confirmation dialog box (Figure 7).

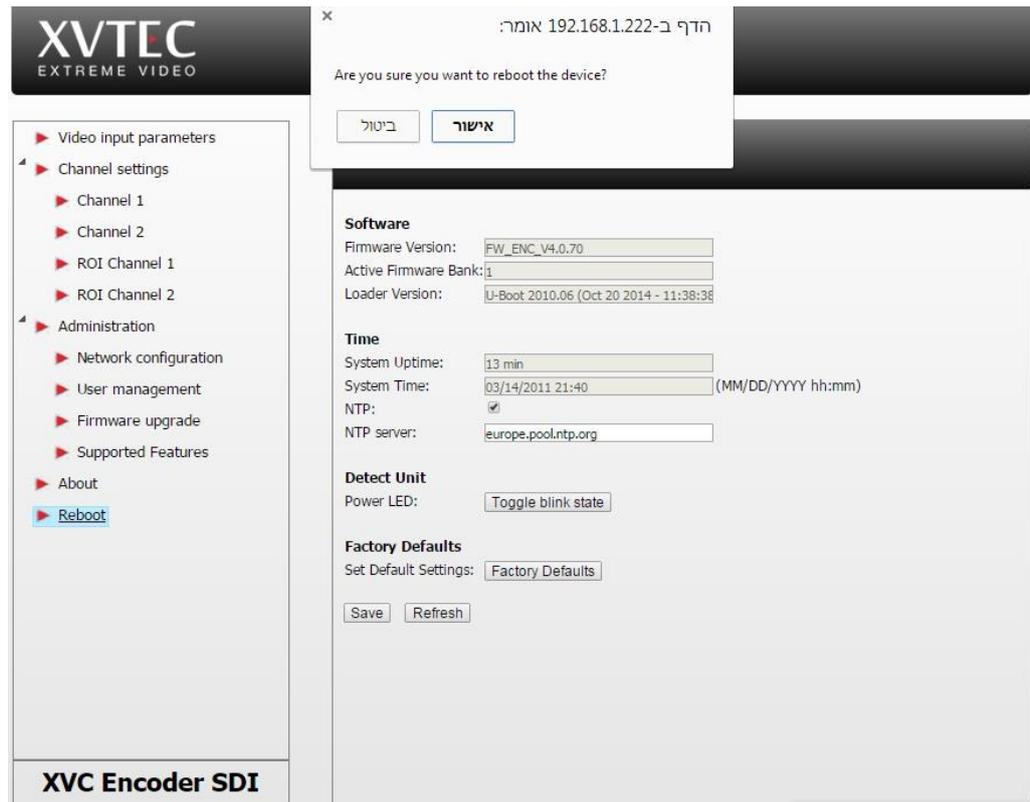


Figure 7: Reboot Page

In the confirmation dialog box, click **OK**.

The XVC encoder reboots, and in the **Administration** page, the **System Uptime** field resets.

Related Procedures:

- Rebooting the XVC Encoder

3.11 Firmware upgrade

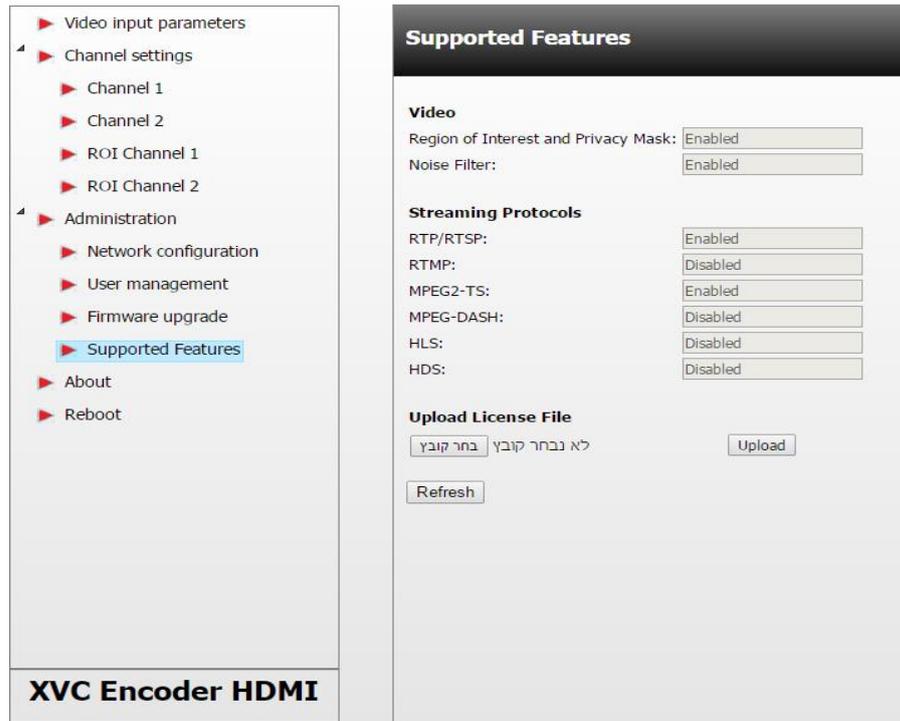
This procedure describes how to upgrade the unit's firmware from the web page.

To upgrade the XVC encoder:

1. Under **Administration** select from the tree **Firmware upgrade**.
2. Press the **select file**, and select a FW_XXX.img firmware file
3. Press upload file. A progress bar will appear indicating the percentage uploaded to the XVC encoder.
4. During the upload process the power led will blink
5. Once the upload is complete
 - a. The unit will reboot, the power led will turn off
 - b. After approx 30 sec the LED will continue to blink. This indicates the unit is updating the F/W.
 - c. At completion the unit will re-boot and the new F/W will be active
6. The new F/W version can be seen under **Administration, Firmware Version**

4 License manager

The license manager is used to enable enhanced features of the XVC encoder. Below is a screen shot of the license manager. A list of enabled features is shown.



In order to enable a feature a license file should be uploaded to the unit by selecting a **.lic** file from the web interface and uploading it. If the license file is valid the feature will be enabled.

5 Viewing the Video Stream Using VLC

This procedure describes how to view the video stream encoded by the XVC encoder directly on your computer, without a decoder, using the VLC media player.

Note: This procedure was tested on VLC 2.1.5

5.1 Streaming to VLC in RTSP protocol

1. Open the VLC application.

In the menu bar of VLC, select Media > Open Network Stream.

Copy the **RTSP Stream URL** displayed in the **Channel settings** (marked in orange)

The screenshot displays the XVTEC Channel 1 Settings page. On the left is a navigation menu with categories like Video input parameters, Channel settings, Administration, and About. The main area is titled 'Channel 1 Settings' and contains three sections: Encoder Settings, Audio Settings, and Streaming Settings. The Streaming Settings section includes fields for Streaming Mode (RTSP), RTSP Port (554), RTSP Stream Name (h264_1), and RTSP Stream URL (rtsp://192.168.1.222:554/h264_1). The RTSP Stream URL field is highlighted with an orange border and an orange arrow. To the right of the Encoder Settings is a 'Detected Video Format' box showing 'Signal Status: Not Locked' and other parameters.

Click **Play** to start previewing the stream in VLC.

5.2 Streaming to VLC in RTP protocol

1. In the WEB interface under channel 1/2, set streaming mode to RTP. *Note switching to different streaming modes, requires saving the parameters and rebooting.*
2. Set the video and audio RTP destination streaming **port** (Marked in red)
3. Set the destination **IP** (Marked in blue)
4. Press **save** or **apply**.
5. download the SDP file and open it in VLC.

The screenshot displays the 'Channel 1 Settings' page in the XVC Encoder HDMI web interface. On the left is a navigation menu with categories like 'Video input parameters', 'Channel settings', 'Administration', and 'About'. The main content area is titled 'Channel 1 Settings' and contains several configuration sections:

- Encoder Settings:** Includes 'Video Enabled' (checked), 'Encoding Pipe' (Native), 'Encoder Bit Rate (Kb)' (5000), 'Rate Control' (CBR), 'Frame Rate' (30), 'Intra Interval' (60), 'Width' and 'Height' (both --), and a 'Force intra' button.
- Audio Settings:** Includes 'Audio Source' (HDMI), 'Audio Enable' (checked), 'Audio Bit Rate (bps)' (80000), and 'Detected Audio Sample Rate (Hz)' (0).
- Detected Video Format:** A table showing 'Signal Status' as 'Not Locked' (highlighted in red), and 'Width', 'Height', 'Frame Rate', and 'Scanning Method' as '--'.
- Streaming Settings:** This section is highlighted with a red box. It includes:
 - 'Streaming Mode' set to 'RTP' (dropdown menu).
 - 'Video RTP Destination Port' set to '7000' (text input, highlighted with a red box and a red arrow).
 - 'Audio RTP Destination Port' set to '7004' (text input).
 - 'RTP Destination IP (Unicast or Multicast)' set to '192.168.1.230' (text input, highlighted with a blue box and a blue arrow).
 - 'RTP SDP' section with a 'Download SDP file' button.

At the bottom of the settings area are 'Apply', 'Save', and 'Refresh' buttons. The footer of the interface reads 'XVC Encoder HDMI'.

5.3 Streaming to VLC in MP2TS protocol (license required)

6. In the WEB interface under channel 1/2, set streaming mode to MPEG2TS. *Note switching to different streaming modes, requires saving the parameters and rebooting.*
7. Set the **MPEG2TS destination port** (Marked in red)
8. Set the **MPEG2TS destination IP** (Marked in green)
9. Press **save** or **apply**.
10. Copy the URL to VLC under "media-> open network stream"

Channel 1 Settings

Encoder Settings

Video Enabled:

Encoding Pipe: Native

Encoder Bit Rate (Kb): 10000

Rate Control: VBR

Frame Rate: 1

Intra Interval: 60

Width: --

Height: --

Detected Video Format

Signal Status: Not Locked

Width: --

Height: --

Frame Rate: --

Scanning Method: --

Audio Settings

Audio Source: HDMI

Audio Enable:

Audio Bit Rate (bps): 80000

Detected Audio Sample Rate (Hz): 0

Streaming Settings

Streaming Mode: MPEG2TS

MPEG2TS Destination IP (Unicast or Multicast): 192.168.1.191

MPEG2TS Destination port: 1234

MPEG2TS Stream URL: udp://@192.168.1.191:1234 (Example of URL to be entered in decoder settings)

5.4 Streaming to a CDN with RTMP protocol (license required)

RTMP protocol is used mainly to stream live (or recorded) video to CDNs such as Akamai, Ustream, YouTube live and others.

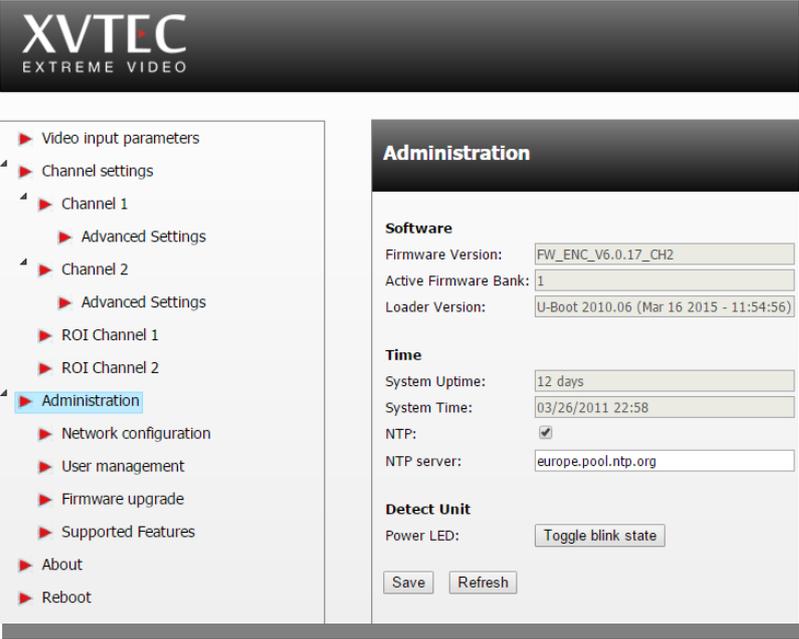
Typically, the user will have to open an account with a CDN provider. A URL (Stream Name) and password (Depending on the provider) will be supplied by the provider which will have to be inserted to the appropriate field in the WEB interface.

6 Restoring the unit

The XVC encoder maintains two firmware versions:

- ◆ FW0- The base version, this version is **NOT** upgradable.
- ◆ FW1 - The upgraded version. Only FW1 gets upgraded.

The **firmware version** and the active **firmware bank** can be seen in **administration** in the WEB interface.



The screenshot displays the XVTEC web interface. The top header features the XVTEC logo and the text 'EXTREME VIDEO'. On the left, a navigation menu lists various settings categories, with 'Administration' highlighted in blue. The main content area is titled 'Administration' and is divided into three sections: 'Software', 'Time', and 'Detect Unit'. The 'Software' section shows 'Firmware Version' as 'FW_ENC_V6.0.17_CH2', 'Active Firmware Bank' as '1', and 'Loader Version' as 'U-Boot 2010.06 (Mar 16 2015 - 11:54:56)'. The 'Time' section shows 'System Uptime' as '12 days', 'System Time' as '03/26/2011 22:58', 'NTP' checked, and 'NTP server' as 'europe.pool.ntp.org'. The 'Detect Unit' section has a 'Power LED' toggle set to 'Toggle blink state'. At the bottom of the main content area are 'Save' and 'Refresh' buttons.

If for some reason FW1 gets corrupted or the unit becomes unstable, execute one of the following procedures:

Action	Procedure
Simple reset - Reboot	<ol style="list-style-type: none"> a. Press reset button - encoder will reboot
Factory defaults - All encoder settings will be deleted including licenses. The encoder will switch to factory defaults. Network parameters will be lost. Use the XVC Management tool to setup the network parameters. The active firmware will still remain FW1	<ol style="list-style-type: none"> a. Power off the unit b. Apply power while pressing the reset button until the power LED turns on (Approx. after 10 secs) c. Release the reset button. The Unit will boot from FW1, with factory defaults
Revert to FW0 - All encoder settings will be deleted including licenses. The encoder will switch to base version firmware FW0 . Network parameters will be lost. Use the XVC management tool to setup the network parameters. After network parameters are set, the user can upgrade the firmware to a new version	<ol style="list-style-type: none"> a. Power off the unit b. Apply power while pressing the reset button until the power LED flashes slowly (Approx. after 20 secs) c. Release the reset button. The Unit will boot, with FW0 as the active firmware
Full recovery	<ol style="list-style-type: none"> a. Please contact support@xvtec.com

7 Performance and limitations

The XVC encoder is capable of encoding a single channel at 1080p60 or two channels at 1080p30 or any combination that does not reach the limit of 1920x1080x60.

There are cases where the encoder will not be able to reach the maximum limit due to pre-processing which uses common resources.

This limitation may appear in several cases, for example:

- The video input is set to 720p60, the output resolution (scaling = on) for both channels is set to 1080p30 (width - 1920, height - 1080)
- The video input resolution is set to 1080i60, the output resolution is set to 1080 (width - 1920, height=1080) and the scalar is enabled

In both cases the scalar is working "hard" up-scaling the input signal