

QVidium® TECHNOLOGIES, INC.

# **QVARQ Proxy Server™**

QVAVQ Series

QoS Multimedia Proxy Servers

## User's Manual v.4

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Application Firmware Version 67s

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# Table of Contents

<b>1</b>	<b>Introduction</b> .....	3
1.1	Overview .....	3
1.2	Linux PC requirements .....	4
1.3	Setup .....	4
<b>2</b>	<b>Transmit Proxy</b> .....	5
2.1	Transmit Proxy Overview .....	5
2.2	Transmit Proxy Configuration .....	5
<b>3</b>	<b>Receive Proxy</b> .....	7
3.1	Receive Proxy Overview .....	7
3.2	Receive Proxy Network Configuration.....	7
3.3	ARQ Packet Transport & Error Correction.....	9
3.4	Server Mode.....	12
<b>4</b>	<b>Troubleshooting &amp; Support</b> .....	13
4.1	Troubleshooting – Common Problems.....	13
<b>5</b>	<b>Appendices</b> .....	14
5.1	Appendix A: Transmit Proxy Configuration Parameters .....	14
5.2	Appendix B: Receive Proxy Configuration Parameters .....	15

# 1 Introduction

## 1.1 Overview

The QVARQ QoS Multimedia Proxy Server™ creates up to 50 copies (or more\*) of an incoming multimedia stream and redistributes it to up to multiple destinations across the Internet or any computer network with sufficient bandwidth. Since the Internet does not support multicast, and because of packet loss on Internet connections, the QVARQ QoS Proxy Server can be an invaluable part of a real-time multimedia distribution system.

The multimedia stream can be any continuous stream of UDP or RTP IP packets. Generally, these multimedia streams would contain video and audio data multiplexed as an MPEG2 Transport Stream. The QVARQ adds QVidium's patented Quality of Service (QoS) technologies, including ARQ error correction and clock synchronization, to correct missing packets, data re-ordering, and intermittent delays, in incoming multimedia streams. In addition, it also adds ARQ error correction to each of the replicated outgoing media streams. Unlike conventional media servers which add tens of seconds or delay to the media streams they distribute in order to handle network loss and impairments, QVidium's QVARQ can handle live real-time media streams while only adding a minimal amount of delay. QVidium QoS technology automatically measures the round-trip time of each network connection from each destination to the QoS Server in order to help minimize the total delay, while preserving the integrity of the multimedia stream. This allows real-time, interactive access to multimedia content across the Internet.

With these advanced Quality of Service (QoS) features, the QVARQ QoS Multimedia Proxy Server™ can redistribute a video stream from nearly any location in the world to dozens of locations across the world over nearly any type of IP network, including wireless connections and the public Internet, with unsurpassed video transport quality.

The QVidium QoS Proxy Server consists of a transmit proxy module and a receive proxy module that operate simultaneously and in tandem to receive and redistribute a media stream from an IP video source, such as a QVidium encoder. The receive module applies ARQ error correction and the other QVidium QoS technologies to recondition a stream that may have been transported over the Internet or other network with impairments. It then forwards the QoS-corrected IP stream to the transmit module. If the IP video source is connected over a lossless network, then the receive proxy may not be necessary. In that case, the transmit module would receive an IP media stream directly from the media source. The transmit module is responsible for replicating and applying the ARQ error correction to each outgoing stream.

\* This limit depends on host processor speed and can be over-ridden upon request.

## 1.2 Linux PC requirements

Any standard Linux distribution should work such as Ubuntu, Redhat or CentOS. It is better to use a minimal server version of Linux instead of a Desktop version so that more system resources are available for the QoS programs.

### Minimum hardware requirements

- 1 Gbyte RAM
- 2 GHz or higher Intel CPU
- 1 Gigabit Ethernet

## 1.3 Setup

1. Point your browser to <http://www.qvidium.com/proxy> and follow the instructions on that page to download and install (or update to) the latest version.

The `rc.qv_httpd` script is then started, which starts a web server listening on port 8111.

2. Point your browser to `http://192.168.1.90:8111`  
where you replace `192.168.1.90` with your Linux PC's IP Address.
3. Click on the "Tx Proxy 1 -> Register" link to install a Tx License.
4. Click on the "Rx Proxy 1 -> Register" link to install a Rx License.
5. To start QoS software when booting you should edit your system startup scripts to run the `/usr/local/bin/rc.qv_httpd` script.
6. You may need to add a multicast route if you plan to multicast from the RX Proxy. To check the routes in Linux type: "route". If you don't see a route for 224.0.0.0, then add one using: "route add -net 224.0.0.0 eth0", assuming that **eth0** is your Ethernet adapter, otherwise use the correct Ethernet adapter for your PC.

## 2 Transmit Proxy

### 2.1 Transmit Proxy Overview

The transmit module of the QVidium QVARQ QoS Proxy Server is configured and operated from the web browser. This section explains how to configure the server's transmit parameters. The configuration involves setting a few basic network parameters. There are no specific parameters involving error correction or the other QoS technologies, since they are all automatically applied to the outgoing stream.

### 2.2 Transmit Proxy Configuration

1. Enter `http://IPAddress` where `IPAddress` is the IP address of the QVidium QVARQ QoS Multimedia Proxy Server™.
2. Click on "Profile" under the "TX Proxy 1" item from the menu on the left. The "TX Proxy Profile" interface should display in the main area to the right of the menu system, as shown in Figure 1. **NOTE: You can only configure the TX Proxy module if it has been registered with a valid license. If uncertain about the license state, please click on "Register".** To obtain a license key that you have purchased, please e-mail QVidium at [info@qvidium.com](mailto:info@qvidium.com) with the 32-digit license code. Without this code we cannot issue you a license key.
3. On the transmit profile configuration page, enter the source UDP port to match the UDP port of the incoming IP media stream. If the source media stream does not have RTP encapsulation, but instead encapsulates the MPEG2 Transport Stream as the raw payload of UDP packets, check "Source UDP Only". If the incoming stream does not have ARQ and is a multicast stream, then additionally, you must enter the multicast IP address. If you are receiving a unicast IP stream that was directly only to this server, please leave the multicast address field blank.
4. The proxy server can run in one of 3 modes, Push Mode (transmitter initiated) or Pull Mode (receiver initiated), or both Push and Pull Modes simultaneously. In Push Mode, you will also have to choose a destination IP address and UDP port number, for the replicated output streams. The ARQ port and the destination UDP media port are set to the same value (10000) by default, but may be set to different values.
5. By setting the ARQ port for the upstream retransmission-request packets and Stream's UDP Port to the same value, it allows the upstream retransmission-request packets to use a port assigned by the transmitter-side router or firewall that eliminates the need to configure a port forwarding rule on the transmitter-side. However, for Pull Mode (or running Pull mode simultaneously with Push Mode) you must set these to different values.
6. After entering all the parameters as described in steps 3 and 4, and shown in Figure 1 below, press the "Save" button to save your changes. None of your changes will be saved nor have any effect unless you first save them. If you have any doubt about the parameters selected when running the encoder, you should click on Profile after saving the parameters or starting the proxy server to see the current operational settings.

- 7. Optionally, you can export any saved parameters to a file or import parameters using the Export and Import menu items.
- 8. Lastly, click "Start" to start the proxy server.

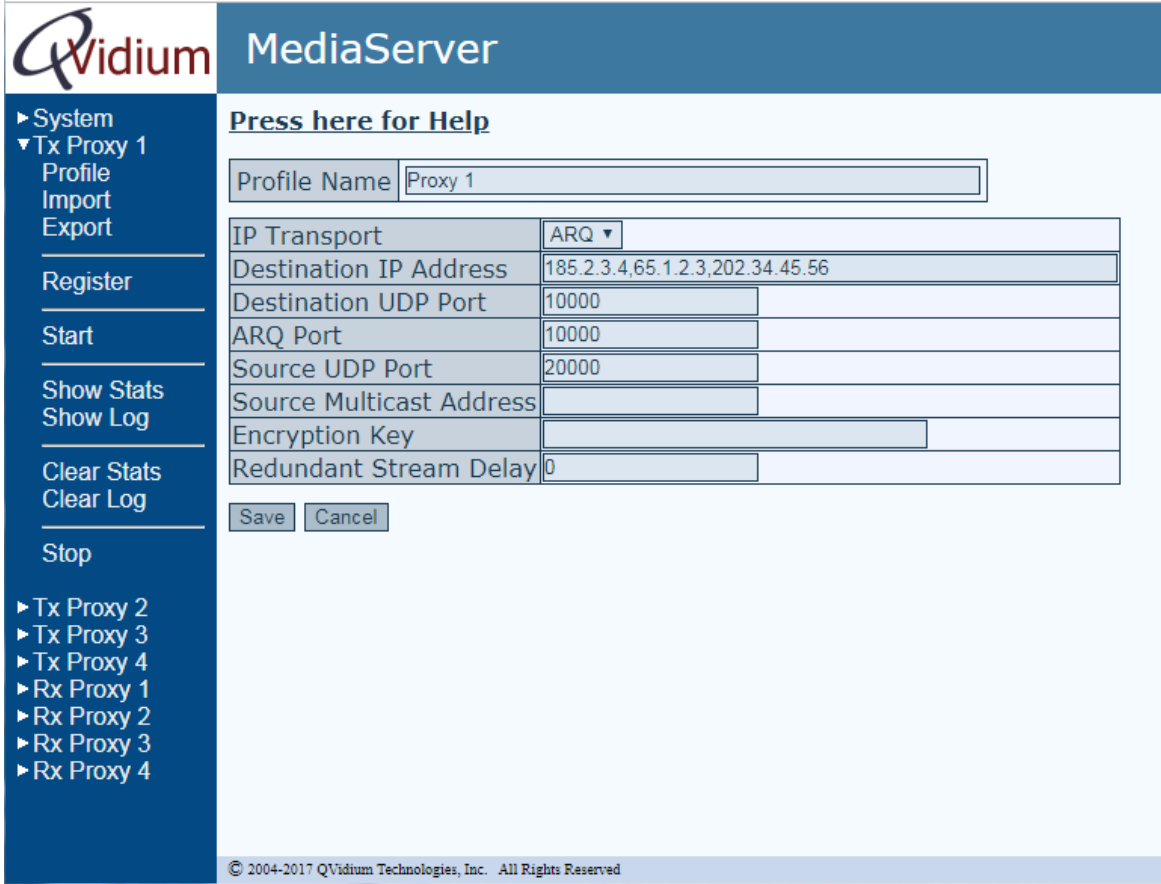


Figure 1: Transmit (Tx) Proxy Configuration.

# 3 Receive Proxy

## 3.1 Receive Proxy Overview

The receive modules of the QVidium QVARQ QoS Proxy Server are configured similarly to the transmit modules. This section explains how to use the Web pages to configure the server's receive parameters. The receive modules of the QVidium QVARQ QoS Proxy Server are configured from three profile web pages: Network Configuration, ARQ Configuration, and Server Configuration, as described below and shown in Figures 2 through 4.

## 3.2 Receive Proxy Network Configuration

Figure 2 shows the receive proxy network configuration page. To configure the IP network parameters, within the Network Parameters section of the proxy profile, select among ARQ, RTP, or UDP packet transport. Also, specify the destination IP address and UDP port number. The destination IP address may be a multicast or a unicast IP address. The proxy receives the video and audio IP streams as UDP packets in all cases, regardless of the type of packet transport you select. Specifying UDP eliminates the RTP header and encapsulates the encoder's multiplexed MPEG-2 transport stream directly as the payload of the UDP packet. Selecting ARQ and RTP add an RTP header to the UDP packet stream. The RTP header adds a timestamp and packet sequence number before inserting the MPEG-2 transport stream packets into the RTP/UDP/IP packet payload.

The network interface to the receive proxy includes QVidium's patented synchronized network jitter buffering mechanism to help remove the effects of variable network delays. In the receive proxy network interface, you may specify a delay for this jitter buffer in milliseconds. When using ARQ network transport mode, a jitter buffer holds the specified number of milliseconds of packets to give the decoder ample time to account for random delays and to allow the decoder to correct packet ordering. The receive proxy uses RTP sequence numbers of incoming packets to insert incoming packets into their proper place in the de-jitter buffer before releasing those packets into the receive proxy. The jitter buffer also uses the RTP timestamp to synchronize the receive proxy's network clock with the video source to adjust the jitter buffer hold time.

In addition to the jitter buffer, the receive proxy includes an out-of-order buffer that, like the jitter buffer, will help restore packet order. However, in contrast to the jitter buffer, the out-of-order buffer is a simple reordering shift register that must first fill to the specified size before it will start outputting packets. You can specify the size of this jitter and out-of-order buffer in the network configuration.

The following procedure will help you configure the network portion of the receive proxy:

1. Enter `http://IPAddress` where `IPAddress` is the IP address of the QVidium QVARQ QoS Multimedia Proxy Server™.
2. Click on "Profile" under the "RX Proxy 1" item from the menu on the left. The "RX Proxy Profile" interface should display in the main area to the right of the menu system, as shown in Figure 2. **NOTE: You can only configure a RX Proxy module that has been registered with a valid license. If uncertain about the license state, please click on "Register".** To obtain a license key that you have purchased, please e-mail QVidium at [info@qvidium.com](mailto:info@qvidium.com) with the 32-digit license code. Without this code we cannot issue you a license key.
3. On the receive profile Network configuration page, IP Transport, Source UDP Port, Jitter, and Out-of-Order Size relate to the incoming IP media stream. Select the IP transport to match the

incoming IP source media stream. You can select ARQ only if the source stream is being unicast from a device that incorporates QVidium's ARQ error correction. Otherwise, enter UDP or RTP as appropriate. UDP is the most common IP video transport and therefore has the widest compatibility. However, using RTP will allow you to measure any packet loss on the status page.

4. As with the TX proxy, enter the source UDP port to match the UDP port of the incoming IP media stream. If the source media stream does not have RTP encapsulation, but instead encapsulates the MPEG2 Transport Stream as the raw payload of UDP packets, check "Source UDP Only". If the incoming stream does not have ARQ and is a multicast stream, then additionally you must enter the multicast IP address. If you are receiving a unicast IP stream that was directly only to this server, then please leave the multicast address field blank.
5. You will also have to choose a destination IP address and UDP port number, for the replicated output streams. The ARQ port and the destination UDP media port should be different values, as shown in Figure 2.

The screenshot shows the QVidium MediaServer interface. The sidebar on the left contains navigation options: System, Tx Proxy 1-4, Rx Proxy 1-4, Profile, Import, Export, Register, Start, Show Stats, Show Log, Monitor, Clear Stats, Clear Log, and Stop. The main content area is titled "MediaServer" and has a "Press here for Help" link. Below this is a "Profile Name" field containing "Proxy 1". The "Network" tab is active, showing a configuration table with the following fields:

Field	Value
IP Transport	ARQ
Destination IP Address (1)	192.168.1.90
Destination UDP Port	1234
Encryption Key	cc_checker
Input Source UDP Port	10000
Bind Output	
Jitter	200
Expected Stream Bit Rate	12.5 Mbps
Redundant Stream Delay	0

Below the table is a note: "(1) Can also be a Multicast Address or Hostname". At the bottom of the form are "Save" and "Cancel" buttons. The footer of the interface reads: "© 2004-2017 QVidium Technologies, Inc. All Rights Reserved".

Figure 2: Rx Proxy Network Configuration.



## 3.3 ARQ Packet Transport & Error Correction

The QVidium QVARQ QoS Multimedia Proxy Server™ features some of the most powerful and advanced error correction capabilities found in any video over IP product. The QVidium QVARQ QoS Multimedia Proxy Server™ implements QVidium's patented ARQ error correction and clock synchronization (US Patents #7,551,647 and #7,522,528) for the more robust video transmission with the lowest delay. QVidium's ARQ (Automatic Retransmission Request) is a dynamically adjusting feedback error correction mechanism designed specifically to enable the highest quality video transport over wireless networks and the Internet. ARQ senses packet loss at the receiver and requests replacement packets from the server. ARQ can provide nearly flawless reproduction of a video stream even through extremely lossy or congested networks.

In contrast with FEC, QVidium's ARQ is a feedback mechanism that detects packet loss at the receiver and requests the retransmission of only those lost packets from a video source. A user-configurable buffer at the receiver (decoder) delays the video stream just long enough to allow the system to replace any missing packets and re-insert them in their proper order without disturbing play out of the video stream. Because ARQ senses actual packet loss, rather than attempt to predict packet loss, it can precisely and completely restore all lost packets without disturbing timing of the video play out. In contrast to FEC, ARQ can successfully recover lost packets regardless of the magnitude or pattern of the packet losses, provided that the network connection has enough capacity to send both the original video stream and the replacement packets.

ARQ shares similarities with robust packet transport protocols, such as TCP/IP in that both use feedback to create robust network packet transport. However TCP/IP uses a sliding window that limits the number of packets that a source can have in transit and requires a positive acknowledgement for each window of packets. This limits TCP's throughput, especially over links with long latencies. Furthermore, under heavy loss conditions, TCP/IP scales back the data transmission rates and provides no concise deadlines or constraints on packet delivery times. For real-time video, this limits the usefulness of TCP/IP and makes it unacceptable for live, low-latency video transport.

In contrast with TCP/IP, QVidium designed its patented ARQ error correction specifically for live, interactive, real-time video and audio signals to automatically recover nearly all lost packets with minimal latency and over nearly any link loss conditions. It adds a small configurable amount of delay to the network transport in exchange for significantly improving the robustness and reliability of video transport.

This section explains how to configure the video transport capabilities of the QVidium QVARQ QoS Multimedia Proxy Server™ and how to enable ARQ error correction.

### 3.3.1 ARQ Operation

**Automatic Retransmission Request (ARQ)** tries to recover any packets lost during transport to the decoder by adding a small amount of delay at the decoder during which time the decoder would have time to detect and request any missing packets. The size of this delay should also 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 unimpeded to the MPEG decoder.

To enable **ARQ**, you must first select ARQ transport from the `Profile` dialog. ARQ transport must also be enabled at this receive proxy. With ARQ selected and the encoder started, the encoder will begin to save outgoing packets for later retransmission, when necessary. You must also be certain to configure any firewalls to allow the ARQ retransmission request packets through. The default port for these upstream ARQ request packets is UDP port 7020, although you can configure this to any other valid, non-conflicting UDP port. However, if you choose to change the

ARQ request port, you must make certain the settings at the encoder and decoder match.

At the receive proxy, the ARQ error correction mechanism first buffers incoming packets in a synchronized network de-jitter buffer that maintains a constant, configurable delay for incoming packets. The de-jitter buffer processes RTP sequence numbers and reorders packets as necessary to restore proper packet sequence and to buffer against erratic network delays. Its goal is to output a smooth, consistent flow of packets with increasing sequence numbers. This output feeds the ARQ error correction mechanism.

The ARQ unit at the receive proxy watches for gaps in RTP sequence number from the de-jitter buffer output, and immediately sends out retransmission requests when necessary. Incoming retransmitted ARQ packets bypass the de-jitter queue and find their correct place in the ARQ buffer, so that by the time packet are output by the ARQ buffer, the ARQ error correction mechanism should no longer contain any missing packets.

When the encoder and decoder are both started, the receive proxy automatically measures the round-trip delay and packet jitter to the encoder and automatically configures ARQ for optimal operation according to a few basic user-specified parameters, as described in Section **Error! Reference source not found.**

**Note:** For ARQ error correction to be enabled, you must select ARQ transport at both the encoder or video source and this receiver proxy. The encoder/video source must be configured to allow upstream ARQ request packets to the source. If you set the ARQ port equal to the UDP port, then for most firewalls QVidium's ARQ will automatically configure the firewall to allow in the upstream ARQ requests.

**QVidium MediaServer**

Press here for Help

Profile Name: Proxy 1

Network | **ARQ Settings** | Server

ARQ Port	10000
Mode	Auto
<b>Auto Mode Parameters</b>	
Target Latency (ms)	250
Robust Mode	<input checked="" type="checkbox"/>
Measure Network	Always
<b>Manual Mode Parameters</b>	
Number Retries	2
Round Trip Time	100

Save Cancel

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Figure 3: Rx Proxy ARQ Error Correction Configuration.

### 3.3.2 ARQ Error Correction Configuration

The configuration page for ARQ is shown above in Figure 3. To enable ARQ, you must first select ARQ transport from the `Profile` dialog. Also, ARQ transport must be enabled at the encoder. With ARQ selected and the decoder started, the decoder 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 the network de-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 five parameters that can be configured in `manual mode`: `Target Latency`, `Burst Drop`, `Robust Mode`, `Number Retries`, and `Round Trip Time`. In `automatic mode`, the system automatically measures and calculates the `Round Trip Time` and `Number Retries`. In most cases automatic mode using the default parameters should be adequate.

Of the required parameters, 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.

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.

To help with firewall configuration and to handle potential port conflicts, the user can change the default port that ARQ uses to send upstream retransmission requests, `ARQ Port`. However, you must make certain that the same ARQ port number is set in both the encoder as in the decoder.

Although the automatic measurement of the round-trip time uses multiple measurements to take into account random network delays, for some networks you might wish to specify a larger round-trip value, or to specify a larger number of retries in case the upstream link loses some of the retransmission request messages. In automatic robust-mode of ARQ operation, the system automatically measures the round-trip time and divides that number into your specified `Target Latency` to determine the number of retries to use. However in `Manual Mode`, you can force ARQ to always use a specified number or retransmission requests.

**NOTE:** Remember to click **Save** after changing any parameters, or your changes will be lost. You also have to click **Start** for any changes to take effect.

## 3.4 Server Mode

In addition to passively listening for a stream that you would push from a media source, you can also set the receiver proxy to be in Server Mode where it pulls a stream from a QVidium encoder or even another QVidium TX Proxy Server. In Server mode, when you start the receive proxy it remotely start a QVidium encoder and initiates a video stream. To put a QVAVC encoder in server mode, simply leave the **Destination IP Address** blank and **Start** the encoder. This will cause the encoder to listen for a start packet from the receive proxy.

To have the receive proxy initiate a stream in Server mode, go to the Server tab and configure the following parameters, as shown in Figure 4, below.

1. Click 'Yes' under "User Server" so that Server mode will be enabled when you next start the proxy receiver.
2. Enter the IP address or hostname of the media source you want to pull the stream from.
3. Set the Echo Port to match the echo port on the media source. Normally the echo port has a default value of 7. You should keep this value at the default of 7 unless you have reason to change it and you have also changed the corresponding entry on the video source.
4. Click Start on the receive server to restart it in Server mode.

The screenshot shows the QVidium web interface for configuring a proxy profile. The system name is 'MediaServer'. The 'Proxy 1 Profile' configuration is displayed, with the 'Server' tab selected. The 'Use Server' option is set to 'No'. The 'IP Address or Hostname' field is empty, and the 'Echo Port' field is set to 7. The 'Save' and 'Cancel' buttons are visible at the bottom of the configuration form.

Network	ARQ	Server						
<table border="1"> <tr> <td>Use Server</td> <td><input type="radio"/> Yes <input checked="" type="radio"/> No</td> </tr> <tr> <td>IP Address or Hostname</td> <td><input type="text"/></td> </tr> <tr> <td>Echo Port</td> <td><input type="text" value="7"/></td> </tr> </table>			Use Server	<input type="radio"/> Yes <input checked="" type="radio"/> No	IP Address or Hostname	<input type="text"/>	Echo Port	<input type="text" value="7"/>
Use Server	<input type="radio"/> Yes <input checked="" type="radio"/> No							
IP Address or Hostname	<input type="text"/>							
Echo Port	<input type="text" value="7"/>							
<table border="1"> <tr> <td>Save</td> <td>Cancel</td> </tr> </table>			Save	Cancel				
Save	Cancel							

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Figure 4: Rx Proxy Server Mode Configuration.

# 4 Troubleshooting & Support

The QVARQ QoS Multimedia Proxy Server™ includes a number of features to aid in system security and logging.

## 4.1 Troubleshooting – Common Problems

### No response from web browser or cannot ping system

1. Make certain that device is powered on and connected to your network.
2. Check that green LAN light in front is lit and link light at RJ-45 port is on.
3. Make certain that device is on the same subnet as the computer you plan to connect to. (Either use a cross-over Ethernet cable to connect directly to the computer or connect through the same switch as your computer.)
4. Connect a VGA monitor and keyboard to the proxy server and type “ifconfig –a” to see the IP address and netmask.
5. Open a shell window (On Windows™ select “Start/Run...” and type “cmd”).
6. Clear the ARP cache by typing “arp –d” and hit Enter.
7. Try pinging the system by typing “ping <IP address from step 4>”, for example type “ping 192.168.1.31”.

### Cannot get TX Proxy to send IP packets

1. Check that a valid video signal is connected to the video **Input** you have configured. Use the Encoder/Profile page to select among Composite and S-Video inputs. Make certain that you **Saved** the profile and **afterwards** hit the **Start** menu item.
2. Make certain that device is powered on and connected to your network.
3. Check that green LAN light in front is lit and link light at RJ-45 port is on.
4. Make certain that you have entered the correct IP address for the destination (under Encoder/Profile) and the correct gateway (under Network/Configure) if the receiver is on another subnet.
5. Try pinging the destination system clicking on Network/Ping and entering the IP address for the decoder device.

# 5 Appendices

## 5.1 Appendix A: Transmit Proxy Configuration Parameters

### **Network Parameters**

The fields below relate to Ethernet/IP video transport settings.

**IP Transport:** *This selects the type of video IP packet encapsulation and error correction used by the codec in generating a Video/IP stream. All packetized video transport mechanisms encapsulate a multiplexed constant bit rate MPEG-2 transport stream.*

- *ARQ uses QVidium's patented error correction mechanism based on a time-constrained selective packet retransmission algorithm. However it relies upon an upstream channel on UDP port 7020.*
- *RTP disables all error correction mechanisms, but still encapsulates the MPEG-2 multiplexed data according to RFC2733.*
- *UDP is similar to the RTP transport above, but does not add the RTP header to the UDP packets. Instead it simply encapsulates the MPEG-2 transport stream data directly into the UDP/IP packet payload.*

**Destination IP Address or Hostname:** *This specifies the IP address or Hostname for the Video/IP stream.*

**UDP Port:** *This specifies the UDP port number (P), base 10, for the Video/IP stream.*

### **ARQ**

The parameters below ONLY pertain to ARQ error correction. They will be ignored when ARQ IP Transport is not selected.

**ARQ Port:** *By default, ARQ normally sends upstream retransmission request packets on UDP port 7020. You can change this ARQ Port setting to any valid and non-conflicting UDP port. However, you must make certain that you specify the same port number at both the encoder and the decoder. We suggest that you reset this to be the same port as the media UDP port (usually 10000) to help with opening firewall problems.*

## 5.2 Appendix B: Receive Proxy Configuration Parameters

This section explains the parameters related to the setup and operation of the receive proxy, the error correction algorithms, and network transport configuration.

### **Network Parameters**

The fields below relate to Ethernet/IP video transport settings.

**IP Transport:** *This selects the type of video IP packet decapsulation and error correction expected by the codec in receiving a Video/IP stream.*

- *ARQ uses QVidium's patented error correction mechanism for lost packet recovery. ARQ encapsulates the video stream as a standard MPEG-2 Transport Stream as the payload of UDP packets with an RTP packet header as per RFC2733. It relies upon an upstream channel on UDP port 7020.*
- *RTP disables all error correction mechanisms, but still allows measuring packet loss.*
- *UDP is similar to the RTP transport above, but expects raw UDP packets without an RTP header. It expects to receive the MPEG-2 transport stream directly from the UDP payload. Use this setting for interoperability with some Set-Top Boxes.*

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

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

**Jitter:** *Packets in incoming IP packet streams may lose their ordering or suffer variable delays during transport through an IP network. The proxy receiver buffers all incoming video/IP packets in a buffer and reorders RTP encapsulated packets by RTP sequence number. This parameter specifies the size of this incoming packet buffer in milliseconds of delay. Specify 0 here to disable this additional buffering when latency needs to be minimize.*

### **ARQ Parameters**

The parameters below ONLY pertain to QVidium ARQ error correction. They will be ignored unless ARQ is selected for IP Transport.

**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.

**Max 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.

**Robust Mode:** Normally, the ARQ will only require that a minimum of one repeat request is sent to the video encoding source device, regardless of the Target Latency. However, enabling Robust Mode will increase the minimum number of repeat requests to a minimum of two retries.

**ARQ Port:** By default, ARQ normally sends upstream retransmission request packets on UDP port 10000. You can change this ARQ Port setting to any valid and non-conflicting UDP port. However, you must make certain that you specify the same port number at both the encoder and the decoder. To help bypass firewall blocking, we suggest that you reset this to be the same port as the media UDP port, usually 10000. However, when using Pull Mode (receiver-initiated), the ARQ port must be set to a different value from the UDP port.

## Server Parameters

The parameters below ONLY pertain to the operation of the QVidium QVARQ QoS Multimedia Proxy Server™ with a QVidium QoS Proxy Server. Leave this disabled when not connecting to a QoS Proxy Server.

This feature allows the decoder to initiate and receive a unicast stream from a QoS Proxy Server. You must provide the IP address and control port for the QoS Proxy Server. The decoder then sends a control packet upstream to the server when you start the decoder.

**Use Server:** Select No to disable this feature. Select Yes to enable operation with a QoS Proxy Server.

**IP Address or Hostname:** Enter the IP address of the QoS Proxy Server to which the decoder will send a start-stream message.

**Echo Port:** Normally, this should be left to the default UDP port 7. This port number must match the value at the QoS Proxy Server. In addition, you may need to configure a firewall at the server to allow ingress for packets on this port.