

Volume

3

QVIDIUM™ TECHNOLOGIES, INC.

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**QVidiumHD™  
Stream Viewer  
User's Manual**

QVidium™ TECHNOLOGIES, INC.  
QVidiumHD™ StreamViewer

# User's Manual

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# Table of Contents

1	<b>Overview</b> .....	3
2	<b>Operation</b> .....	4
2.1	<b>Principles of Operation</b> .....	4
2.2	<b>Closed Captioning</b> .....	4
2.3	<b>Global Settings</b> .....	5
2.4	<b>Registering the Software</b> .....	5
3	<b>Streaming Video Recorder</b> .....	6
4	<b>Stream Profiles and Play Out</b> .....	7
4.1	<b>Stream Profiles</b> .....	7
4.2	<b>Starting Video Play Out</b> .....	8
4.3	<b>StreamViewer Error Correction</b> .....	8
4.3.1	<b>ProMPEG FEC: Forward Error Correction</b> .....	8
4.3.2	<b>ARQ: Automatic Retransmission Request</b> .....	8
4.3.3	<b>Network Statistics</b> .....	9
5	<b>Troubleshooting</b> .....	11
6	<b>Appendix A: Profile Properties</b> .....	12
6.1	<b>Network Parameters</b> .....	12
6.2	<b>ARQ Parameters</b> .....	12
6.3	<b>DVCPPro Parameters</b> .....	13

# 1 Overview

## *Application Overview*

**T**he QVidiumHD™ Video StreamViewer is a high-definition networked-video software application that can locally store HDV, DVC-ProHD, and other formats of live streaming audio/video content, while simultaneously playing out live networked streaming video.

The QVidiumHD StreamViewer records, decodes, and plays out live networked MPEG-2, MPEG-4 SP/ASP (MPEG-4 part 2), or MPEG-4 AVC (H.264, or MPEG-4 part 10) encoded video streams embedded within an MPEG-2 compliant Transport Stream and transported over an IP network, encapsulated either in RTP or raw UDP/IP packets. This includes DVB-compliant CBR (constant bit rate) video streams, ProMPEG, and HDV video streams. It can also handle DV and DVCPro-HD encoded video streams sent by a QVidium IEEE1394 IP Gateway. The QVidiumHD StreamViewer can also handle MPEG-1, MPEG-2, and Dolby AC3 encoded audio. The RecordManager can simultaneously record the incoming stream, while playing the recovered digital audio and video signals. It can display the live video stream directly onto a high-resolution monitor or display device in full-screen mode, or within a separate video play-out window when used as a viewfinder or monitor for the recording function. The RecordManager automatically detects the video resolution for both High-Definition and Standard Definition video streams and resizes the video image accordingly. It also automatically decodes and displays any closed captioning data embedded within the video content.

The QVidiumHD™ Player is supplied as a software application designed to run under the Microsoft Windows™ Vista, XP, or Windows™ 2000 operating systems. The QVidiumHD StreamViewer employs QVidium's implementation of the ProMPEG standard for Video over IP with Forward Error Correction as well as QVidium's patent-pending ARQ error correction mechanisms, while also taking advantage of Microsoft DirectX™ and Microsoft DirectShow™, to provide exceptional video quality and the most robust and error-free stream reception and play-out possible, even in the face of network impairments, such as lost packets, jitter, and packet reordering. QVidium's implementation of video encoding and ProMPEG video standards allow the QVidiumHD™ player to be fully compatible with any video signal source that also adheres to the ProMPEG standard for Video over IP (Code of Practice #3, Release2, Annex A).

## 2 Operation

### 2.1 Principles of Operation

The QVidiumHD™ StreamViewer is a software application that combines a streaming Video over IP hard disk recorder with a high-definition video decoder to provide a versatile and robust means for receiving, recording and displaying live video content from a wide variety of video sources.

The QVidiumHD™ StreamViewer is built around common industry standards for video over IP streaming to insure compatibility, flexibility, and interoperability with other video over IP encoders and camcorders. These standards include: MPEG-2, MPEG-4, DV, and DVCPRO-HD video decoding, Dolby AC3, MPEG-1 Layer-II, and MPEG-2 audio decoding, MPEG-2 Transport Streams, ProMPEG Video Transport and Forward Error Correction (FEC), RTP/UDP/IP video packet protocol, and Microsoft DirectX™ and DirectShow™ video and audio technology. (Windows Media video decoding is available as an additional option upon request.)

This instruction manual provides detailed operation instructions for each of the StreamViewer's two main functions:

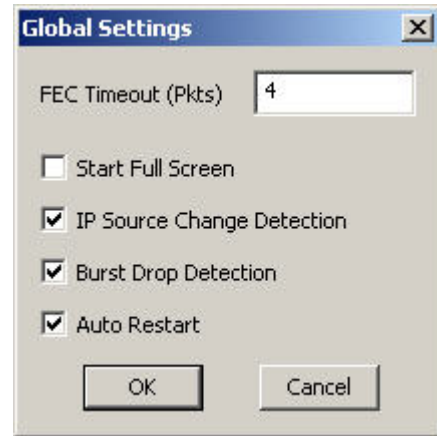
- **LIVE STREAMING VIDEO RECORDER**
- **LIVE STREAMING RECORDING MONITOR AND VIDEO STREAM PLAYER**

### 2.2 Closed Captioning

The Stream Player recognizes, decodes, and displays NTSC closed captioning, as specified by the Advanced Television Systems Committee standard ATSC A/53 for Video Blanking Interval (VBI) data embedded on video line 21. (At present, European Teletext for Pal video is not supported.) When live streaming video content contains closed captioning data (locally stored video with closed caption is not supported) the Stream Player will automatically display the closed captioning text as an overlay on the displayed video. This display of closed captioning text is independent of the audio and will not affect play out of the audio feed.

## 2.3 Global Settings

Under the **File** menu is a **Settings** menu item that brings up the **Global Settings** panel as shown on the right. The Global Settings panel contains four miscellaneous configuration settings that affect the overall behavior of the application. The **FEC Timeout** parameter sets the maximum delay that the application waits for an FEC packet before deciding that the received video stream is not encoded with forward error correction checksum packets and thereby sets the delay to wait before non-FEC play out can begin.



The **Start Full Screen** checkbox configures video play out to take over the entire display screen. With this setting unchecked, play out is displayed in a separate resizable video window.

The last three checkboxes, **IP Source Change Detection**, **Burst Drop Detection**, and **Auto Restart**, control whether the application should attempt to detect when the Video over IP stream has been changed to a different source, or restarted with different video resolution or bit rate settings, or has paused for some other reason, and if the StreamViewer detects such a change, to restart the video and thereby reset the video settings. Without these settings enabled, the video may freeze when the video source changes or when there is a change in the video bit rate, format, resolution, or timing.

## 2.4 Registering the Software

The StreamViewer software comes with a free 45-day demo license when first installed. After purchasing a license for the StreamViewer, you can obtain a permanent license key from QVidium by clicking on **Register** under the **Help** menu and e-mailing the **Identification** number to *info@qvidium.com* along with your identifying information so that we can find a record of your purchase. QVidium will then e-mail you back a **License Key** that you can paste into the **StreamViewer Registration** form to permanently register your software.

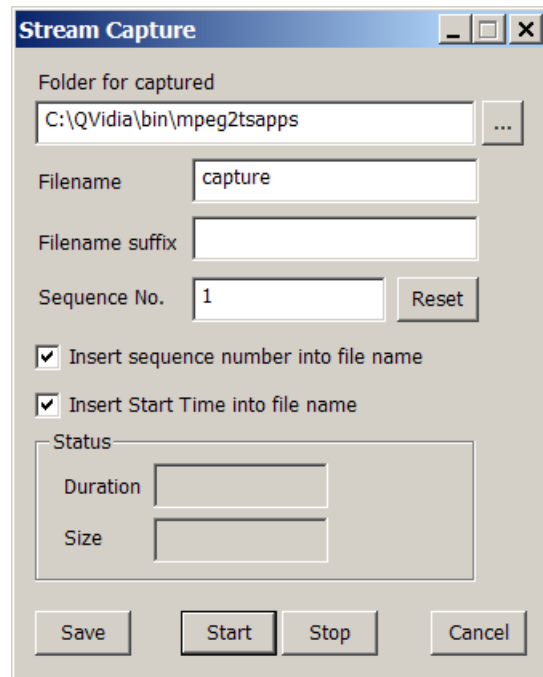
## 3 Streaming Video Recorder

A primary function of the StreamViewer is to receive and record a Video over IP stream. Using QVidium's advanced error correction, the StreamViewer tries to reconstruct the original video signal as perfectly as possible. Error correction recovers lost packets and an internal jitter buffer re-orders packets to their correct sequence and smooths out any timing gaps to create a fluid, smooth-flowing and error-free video stream. The StreamViewer can then store that recovered video stream onto a hard disk drive for later play back.

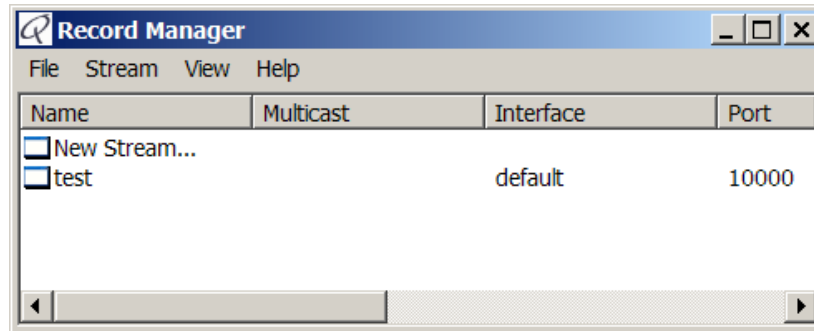
To configure and enable video recording, click on **Capture** under the **File** menu to bring up the Stream Capture panel as shown on the left. You can browse for and set the folder where the recorded video will be stored, and set the filename for the stored video clip. For convenience, StreamViewer includes an option to tag the video file with a video clip sequence number and to insert a time stamp into the video clip file name.

Clicking on the **Start** button starts the capture and **Stop** stops the capture. The **Save** button saves the configuration settings, and **Cancel** simply closes the Capture panel without saving your configuration setting changes.

A **Status** field displays the duration of the recorded video clip in seconds and the size of the captured file.



# 4 Stream Profiles and Play Out



## 4.1 Stream Profiles

StreamViewer's main window displays a list of pre-configured stream profiles. Initially, no pre-configured profiles exist. Clicking on "New Stream..." allows you to create new stream profiles. It pops up the **New Stream...** panel as shown at right. Most of the parameters can generally be left at their default values for most common modes of operation. The two key parameters to configure are the profile name and UDP port. After assigning a name to the profile and verifying that the UDP port corresponds to the port of the stream you wish to receive, click OK to write the new profile and return to the profile list. You can later modify these settings by single-clicking on the profile to edit (highlighting it) and then clicking on **Edit** under the **Stream** menu. StreamViewer automatically detects the format of the incoming video stream. It automatically handles both MPEG-2 Transport streams over either UDP or RTP/UDP packet formats. It can also automatically detect and play out either MPEG-2, MPEG-4, DV, or DVCProHD formats. There is no need to configure this separately. The **Video Parameters** area of this setup window only applies if the incoming stream is in DVCProHD format. If not using DVCProHD, you can ignore these settings.

**New Stream...**

Name:

Network Parameters

Multicast Address:

Multicast Interface:

UDP Port:

Stream Replicator Parameters

IP Address:

Echo Port:

ARQ Parameters

Port:

Target Latency (ms):

Burst Drop (ms):

Robust Mode:  Yes  No

Min Jitter Delay (ms):

Video Parameters

DVCProHD Mode:

DVCPro50 Mode:

Description:

OK Cancel

Figure 2: New stream profile form.

Unless you are configuring the StreamViewer for IPTV from a QVidium IPTV video server, you should leave the Stream Replicator IP address blank.



## 4.2 Starting Video Play Out

You may select from a number of convenient views of your list of profiles from the View menu. To start receiving and playing out a stream for display in its own video window, just double-click on the desired profile. Alternatively, you can start and stop play out by clicking on “Start” or “Stop” under the Stream menu.

## 4.3 StreamViewer Error Correction

StreamViewer supports some of the most advanced forms of live streaming video error correction available, including the industry standard ProMPEG FEC (forward error correction) and QVidium's patent-pending Advanced ARQ (Automatic Retransmission ReQuest). StreamViewer automatically detects and activates the appropriate form of error correction based on settings at the video source.

### 4.3.1 ProMPEG FEC: Forward Error Correction

StreamViewer listens for ProMPEG FEC checksum packets and automatically configures its FEC error correction mechanism accordingly, therefore eliminating the need for user configuration of FEC. It automatically detects FEC settings, such as row and column sizes, and uses the incoming parity packets to try and recover lost packets when necessary. The Receive Stats panel, shown below, keeps track of lost and recovered packets, along with the current FEC configuration, so you can monitor the effectiveness of the FEC settings.

### 4.3.2 ARQ: Automatic Retransmission Request

Automatic Retransmission Request (ARQ) tries to recover any packets lost during transport by adding a small amount of delay, giving the decoder time to detect and request and replace any missing packets with newly retransmitted ones. The size of this delay should include adequate time for the missing packet to be received and inserted into the play out queue so that the video stream can continue to flow smoothly and uninterrupted to the MPEG decoder.

StreamViewer sends a small query packet upstream to the video source to automatically detect and enable ARQ Mode when the video source supports QVidium's ARQ. With ARQ enabled and video play out started, StreamViewer will watch for gaps in the RTP sequence numbers from the output of the jitter buffer. When it detects missing packets, it sends retransmission requests to the encoder so that the encoder can quickly resend any missing packets. Incoming retransmitted ARQ packets bypass StreamViewer's internal jitter queue and find their correct place in the ARQ buffer, so that by the time packet are output by the ARQ buffer, the output of the ARQ buffer should no longer contain any missing packets.

The ARQ has three parameters that can be configured. In most cases the default parameters should be adequate for the initial operation. The first parameter, Target Latency, specifies the total delay, in milliseconds, allotted for the request, retransmission, and recovery process. The ARQ mechanism will attempt as many retries as possible within this target

latency time. Thus, larger target latency times increase the delay before video is output, but allows for more chances of requesting and recovering any missing packets.

Network		FEC	
Out of Order	0	Unrecovered	2
Dropped	3	Reconstructed	1
Duplicates	0	DRows	10
Bitrate	4320000	LColumns	10
Jitter (ms)	11	Video	
Packet Rate	396	Queue Level	
Total Packets	5053	Frequency	
Session			
Time	12 secs	Sender	127.0.0.1

OK Clear

A Burst Drop delay can also be specified to delay any retransmission requests for a time equal to the maximum expected packet loss time, such as from dynamic router changes of other sources of burst loss.

A Robust Mode can also be selected. When selected (checked), a minimum of two tries will be attempted for recovering any missing packets. When not selected (unchecked), ARQ will always try at least once to recover any missing packets.

### 4.3.3 Network Statistics

To monitor packet reception of the incoming IP video stream, click on **Show Stats** from the **Stream** menu. This pulls up the **Receive Stats** panel as shown below. The Receive stats panel has statistics organized into four sections: Network, FEC, Video, and Session. Under Network, it lists the number of Out of Order packets, the number of Dropped packets, and the number of Duplicate packets. It also shows the measured bit rate for the video stream and the maximum inter-packet time gap in milliseconds (jitter), along with the packet rate and the total number of received packets.

Under FEC, Receive Stats keeps track of the number of packets that FEC could not recover (**Unrecovered**), and the number of packets that FEC was successfully able to recover (**Recovered**). It also shows the detected and automatically configured FEC interleave matrix size in terms of the number of rows (**DRows**) and columns (**LColumns**).

Under **Video**, the Receive Stats panel shows the **Queue Level** of video packet in the video

timing recovery queue and the **Frequency** shows the recovered video clock frequency. (Note: monitoring of these Video statistics is currently not implemented.)

The **Session** section shows the elapsed time since starting the decoder and the IP address of the video sender.

## 5 Troubleshooting

If you experience problems with stream playout, please first check that you have downloaded and installed the Elecard MPEG decoder software (available through the link on our web site or directly from Moonlight Software at [www.elecard.com](http://www.elecard.com) (Elecard MPEG Player). In addition, after downloading and installing this software, please be certain to have downloaded and run the [RegisterElecardMPEGFilters.bat](http://www.qvidium.com/downloads) file from <http://www.qvidium.com/downloads>.

For troubleshooting information and the latest software, please contact QVidium Technologies, Inc. by either phone or e-mail at:

Phone: (858) 792-6407

E-mail: [support@qvidium.com](mailto:support@qvidium.com)

Support Hours: Monday - Friday 8:30 am to 5:00 pm PST

# 6

## Appendix A: Profile Properties

### 6.1 Network Parameters

**Multicast Address:** *This specifies the IP multicast address, if any, to listen to for the Video/IP stream. If expecting a unicast video/IP stream, leave this field blank.*

**Multicast Interface:** *For computers with multiple network adapters, this specifies which network interface StreamViewer should listen on for the incoming video stream.*

**UDP Port:** *This specifies which UDP port number (base 10) to listen on for the Video/IP stream.*

### 6.2 ARQ Parameters

The parameters below ONLY pertain to QVidium ARQ error correction. They will be ignored unless ARQ is selected at the video source.

**ARQ Target Latency:** *QVidium's ARQ error correction operates through the addition of a small additional buffering delay to provide enough time to request and receive replacement for each lost packet. Target Latency gives the ARQ mechanism a target value for determining the necessary ARQ delay. The ARQ divides the Target Latency, specified in milliseconds, by the round-trip time to the video encoding source to determine the number of request attempts. Unless Robust Mode is enabled, it sets a minimum ARQ latency of one round-trip time. A larger Target Latency allows the system to increase the number or repeat requests.*

**ARQ Burst Drop:** *Burst packet losses are common occurrences in many IP networks and the Internet. IP networks may dynamically change paths in response to load balancing, link failure avoidance, and for other reasons. During a re-route, a sequence of queued packets on a discontinued path may be dropped. A burst of packets may be dropped when higher priority packets stall a lower priority buffer. ARQ will notice a burst packet loss when the first packet after the loss arrives at the codec. Setting the Max Burst Drop Delay (in milliseconds) will delay the ARQ repeat request by this amount to handle packet burst losses.*

**ARQ Robust Mode:** *The ARQ can automatically calculate the number of retries (repeat request sent to the video encoding source device) for a given Target Latency and measured round-trip time. In some cases the number of retries is calculated to be one. Enabling Robust Mode will ensure the minimum number of repeat requests to a minimum of two retries.*

## 6.3 DVCPro Parameters

*The following parameters are ignored unless the incoming stream matches the selected video format.*

***DVCProHD Mode:*** *Select the high-definition video format for receiving and playing DVCProHD streams. This parameter allows for the specification of various HD resolutions and frame rates.*

***DVCPro50 Mode:*** *Select the standard-definition video format for receiving and playing DVCPro50 streams. This parameter allows for the specification of various standard definition frame rates and whether the video stream is in Interlace or Progressive format.*