

QVidium® TECHNOLOGIES, INC.

QVidium QVARQ A140 Rx Proxy

Model #QVAM140-ARQ

For Amino 140 IPTV SetTop Box

User's Manual v.2

December 8, 2013

Rx Proxy Software Version 10

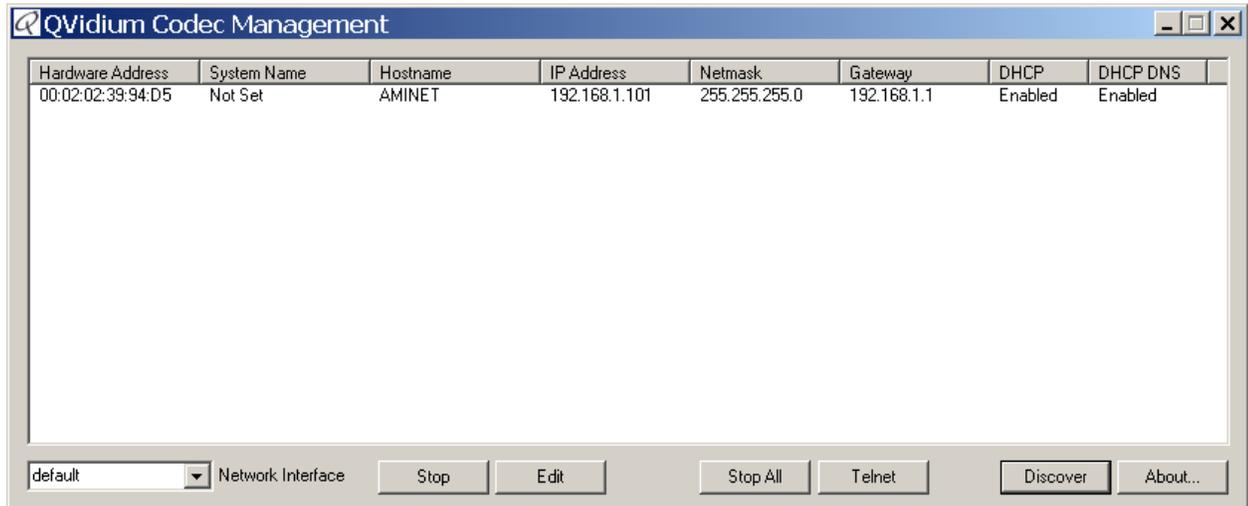
Table of Contents

1	Network Configuration	3
2	Receive Proxy	5
2.1	Receive Proxy Overview	5
2.2	Receive Proxy Network Configuration	5
2.3	ARQ Packet Transport & Error Correction	7
2.4	Server Mode	10
3	Troubleshooting	11
3.1	Troubleshooting – Common Problems	11
4	Appendices	12
4.1	Appendix A: Receive Proxy Configuration Parameters	12

1 Network Configuration

The Amino A140 SetTop Box is, by default, preconfigured to obtain its IP address through DHCP. The following instructions will help you determine its IP address and allow you to set a static IP address.

1. Download and install QVidium's CodecManager Application in a Windows PC
 - a. Go to <http://www.qvidium.com>, click on Support
 - b. Scroll towards bottom. Click on "QVidiumCodecManager-7.msi" (<http://www.qvidium.com/downloads/files/QVidiumCodecManager-7.msi>)
2. Connect break-out cable or HDMI cable to connect A140 to a video monitor. (HDMI is recommended, but you can connect to component or composite outputs as well.)
3. Connect the PC and the A140 via Ethernet cables to two ports on the same Ethernet switch. (Do not use cross-over cables.)
4. Connect A140 power adapter to A140 and plug into an AC power source
5. Wait for QVidium splash screen to briefly appear on monitor.
6. Start Codec Manager.
 - a. You should see something like the following:



- b. If you do not see an entry for AMINET then you may need to set a different "Network Interface" (low left corner pull-down menu) and click **Discover**.
7. You should see the IP address as part of the entry for the Amino A140 (AMINET).
8. To change the IP address to a static IP address, click **Edit**. Fill in the desired settings and click **OK**. To set a static IP address, you need to set "Use DHCP" to **No**. If this is on a local area network (LAN), then you can leave the **Default Gateway** blank.
9. After clicking on OK, the A140 should automatically reboot for the new settings to take effect.

The image shows a standard Windows-style dialog box titled "Dialog" with a close button (X) in the top right corner. The dialog contains the following fields and options:

- System Name:** A text input field containing "Not Set".
- Hostname:** A text input field containing "AMINET".
- IP Address:** A text input field containing "192 . 168 . 1 . 119".
- Netmask:** A text input field containing "255 . 255 . 255 . 0".
- Default Gateway:** A text input field containing "192 . 168 . 1 . 1".
- Use DHCP:** Two radio buttons, "Yes" (selected) and "No".
- Use DHCP for DNS:** Two radio buttons, "Yes" (selected) and "No".
- Buttons:** "OK" and "Cancel" buttons at the bottom.

2 Receive Proxy

2.1 Receive Proxy Overview

QVidium has created a special version of its patented QVARQ RX Proxy Error Correction software for the Amino A140 Set-Top Box video decoder, and has added this QVARQ receiver proxy software, along with a web interface, to the Amino A140 that we sell as Model #QVAM140-ARQ. This ARQ receive proxy software, when started, runs alongside the default Amino software to intercept an incoming ARQ packet stream, process the error correction to restore lost packets, correct the incoming stream timing, restore the correct packet ordering, and then forward the corrected video data stream to the internal Amino decoder for outputting to your monitor.

The Proxy menu controls the configuration and operation of this QVARQ RX Proxy software. This section explains how to use the Web pages to configure the receive proxy parameters through three profile web pages: Network Configuration, ARQ Configuration, and Server Configuration, as described below and shown in Figures 3 through 6.

2.2 Receive Proxy Network Configuration

Figure 3 shows the Receive Proxy network configuration page. To configure the IP network parameters, within the Network Parameters section of the proxy profile, set the UDP port and ARQ port for the incoming stream. The proxy receives the video and audio IP streams as RTP/UDP IP packets. 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 processing and ARQ packet stream, the receive proxy software inserts a jitter buffer that 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 Auto ARQ Mode (selected by default on the ARQ configuration tab), the value you set for the Jitter Buffer becomes a minimum value, since the receiver proxy software will ping the sender to automatically determine the network jitter and over-ride the jitter buffer setting to a larger value if necessary.

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 Amino 140 SetTop Box
2. Click on "Profile" under the "Proxy" item from the menu on the left. The "Proxy Profile" interface should display in the main area to the right of the menu system, as shown in Figure 3. **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 with the 32-digit license code. Without this code we cannot issue you a license key.

3. On the Proxy/Profile Network configuration page, enter the source UDP Port to match the UDP port of the incoming IP media stream. The Jitter field is defaulted to 50 ms and can be let at this setting..
4. Enter the Source ARQ port to match the UDP port set on the transmitting side (QVidium Encoder or TX Proxy Server) for the ARQ packets of the incoming IP media stream. If connecting to a TX Proxy Server or if the encoder is sending to multiple destinations, then you will need to use a different UDP port number for the ARQ stream from the incoming UDP media stream.

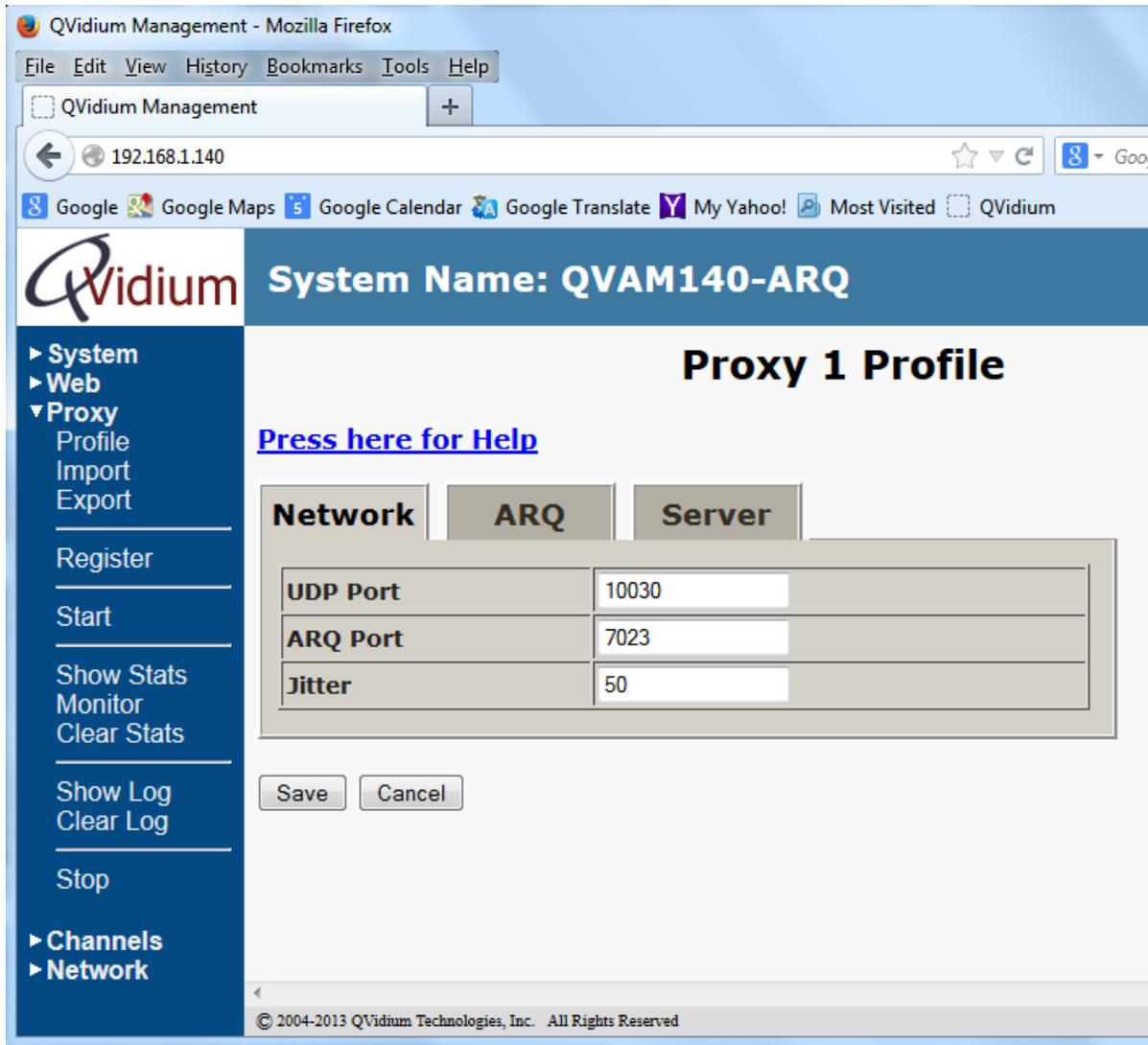


Figure 3: Rx Proxy Network Configuration.

2.3 ARQ Packet Transport & Error Correction

The QVidium QVARQ Rx Proxy features some of the most powerful and advanced error correction capabilities found in any video over IP product. The QVidium QVARQ Rx Proxy 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 Rx Proxy and how to enable ARQ error correction.

2.3.1 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

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 System Name: Not Set

Proxy 1 Profile

[Press here for Help](#)

Network **ARQ** **Server**

ARQ Port	7020
Mode	Auto
Manual Mode Parameters	
Number Retries	2
Round Trip Time	100
Auto Mode Parameters	
Target Latency	250
Max Burst Drop	40
Robust Mode	<input checked="" type="checkbox"/>

Save Cancel

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Figure 4: Rx Proxy ARQ Error Correction Configuration.

2.3.2 ARQ Error Correction Configuration

The configuration page for ARQ is shown above in Figure 4. 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.

2.4 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 5, 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. At the top left is the QVidium logo. To its right, a blue header bar contains the text "System Name: Not Set". Below the logo is a vertical navigation menu with the following items: System, Web, Proxy (expanded), Profile, Import, Export, Register, Start, Show Stats, Monitor, Clear Stats, Show Log, Clear Log, Stop, and Network. The main content area is titled "Proxy 1 Profile" and includes a link "Press here for Help". Below this are three tabs: Network, ARQ, and Server. The Server tab is active, showing a configuration form with the following fields: "Use Server" with radio buttons for "Yes" and "No" (where "No" is selected), "IP Address or Hostname" with an empty text input field, and "Echo Port" with a text input field containing the number "7". Below the form are "Save" and "Cancel" buttons. At the bottom of the page, a copyright notice reads "© 2004-2010 QVidium Technologies, Inc. All Rights Reserved".

Figure 5: Rx Proxy Server Mode Configuration.

3 Troubleshooting

3.1 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 Appendices

4.1 Appendix A: 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 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 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. To help bypass firewall blocking, we suggest that you reset this to be the same port as the media UDP port, usually 10000.*

Server Parameters

The parameters below ONLY pertain to the operation with a QVidium Tx 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.*