User Guide
HD Video Encoder
Model Name: DME-05

The Power of ZEUS™

DOC-USR-0151-05

Manual Version 5.0

Before attempting to connect or operate this product, please read these instructions carefully and save this manual for future use.

Revision History

Version	Date	Change Note	Author
1.0	03/14/2018	Initial Document	SI
2.0	01/24/2019	Updated Title	SI
3.0	06/03/2019	Added RTSP to output formats	SI
4.0	06/26/2019	Added RTMPS to features and added Facebook live section	SI
5.0	07/23/2020	Renamed document	SC

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1.0 GENERAL DESCRIPTION

The ZEUS® DME-05 Multi-Format Video Encoder is a system capable of processing multi-format H.264 High Profile video up to 1080p at 60 frames per second. The DME-05 is a cost-effective system suitable for broadcast encoders and IP streaming. The DME-05 provides immediate access to multi-format HD video, integrated system peripherals and production-qualified codecs.

The DME-05 features multiple I/O interfaces, including 3G-SDI, HDMI, ASI and Gigabit Ethernet. Multiple interfaces allow customers to quickly integrate full H.264 1080p performance in their network without the power consumption and physical space required of a PC-based platform.

2.0 QUICK START GUIDE

2.1 If You Have Received a System from Z3 with the Software Preloaded

To start working with the encoder, you can go straight to Section 6.0, “GETTING STARTED WITH THE DME-05,” on page 12. This section describes how to quickly generate a UDP, RTP, RTSP or RTMP stream over IP as well as how to generate an ASI stream. Information is also provided on how to change bitrate dynamically, how to adjust the UDP TS rate, tuning for latency, streaming in multiple resolutions, recording to USB and utilizing various features including MPTS, closed captioning and forward error correction.

Details on configuring and running the DME-05 as a decoder can be found in Section 7.0, “RUNNING THE DECODER”, on page 40.

2.2 If You Already have a System from Z3 and Need to Update the Firmware

You can update the firmware via the HTTP-based user interface by following the instructions in Section 8.4: “Making a Firmware Update”, on page 54.

***Note:** Actual version numbers for your Z3 product may differ from those pictured in this document.*

3.0 PACKAGE CONTENTS

DME-05

BNC to BNC Cable

Serial Cable + Gender Changer

12V2.5A Power Adapter

HDMI Cable

Figure 1 Package Contents for the DME-05

***Note:** The serial cable is included for advanced troubleshooting purposes only and is not needed by the typical user.*

4.0 FEATURES

- HD resolutions up to 1920x1080, including 1080p60/50, 1080i30/25, and 720p60/50
- H.264 support
- Support for extraction from up to four sub channels of audio from SDI
- AAC-LC, AACH-HE v1, and AAC-HE v2 audio codecs
- Ability to encode two different streams from the same source
- Closed caption support (EIA-608, EIA-708)
- Pro-MPEG Forward Error Correction support for encode and decode
- Inputs: HDMI, 3G-SDI, ASI (Decode)
- Outputs: HDMI, 3G-SDI, ASI (Encode)
- Interfaces to 1Gb Ethernet, USB 2.0 (x2), RS-232
- Outputs MPEG-2 Transport Stream, RTP, RTSP, RTMP, RTMPS, TSRTP or TS File
- HTTP-based configuration software for user-friendly configuration and control
- RS-232 serial port for technical configuration and control
- Operating Temperature and Humidity: 0 to 40ºC at 20-80% relative humidity (non-condensing)
- Storage Temperature and Humidity: -10 to 65ºC at 20-80% relative humidity (non-condensing)
- Measurements: 142 x 130 x 34 mm (16.93 x 8.46 x 1.72 in)
- Weight: 613 g (1.35 lb)

4.1 Supported Input Resolutions

SDI:	1080p60, 1080p50, 1080i30, 1080i29.97, 1080i25, 720p60, 720p59.94, 720p50, 576p50, 576i25, 480i30, and 480i29.97
HDMI:	1080p60, 1080p50, 1080i30, 1080i29.97, 1080i25, 720p60, 720p59.94, 720p50, 576p50, 576i25, 480p60, 480i30, and 480i29.97

4.2 Supported Output Resolutions

HDMI:	1080p60, 1080p59.94, 1080p50, 1080i30, 1080i29.97, 1080i25, 720p60, 720p59.94, 720p50

5.0 OPERATING CONTROLS

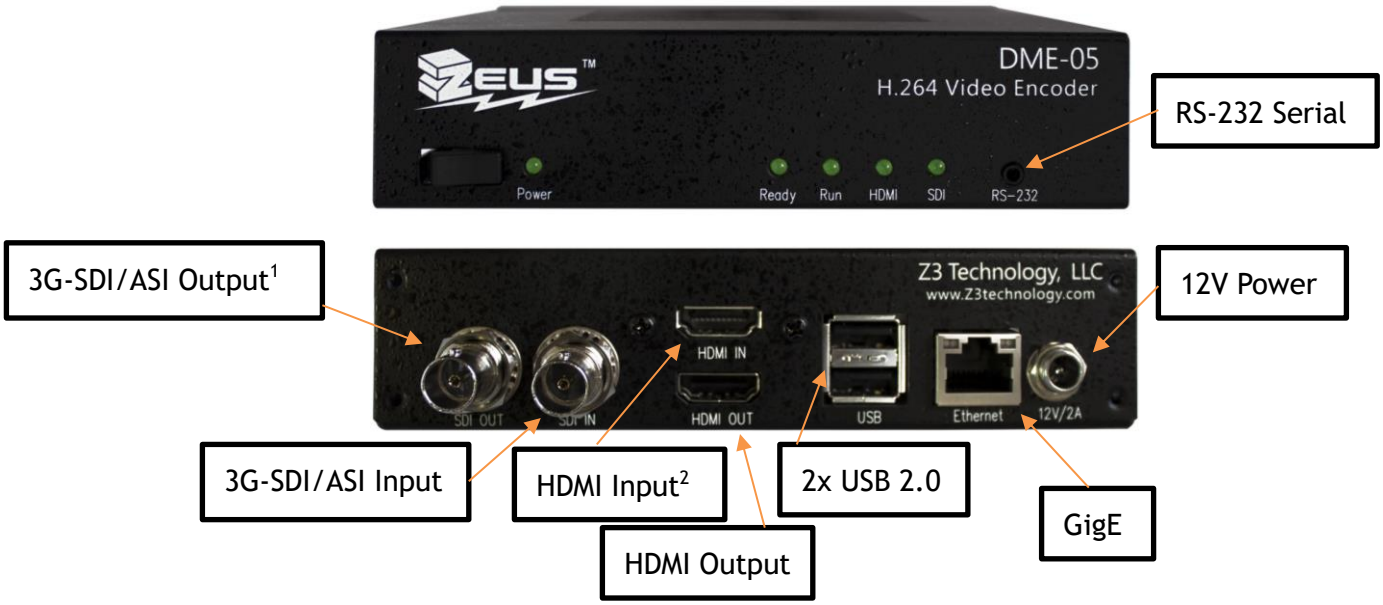

Figure 2 Front and Rear Views of the DME-05

6.0 GETTING STARTED WITH THE DME-05

This section gives step-by-step instructions on using the DME-05 to stream 1080p or 1080i video to the VLC media player running on your PC. In addition to the DME-05, you will need a computer with VLC media player downloaded, a 1080p60/1080i video source with SDI output, a BNC to BNC cable and at least one Ethernet cable. Encoding with an HDMI source is described later in Section 6.10.

***Note:** Actual version numbers for your Z3 product may differ from those pictured in this document.*

6.1 Set up the SDI Video Source

(1) Select an HD source with SDI output.

(a) Power on the HD source.

(b) Connect the HD source via SDI to a monitor.

(c) Set the HD Source to 1080p60 or 1080i output.

(d) If you are using a media player rather than a video camera, select and begin playback of the content you would like to stream.

6.2 Connect and Power up the DME-05

(1) Connect the SDI source to “SDI In” on the unit.

Figure 3 DME-05 Rear Panel SDI Encode Connections

(2) Connect an Ethernet cable from “Ethernet” on the back of the unit to a switch, router or other DHCP server on the same network as your Windows PC. You will use this PC to control the DME-05 and to decode the output stream.

(3) Connect the AC power supply and turn on the power switch. It will take 45-60 seconds to boot.

6.3 Find the Encoder Using ZFinder

ZFinder is a PC Utility that allows you to find any Z3 Technology product on your network. If you have not downloaded this to your computer, you can find it on the USB drive provided with your system.

(1) Verify your PC is set to DHCP. If it is set to a static IP address, ZFinder will be unable to discover your encoder, or it will appear in red and you will be unable to proceed further.

(2) Run the "ZFinder" PC Utility on your Windows PC. The ZFinder window appears. ZFinder then completes a scan of the network and lists the location of all Z3 systems connected to the network. In this case, the DME-05 appears.

(3) Click on the DME-05 entry in the window to select it. This will cause the "Edit Device", "Open Device" and "Flash LEDs" boxes to activate.

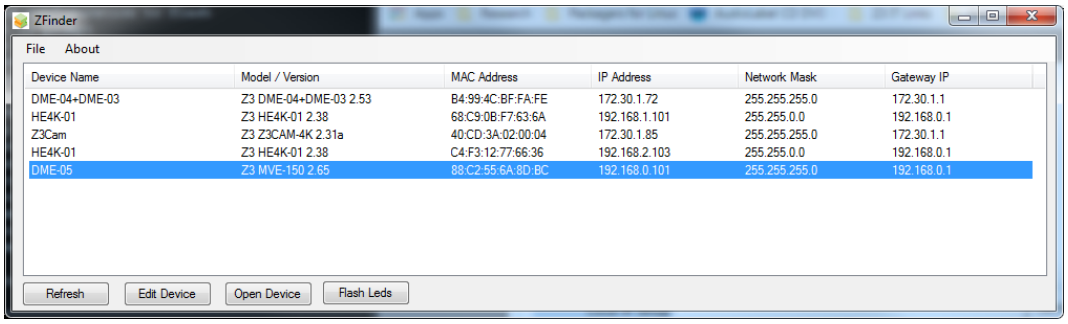

Figure 4 ZFinder with a Product Selected

***Note:** Selecting "Edit Device" allows for manual changes to network settings. Selecting "Flash LED's" is not applicable to the DME-05 as there are no LEDs.*

(4) Click on "Open Device." An Internet browser window is opened (for best results, Firefox or Chrome are recommended) and the HTTP-based graphical user interface (GUI) appears at the System Setup tab.

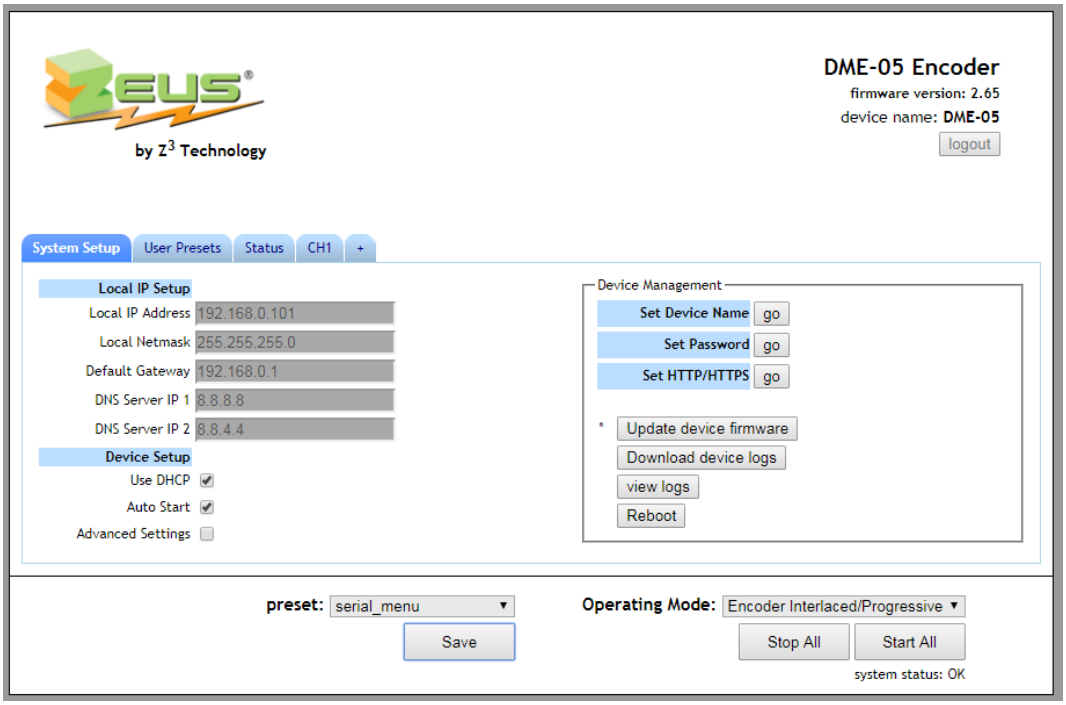

Figure 5 DME-05 User Interface System Setup Tab

6.4 Configure Encoder for UDP Streaming

(1) Click on the CH1 tab.

(2) Verify the "Video Source" is set to "HD-SDI" using the dropdown menu.

***Note:** HD-SDI selection supports HD-SDI resolutions and 3G-SDI resolutions.*

(3) Set the "Video Resolution" to "1920x1080" or "Follow Input".

(4) Set "Output Format" to "UDP".

(5) You can set the "Dest Address" to:

(a) the IP address of your PC that will be running the VLC media player (in the pictured example, 192.168.0.6)

(b) or to a multicast address (An example multicast address would be "225.1.2.3". If you are on a shared network, check with your Network Administrator.)

(6) Make note of the value of "Dest Port" (This will be "5004" by default).

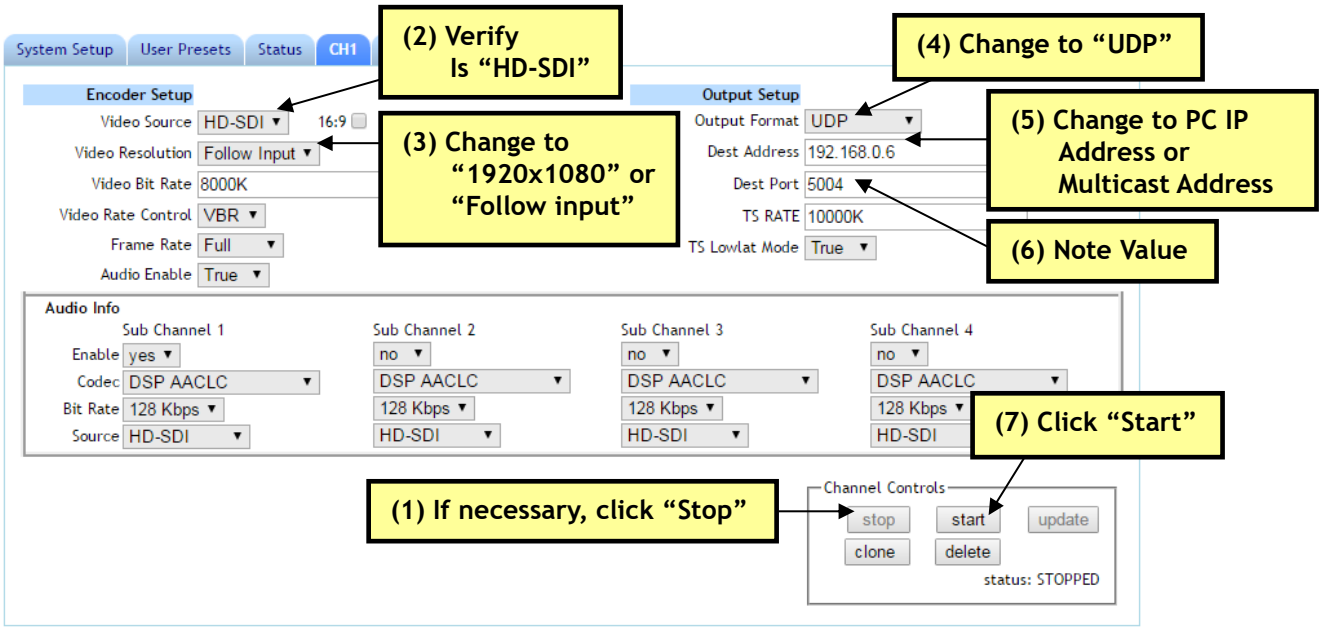

Figure 6 Channel 1 Tab - UDP

(7) If the encoder hasn't already autostarted, click on "start" in the "Channel Controls" section near the bottom of the screen. If the encoder is already running, click on "stop" and then "start" to confirm the specified values are in effect.

***Note:** By default a limited selection of video encoding settings are available in the user interface. See Section 8.3, "Advanced Settings Mode", for more information on accessing additional settings.*

6.5 View a UDP Stream in VLC

(1) Run VLC media player on your PC (version used by Z3: 2.1.5)

(2) Select Media – Open Network Stream. In the box, type "udp://@192.168.0.6:5004", where "192.168.0.6" matches the values of the computer IP address or multicast address entered for "Dest Address", and 5004 is the value of "Dest Port" noted previously.

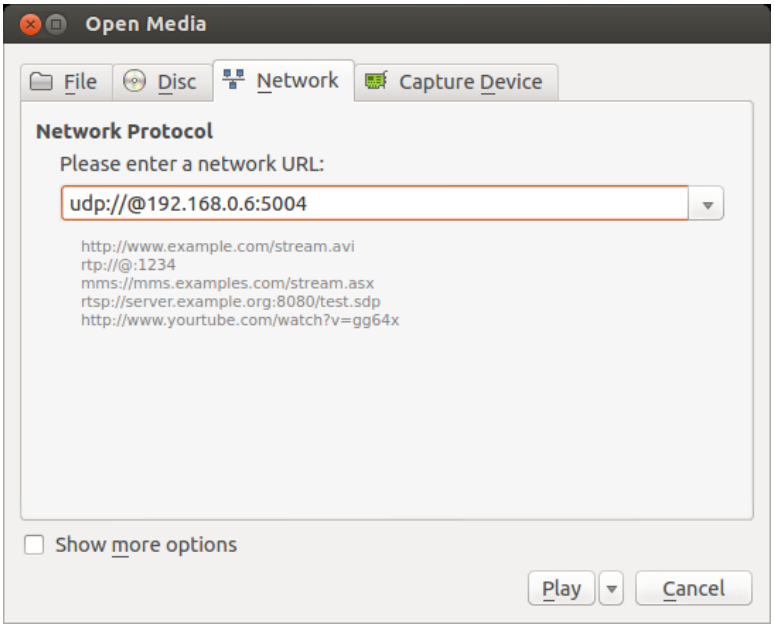

Figure 7 VLC Open Network Stream Screen for UDP

(3) Press "Enter."

(4) You will now see video streaming to VLC.

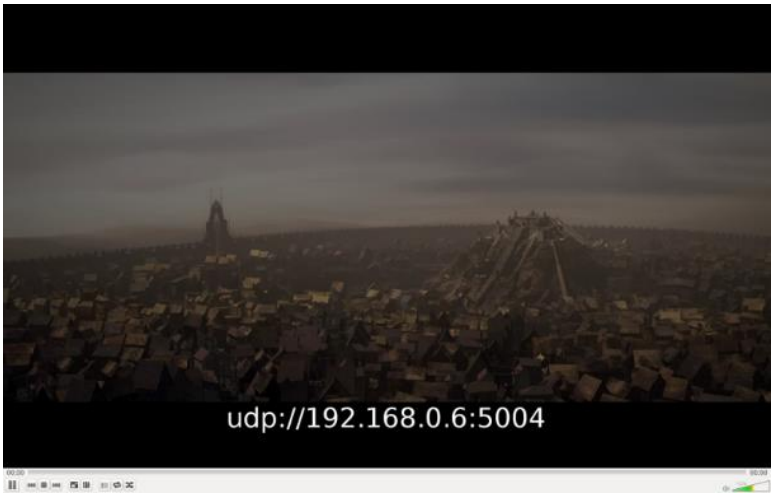

Figure 8 Example of Z3 Video Streaming to VLC (UDP)

6.6 Configure Encoder for RTP/RTSP Streaming

Once you have UDP streaming, it is relatively simple to change to RTP or RTSP streaming. All that is needed is one parameter change. To stream using RTP or RTSP, complete the following steps:

(1) In the CH1 configuration tab, click on “stop” to stop the current encoding session.

(2) Change “Output Format” from “UDP” to “RTP/RTSP”.

When RTP/RTSP is selected, the encoder will send an RTP stream using the Dest Address and Dest Port listed in the user interface. If RTSP will be used exclusively, the Dest Address field can be set to “127.0.0.1” to prevent the RTP stream from being sent.

***Note:** As RTSP operates through port 554, it is advised never to set the “Dest Port” field to “554” when RTP/RTSP is selected.*

(3) Click on “start” to start the RTP/RTSP encoding session.

***Note:** By default a limited selection of video encoding settings are available in the user interface. See Section 8.3, “Advanced Settings Mode”, for more information on accessing additional settings.*

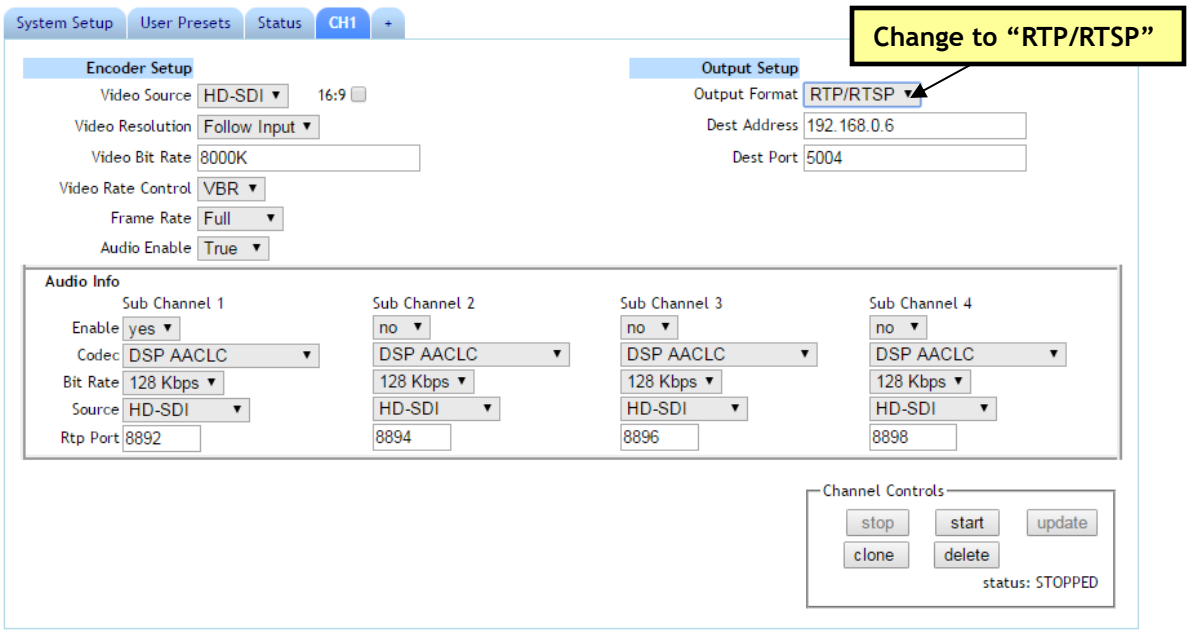

Figure 9 Channel 1 Tab - RTP/RTSP

6.7 View an RTSP Stream in VLC

(1) Run VLC on your PC (version used by Z3: 2.1.5)

(2) In the "Open Media" box, enter "rtsp://{IP Address}/z3-{ch #}{m}.mp4" for the network URL.

(a) {IP Address} will be the IP address of your encoder. If your encoder is set to DHCP (This is the default setting when you first receive your encoder.), you can find this in ZFinder or the web browser with the user interface open. If you have set your encoder to a static IP address, this should match the "Local IP Address" field in the System Setup tab. In the example pictured, the encoder was assigned 192.168.1.102 at start up.

(b) {ch #} corresponds to the number of the channel tab of the user interface. For example if the CH1 tab is used, "1" is entered.

(c) {m} is added if a multicast address is being used. (For example, rtsp://{IP_Address}/z3-1m.mp4) If you are using a unicast address, as we are in the example pictured, omit the letter m after "z3-1" in the address.

(d) In this example, the full network URL would be "rtsp://192.168.1.102/z3-1.mp4".

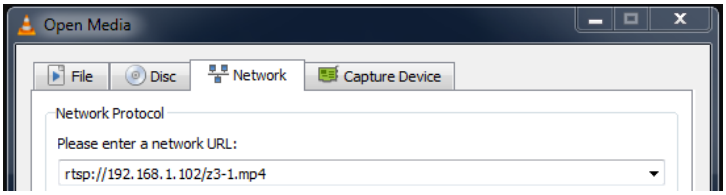

Figure 10 VLC Open Network Stream Screen for RTSP

***Note:** VLC version 2.1.5 or later is needed for RTSP support.*

(3) You will then see RTSP video streaming on VLC.

Figure 11 Example of Z3 Video Streaming to VLC (RTSP)

6.8 Configure Encoder for RTMP/RTMPS Streaming

The DME-05 supports RTMP and RTMPS streaming accepted by a variety of CDN's (Content Delivery Networks) and social media platforms for wide content distribution and live streaming.

***Note:** VLC does not support RTMP. The test player within Wowza Streaming Engine™ is recommended.*

6.8.1 Stream RTMP to the Wowza Streaming Engine™

Z3 Technology is a member of the Wowza Media Systems™ Technology Alliance partner program, and the Wowza Streaming Engine™ is used here as an example server for RTMP streaming.

(1) In the CH1 configuration tab, click on "stop" to stop the current encoding session.

(2) Set "Output Format" to "RTMP".

(3) For "Dest Address", type "{IP_Address}:{port}/{app}/{stream_name}",

(a) {IP_Address} will be the IP address of the PC with the Wowza server installed. In the example pictured, "192.168.0.4" is used.

(b) {port} will be the port used on the PC with the Wowza server. In the example pictured, "1935" is used.

(c) {app} will need to match the application used in Wowza. In the example pictured, "live" is used.

(d) {stream_name} can be name of your choosing. In the example pictured, "1080" is used.

(e) In this example, the full "Dest Address" would be "192.168.0.4:1935/live/1080".

(4) If necessary, set "Authentication" to "Enable" and enter your valid Wowza login credentials.

***Note:** By default a limited selection of video encoding settings are available in the user interface. See Section 8.3, "Advanced Settings Mode", for more information on accessing additional settings.*

(5) Click the "start" button.

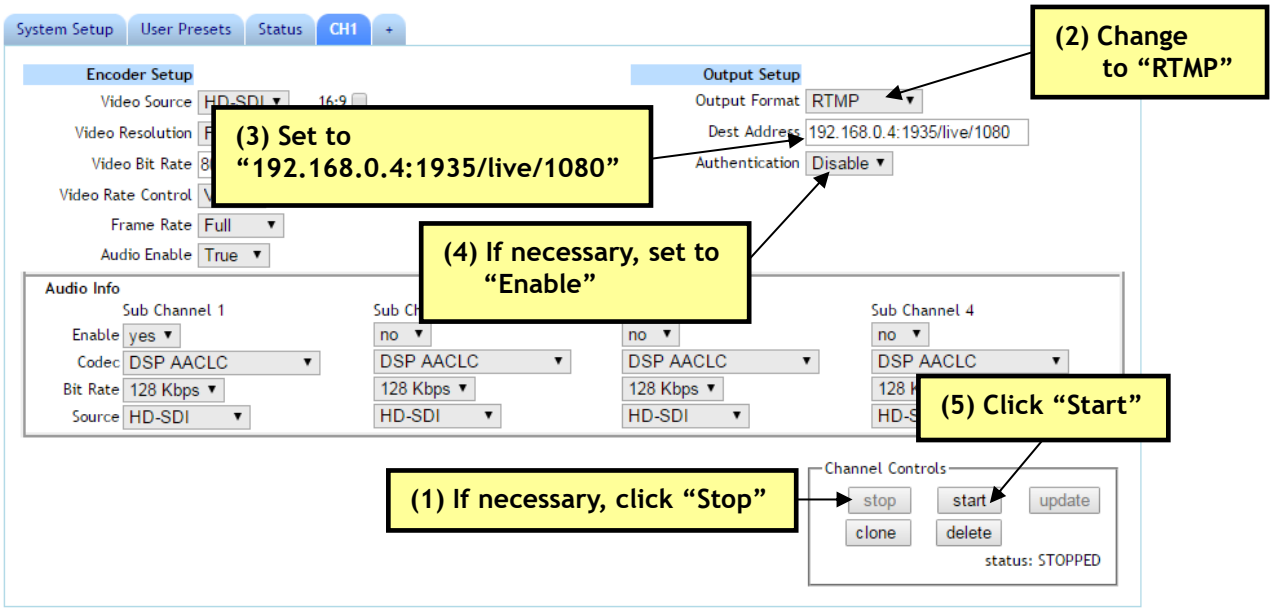

Figure 12 Channel 1 Tab – RTMP Streaming to the Wowza Streaming Engine™

(6) If you have not already done so, install the Wowza Streaming Engine™ server on a PC on your network (for details on configuring Wowza, please see APPENDIX A: Configuring the Wowza Server for RTMP).

(7) Go to a PC that is on the same network as the Wowza server and open a web browser (in this example, FireFox is used). Type in the URL of the Wowza server with the port 8088 (in this example, "192.168.0.4:8088"). This will bring up the Wowza home page. Log in with your valid user name and password.

(8) At the top you will see four options: Home, Server, Applications, and Help. Click on "Applications"

(9) Then select "live".

(10) Click on "Test Players" in the top right hand corner.

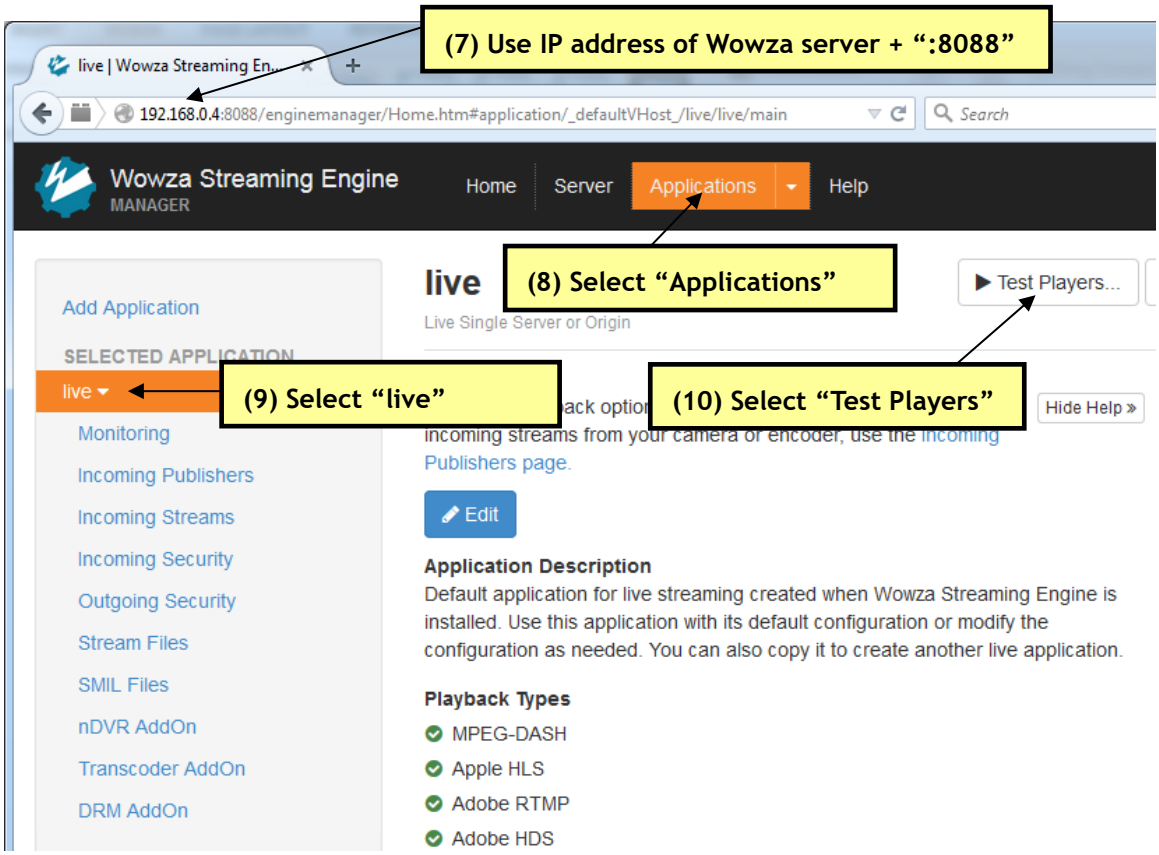

Figure 13 Getting to the Wowza Test Player

(11) You should see the "Test Players" popup screen. Select the "Adobe RTMP" tab,

(12) Change the Stream name to "1080" (should match the directory you are streaming to in the DME-05 user interface)

(13) Click "Start". You will then see the content streamed from your Z3 product.

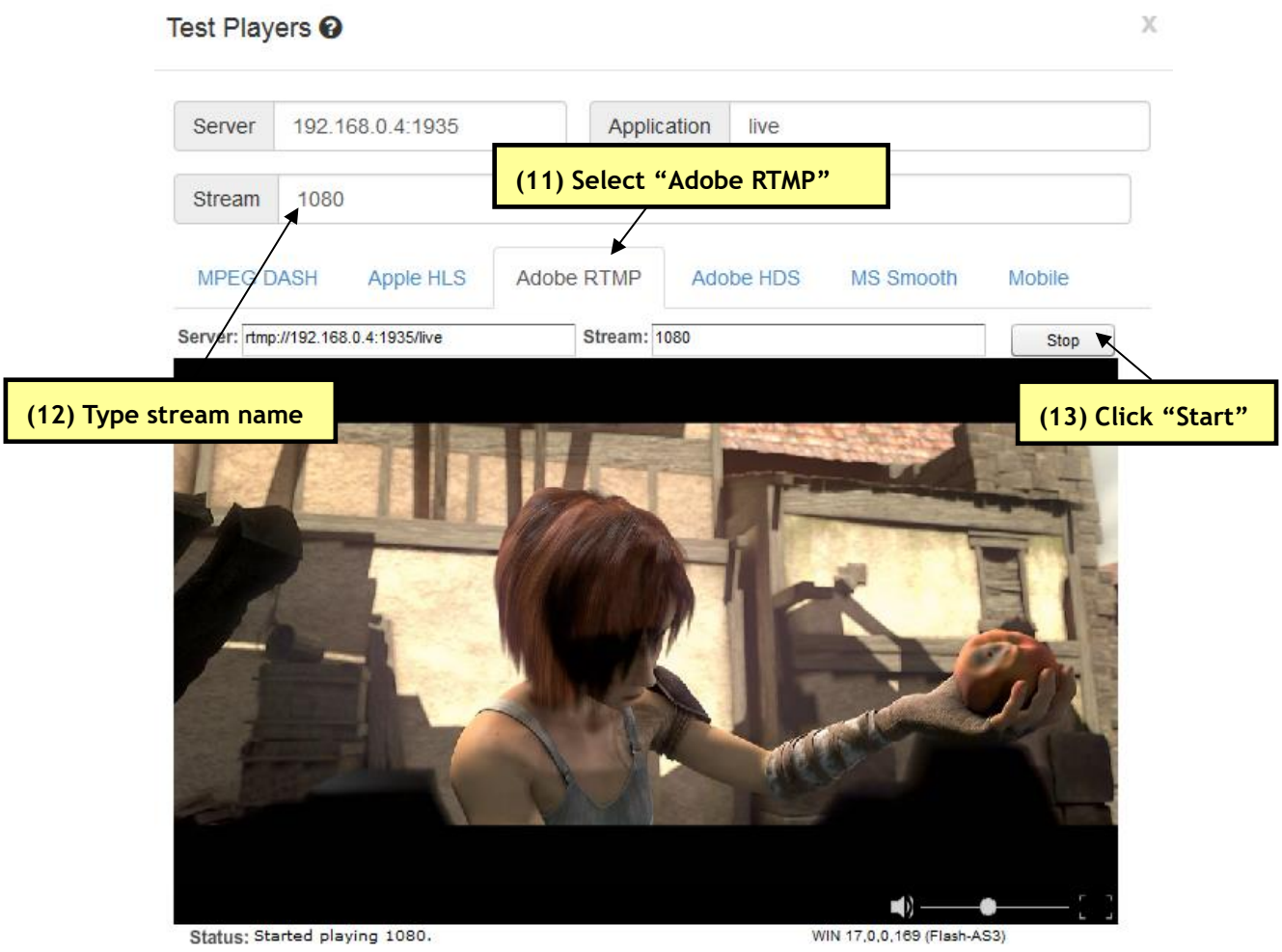

Figure 14 Viewing Content on Wowza

6.8.2 Stream RTMP to YouTube Live

(1) If you have not already done so, verify you have set up a YouTube live account and access your YouTube live dashboard. (As of the date of this document, the dashboard URL is: https://www.youtube.com/live_dashboard)

(2) Under Encoder Setup, locate your "Server URL" and "Stream name/key".

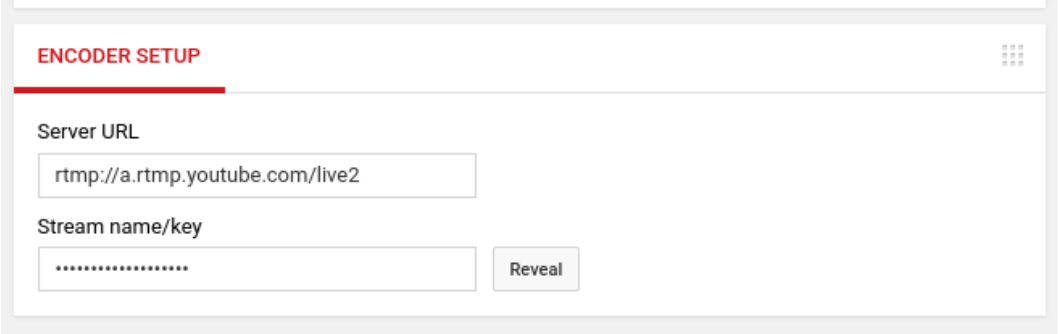

Figure 15 YouTube Live Dashboard – Encoder Setup

(3) Return to the encoder user interface CH1 tab and click on "stop" to stop the current encoding session.

(4) Set "Output Format" to "RTMP".

(5) For "Dest Address", type "{server_url}/{stream_key}",

(a) {server_url} will be the value specified in your YouTube Live dashboard.

(b) {stream_key} will be the value specified in your YouTube Live dashboard.

(6) It is recommended to set "Video Rate Control" to "CBR".

(7) It is recommended to set "GOP Size" to:

(a) 120 Frames – 240 Frames for 60 fps content.

(b) 60 Frames – 120 Frames for 30 fps content.

***Note:** By default a limited selection of video encoding settings are available in the user interface. See Section 8.3, "Advanced Settings Mode", for more information on accessing additional settings including GOP Size.*

(8) Consult the YouTube live stream setup documentation available in YouTube's online Live streaming guide for recommended bitrates for your resolution.

(9) Click the “start” button. Allow a few seconds for your video to appear in your YouTube live dashboard.

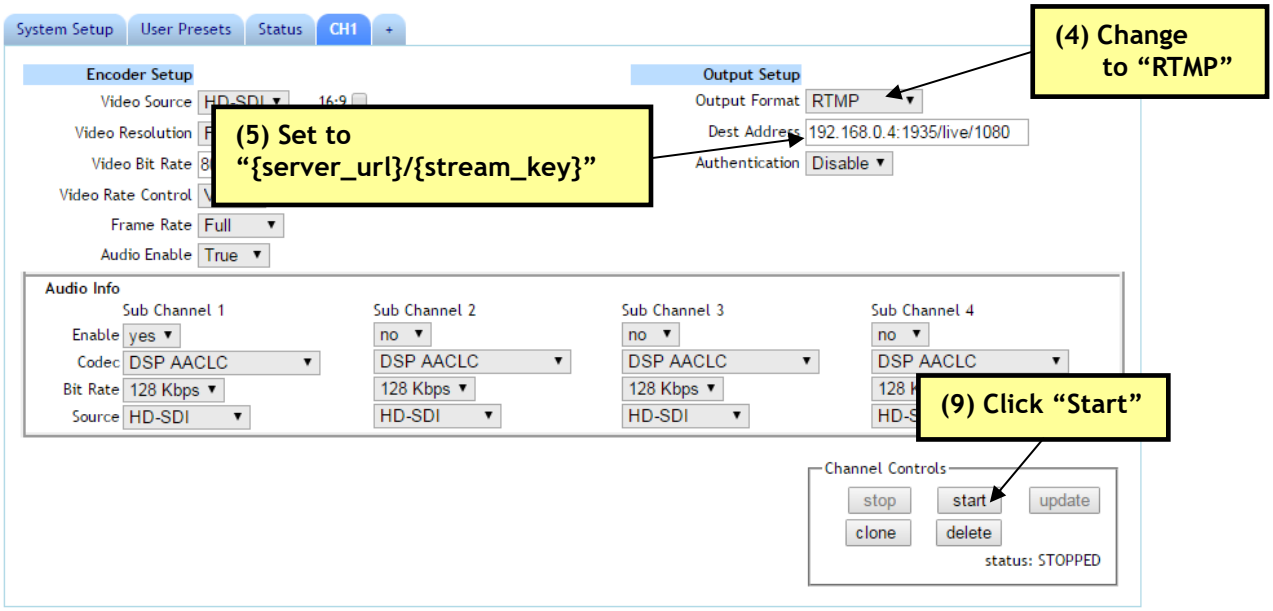

Figure 16 Channel 1 Tab - RTMP Streaming to YouTube Live

6.8.3 Facebook Live Streaming with RTMPS

(1) If you haven’t already, ensure you have an active Facebook account and page if broadcasting for an organization.

(2) Point your browser to Facebook’s main URL and navigate to the page management interface for your page, if desired. Select the “Live Video” link at the top of the “Create Post” dialog box near the top of the page.

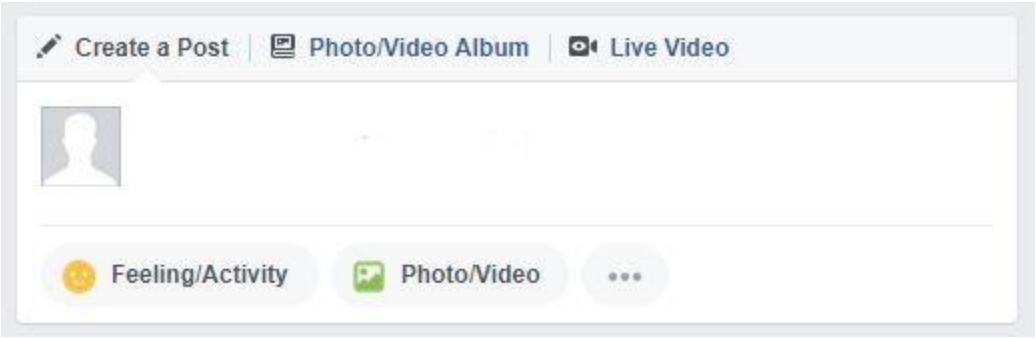

Figure 17 Facebook “Create Post” dialog box

(3) At the top of the new dialog box that appears, select External Device. Take note of the Server URL and Stream Key for your session displayed on the left.

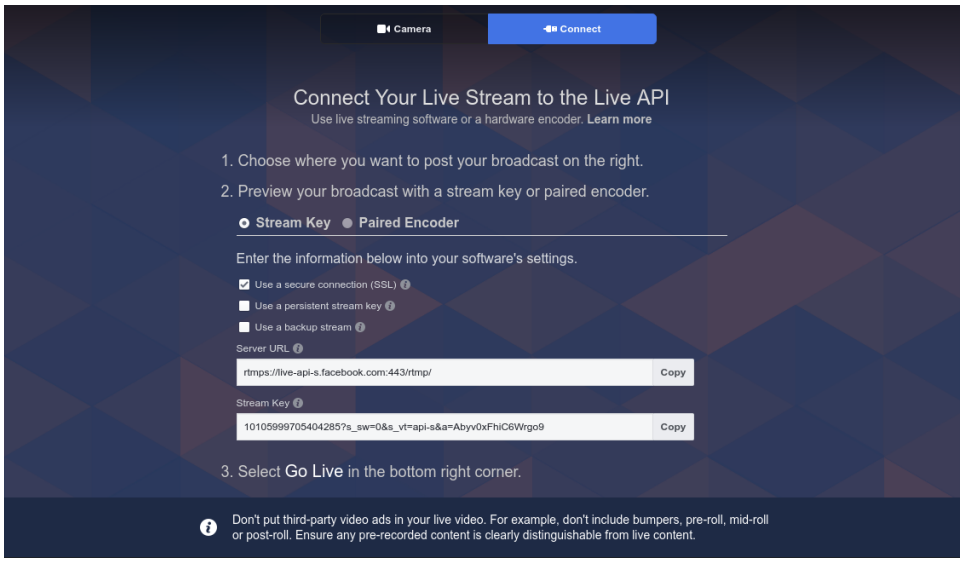

Figure 18 Facebook Live Streaming Dialog

(4) Return to the Z3-DME-05 web interface and select the "Ch1" tab. Click "Stop." Ensure the "Output Format" is set to "RTMPS."

(5) Enter the Server URL minus the protocol header and stream Key as a continuous string in the "Dest Address" field. In our example, the full address reads "live-api.facebook.com:443/rtmp/10105999705404285?s_sw=0&s_vt=api-s&a=Abyv0xFhiC6Wrgo9". Authentication should remain disabled.

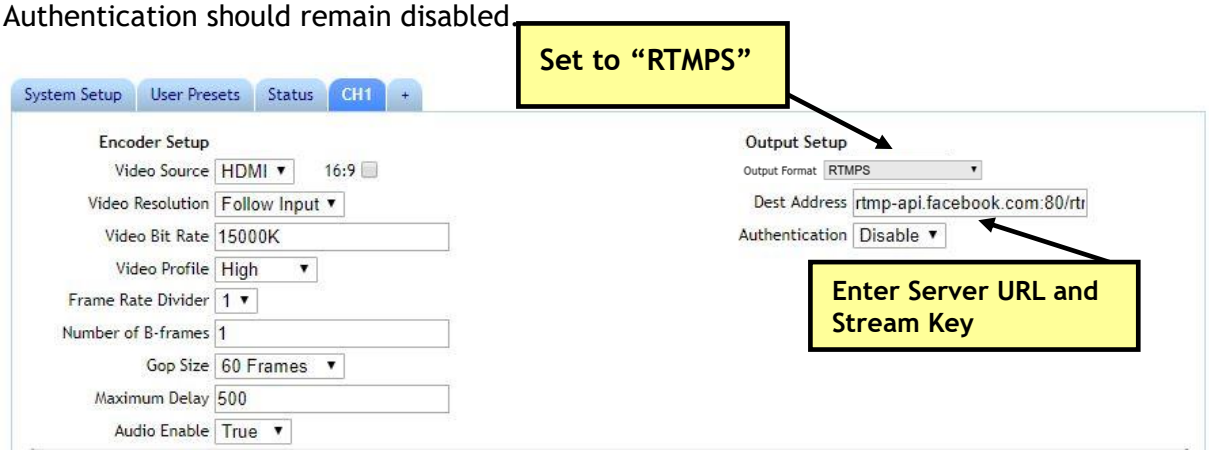

Figure 19 Facebook Live Stream Encoder Settings

(6) Click "Start" or "Start All" to begin encoding stream.

(7) Return to the Facebook Live Video Setting dialog box to ensure your stream is previewing properly. Add a message to the video stream, if desired, and click "Go Live" at the bottom. Your Stream is now active!

6.9 Configure Encoder for ASI Output

Once you have an IP stream, it is relatively simple to change to ASI output. All that is needed is one parameter change. To output using ASI, complete the following steps:

(1) The SDI connections also support ASI. Connect a BNC cable from "SDI Out" to your desired video decoder or other device to receive the ASI stream. The DME-05 can be connected directly to a second DME-05 unit configured as a decoder. For more information on running this unit as a decoder, see Section 6.18.

Figure 20 DME-05 Rear Panel ASI Output Connection

(2) In the CH1 configuration tab, click on "stop" to stop the current encoding session.

(3) Change "Output Format" from "UDP" to "ASI".

(4) Click on the "start" button to start the encoding session.

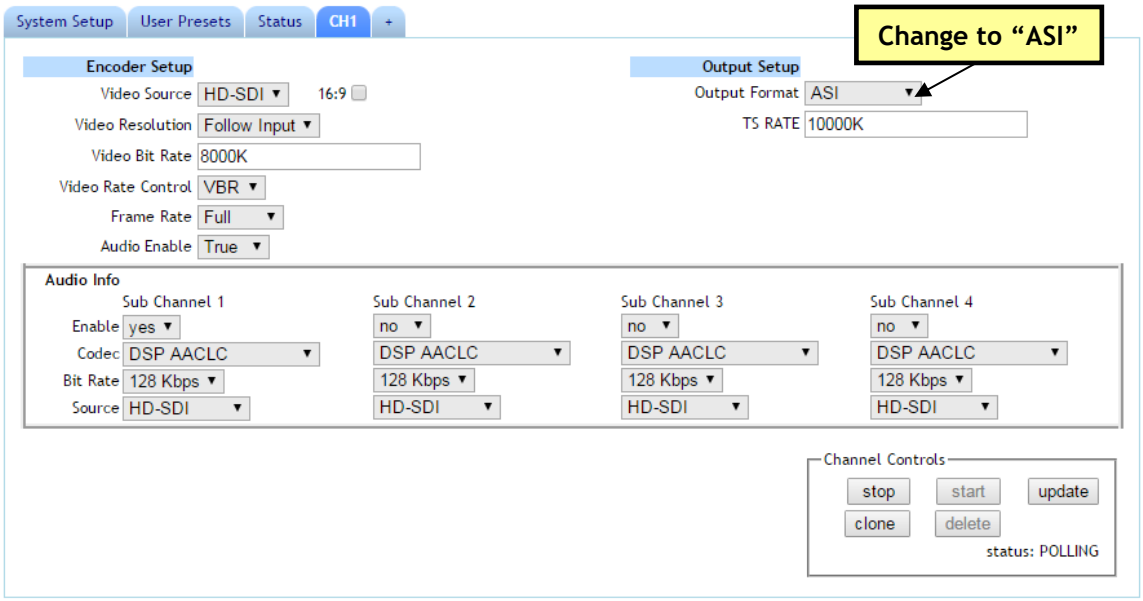

Figure 21 Channel 1 Tab - ASI

6.10 Encoding an HDMI Video Source

The Z3-DME-10 also supports encoding non-HDCP HDMI video.

(1) Connect an HDMI source to "HDMI In" on the rear panel of the encoder.

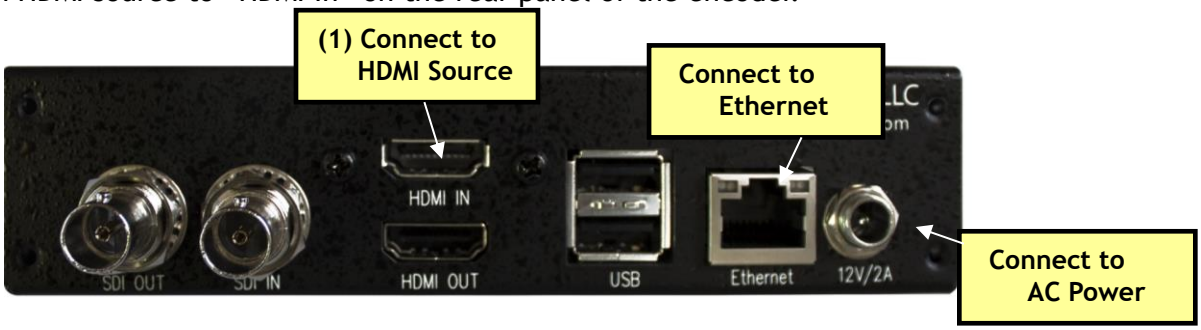

Figure 22 DME-05 Rear Panel HDMI Encode Connections

(2) Return to the user interface and click the "stop" button to stop any current encoding.

(3) At the CH1 tab, change the "Video Source" to "HDMI1" using the dropdown menu.

(4) Verify your remaining settings are as desired. See Section 9.0 for a detailed list of all options.

***Note:** By default a limited selection of video encoding settings are available in the user interface. See Section 8.3, "Advanced Settings Mode", for more information on accessing additional settings.*

(5) Click the "start" button.

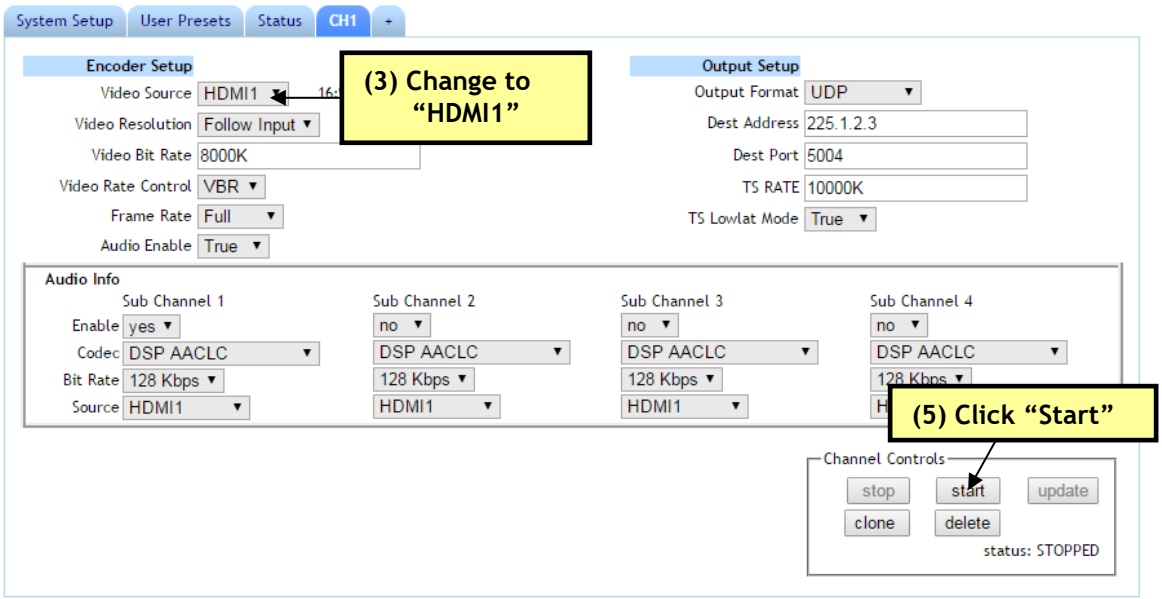

Figure 23 Channel 1 Tab - HDMI

6.11 Changing the Bitrate and Frame Rate Dynamically

The DME-05 includes an "update" button which allows you to change the bitrate or frame rate without stopping and restarting the encoder. To observe this feature, complete the following steps:

(1) In VLC, click on "Tools" and select "Codec Information". This brings up a window with four tabs. Select the "Statistics" tab. In this tab, you can see the current video + audio bitrate:

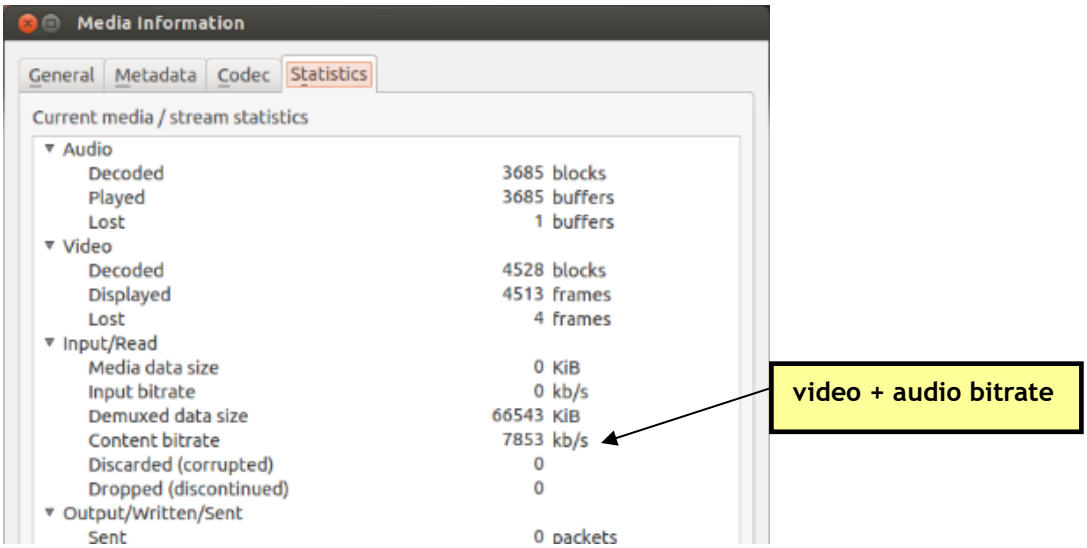

Figure 24 Viewing Bitrate in VLC

(2) In the CH1 tab, change the "Video Bitrate" from "8000K" to "2000K" and click the "update" button.

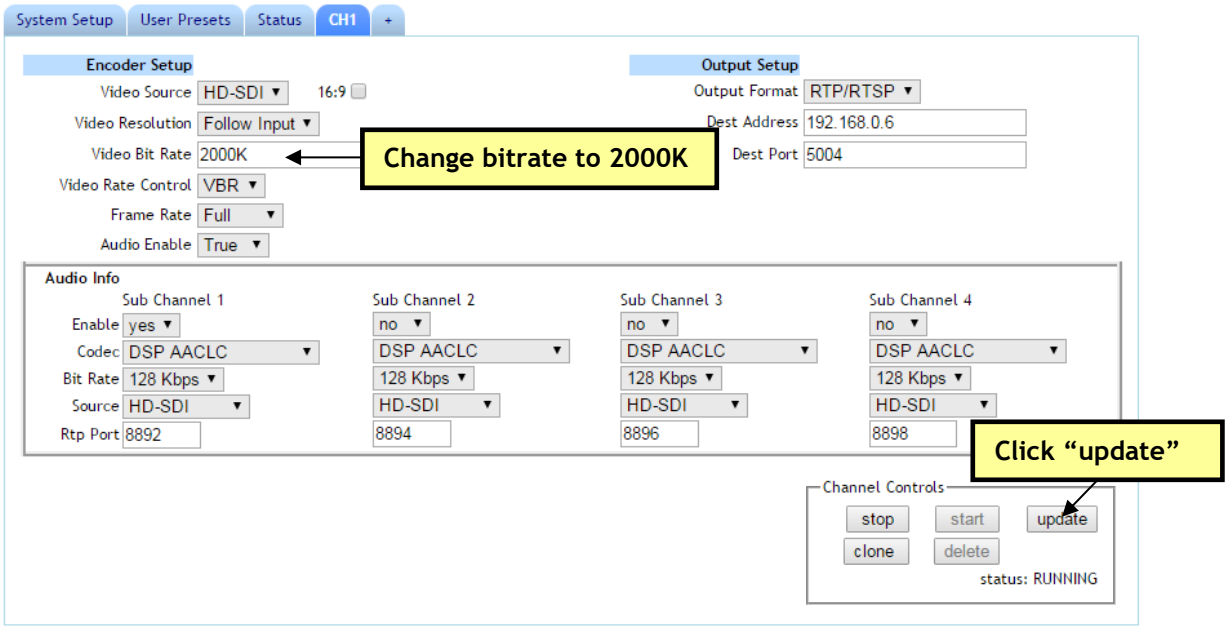

Figure 25 Changing the Bitrate Dynamically

(3) You should see the video bitrate drop and the quality of the picture in VLC change.

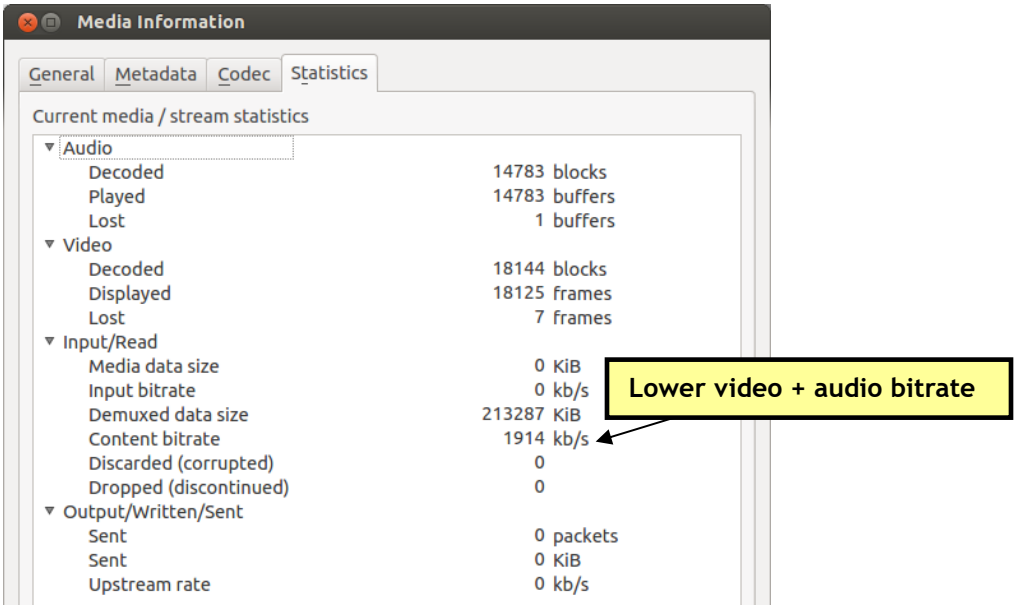

Figure 26 Drop in Bitrate after Dynamic Bitrate Change

If you click on the "Status" tab and click "Refresh," you will also see the updated bitrate reflected:

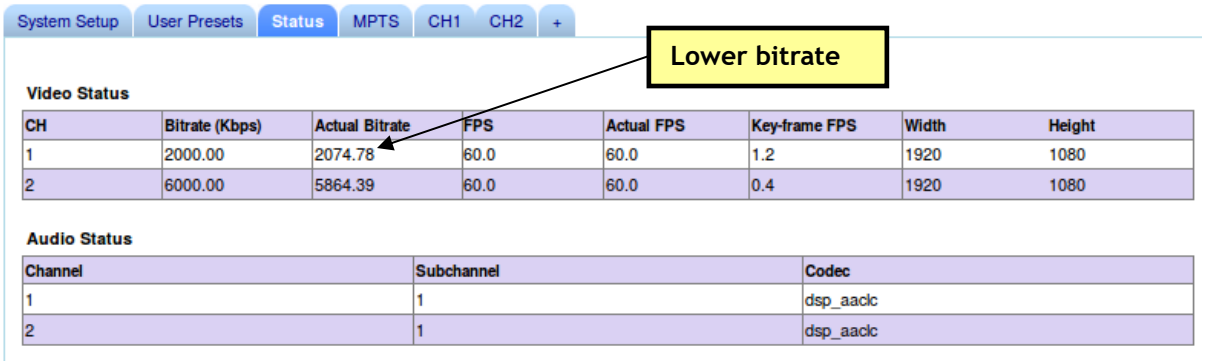

Figure 27 Status Page Output Showing Lower Bitrate

The parameter "Frame Rate" can also be updated dynamically using the "update" button. All other parameters require a stop and then start to change.

6.12 Adjusting the UDP TS Rate

The DME-05 includes a parameter to adjust the TS rate independent of the video bitrate. This can be found when UDP is selected as the output format.

Normally, this value is set to 25% to 33% above the sum of the video and audio bitrate. For example, the default value out of the factory is a value of 10Mbps, corresponding to 8Mbps for the video.

There are times, however, when it is desirable to make this value higher. For example, if the encoder bitrate is very low (below 1Mbps), it is advisable to allow more leeway in the event there are some challenging scenes to encode. The steps below show an example where this might be desirable and what specifically you can do to change this and verify that the change was successful.

(1) In the CH1 configuration tab, click on "stop" to stop the current encoding session.

(2) Change "Video Resolution" to "720x480".

(3) Set "Video Bitrate" to "512K".

(4) Set "Output Format" to "UDP".

(5) When UDP is selected, the "TS RATE" field will appear with the default value of "10000K". Change this to "1000K".

(6) Click on the "start" button.

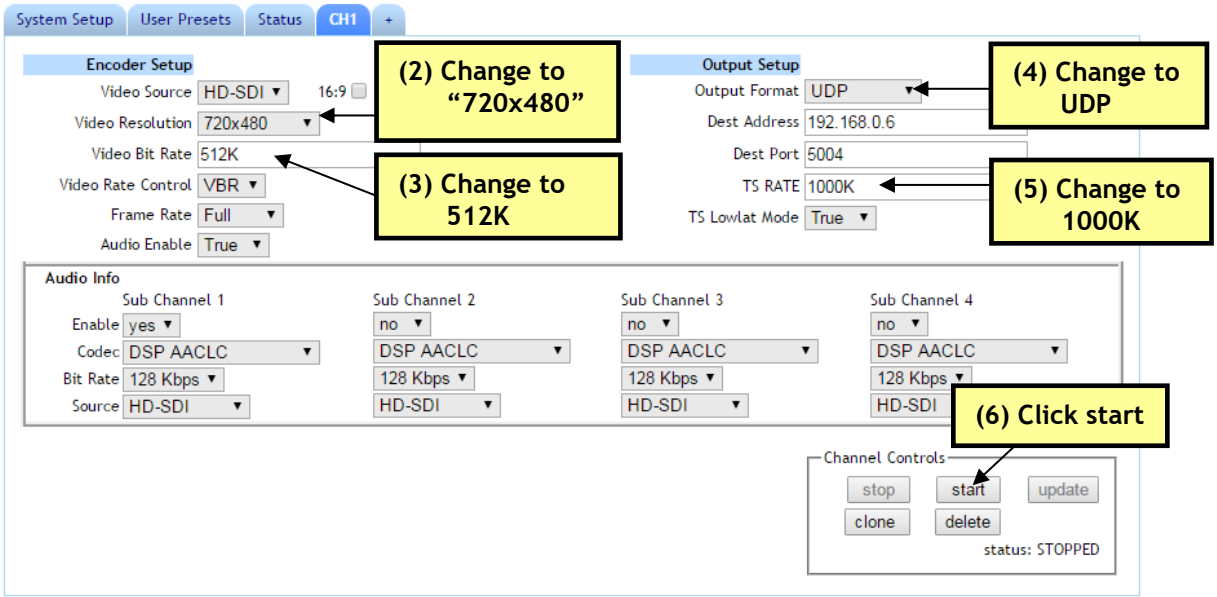

Figure 28 Changing TS Rate

(7) Open VLC to view your UDP stream (see Section 6.5) and view the Media Information "Statistics" tab (see Section 6.8). You will see a lower value for the overall input rate and for the "content" rate:

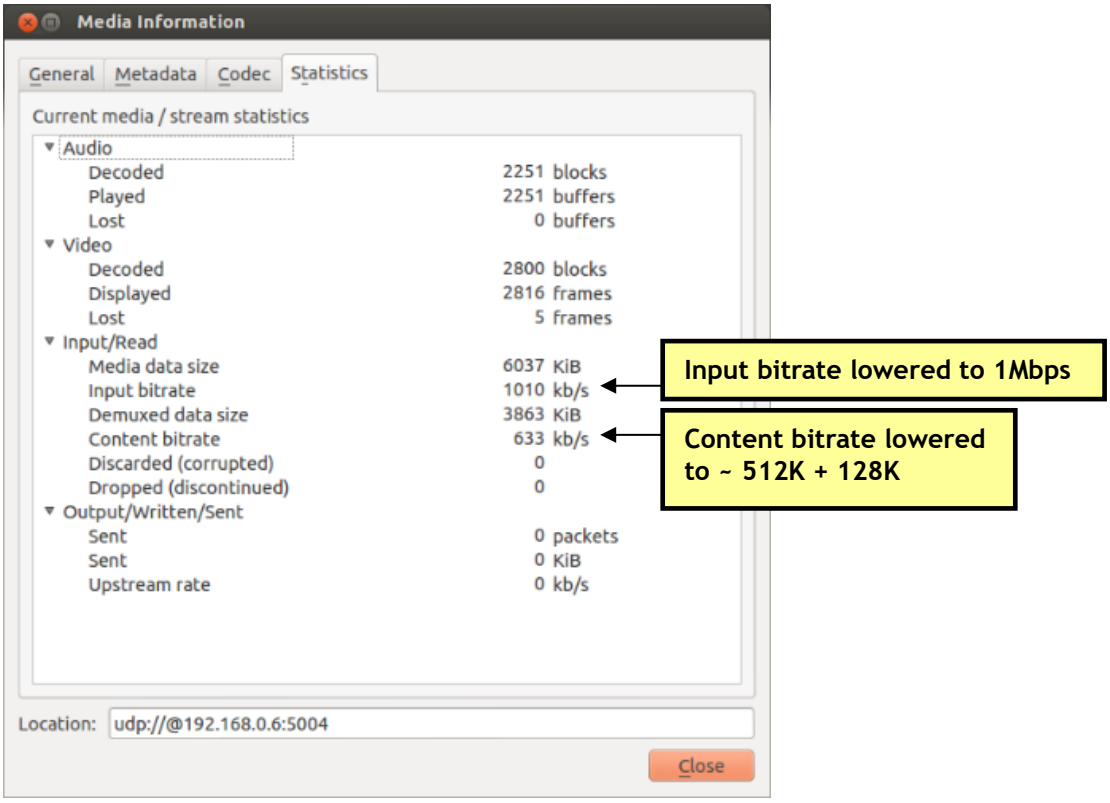

Figure 29 TS Rate and Lower Bitrate Reflected in VLC

The value of TS Rate must be higher than (video bitrate + audio bitrate) * 1.25. If an attempt is made to input a value less than this, the error message "TS rate too small to carry elementary streams" will appear.

6.13 Tuning for Latency

6.13.1 Maximum Delay and B-frames

For latency, the key parameters to work with are Maximum Delay and Number of B-frames. These settings can only be accessed when the advanced settings mode has been enabled. (See Section Advanced Settings Mode" for more information on accessing these settings.)

Maximum Delay defines the number of milliseconds of buffering the encoder has to work with. The higher this value, the more buffer it has to work with and the more time it has to "smooth things out" for challenging content. However, a higher value also causes latency to increase accordingly. To minimize latency, this value should be set to the lowest possible value. The lowest value Z3 recommends is 100. Note that lowering this value will also cause quality to degrade for challenging content (because the encoder has fewer bits "over time" to work with). The tradeoff between latency and quality through this parameter is left up to the user.

B-frames improve the quality of the picture, but they also increase the latency by 1 frame time. To minimize latency, B-frames should be disabled (done by setting "Number of B-frames" to "None").

In general, streaming using RTP will result in lower latency than streaming using TS.

Figure 30 shows the suggested values for Maximum Delay and Number of B-frames for three common use cases:

	Maximum Delay	# of B-frames
Case 1: Highest Quality, Highest Latency	2000	2
Case 2: Good Quality, Standard Latency	500	1
Case 3: Normal Quality, Lowest Latency	100	None

Figure 30 Tuning for Latency

6.13.2 TS Lowlat Mode

When streaming UDP or TSRTP, the DME-05 supports a low latency mode called TS Lowlat Mode. When enabled, TS Lowlat Mode sends the transport stream packets as soon as possible, instead of pacing them out evenly.

For minimum latency (with possibility of skipped frames) at the expense of increased network burstiness, set TS Lowlat Mode to “True”. This is enabled by default.

To ensure smoothest playback and reduce loading on network, set TS Lowlat Mode to “False”. This must be set to “False” for the stream to be compliant with ISO 13818-1 systems specification for transport stream timing.

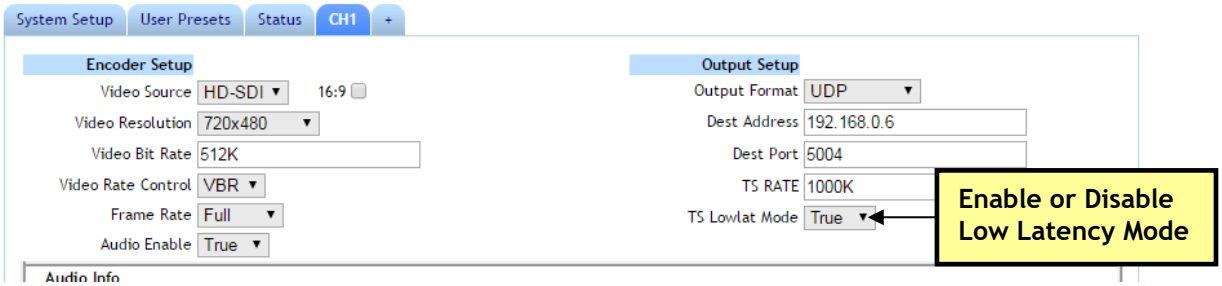

Figure 31 Enable TS Lowlat Mode

6.13.3 VLC Media Player Latency

If streaming to VLC, latency can be reduced on the decode side by adjusting the network caching value. By default, this is set to 1000ms. You can lower this to as low as 200ms. To do this, go to the following:

VLC → Tools → Preferences → Show Settings (ALL) → Input / Codecs → Network caching (ms)

6.14 Recording to USB

The DME-05 supports writing encoded video to a storage device connected to the USB port in .ts file format.

(1) Verify the encoder is connected to an SDI or an HDMI video source.

(2) Open the user interface (See Section 6.3).

(3) Connect a USB flash drive or other USB storage device to "USB" on the back of the encoder.

***Note:** The USB drive must be formatted in either FAT32, VFAT, EXT3, or EXT4 format.*

(4) Return to the user interface channel tab and select "TSFILE" from the "Output Format" dropdown menu.

(5) The "Output Device" and "File Prefix" fields appear. Click on the "Output Device" field to select your USB storage location. This will automatically populate if a USB is detected.

If one USB device is connected, "/dev/sda1" corresponds to either USB port. If two USB devices are connected, "/dev/sda1" corresponds to USB device that was connected first and "/dev/sdb1" corresponds to the USB device that was connected second. Only one device can be selected at a time for each channel.

(6) In the "File Prefix" textbox, enter the desired prefix for your .ts file name.

(a) When saved, a number will be automatically generated and added to the end of the file prefix, starting with zero. If subsequent recordings are made to the same USB device, existing files with the same prefix will be detected and the new recordings will auto-increment to the next number.

(b) For example, by default, the prefix "MOV" is provided. This will result in a file entitled "MOV0.ts" on the USB. Subsequent recordings will be entitled "MOV1.ts", "MOV2.ts", etc.

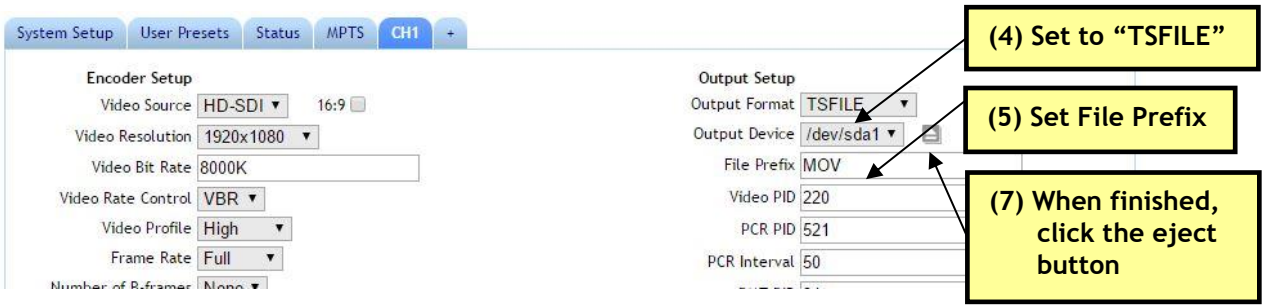

Figure 32 CH1 Tab Configuration – TSFILE

(7) When finished, click the eject button next to the "Output Device" field. An alert will appear when the USB is able to be removed safely.

6.15 Simultaneous Streaming and Recording

When streaming UDP, TSRTP or ASI, the TS stream can be simultaneously saved to a file on a USB storage device. This auxiliary TS file option can only be accessed when the advanced settings mode has been enabled. (See Section Advanced Settings Mode," for more information on accessing these settings.)

(1) Verify the encoder is connected to an SDI or an HDMI video source.

(2) Open the user interface (See Section 6.3).

(3) Connect a USB flash drive or other USB storage device to "USB" on the back of the encoder.

***Note:** The USB drive must be formatted in either FAT32, VFAT, EXT3, or EXT4 format.*

(4) Return to the channel tab and set the "Output Format" to output "UDP" (See Section 6.4), "TSRTP" or "ASI" using the dropdown menu.

(5) When one of these options is selected, the "Aux TS File Enable" field appears. Select "True" using the dropdown menu to enable an auxiliary .ts file recording.

(6) The "Output Device" and "File Prefix" fields will appear. Refer to Section 6.14 to set these fields and eject your USB device when finished.

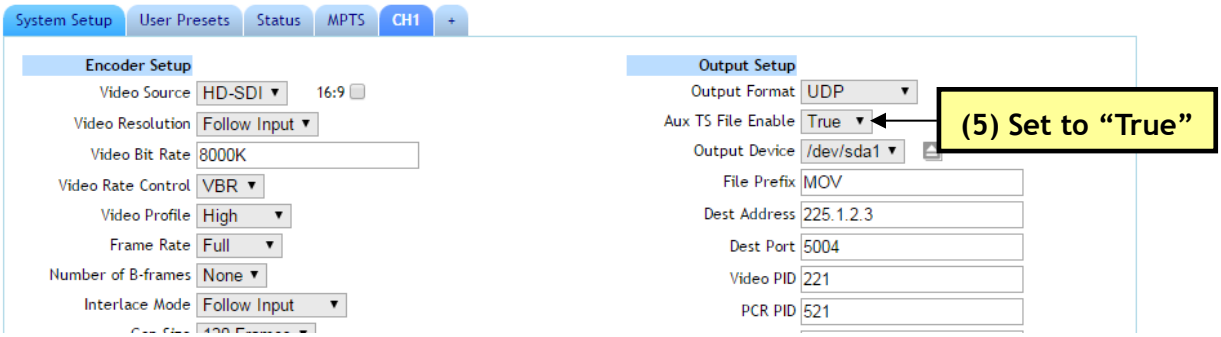

Figure 33 Using the Aux TS File Enable Option

6.16 Using MPTS to Combine Multiple Streams

The DME-05 includes an MPTS (Multiple Program Transport Stream) that combines multiple channels into a single stream. This can be used by taking two inputs to the DME-05 and simultaneously streaming them into one ASI output and/or one IP stream containing two channels.

The MPTS option can only be accessed when the advanced settings mode has been enabled. (See Section Advanced Settings Mode" for more information on accessing these settings.)

(1) Verify the encoder is connected to an SDI and an HDMI video source.

(2) Open the user interface (See Section 6.3).

(3) The SDI connections also support ASI. Connect a BNC cable from "SDI Out" to your desired video decoder or other device to receive the ASI stream.

Figure 34 Z3-MVE-250 Rear Panel Example Encode Connections

(4) In the "CH1" tab, select "HD-SDI" for the "Video Source" and change the "Output Format" to "MPTS".

(5) If necessary, create the second channel by clicking on the + tab.

(6) In the "CH2" tab, select "HDMI1" for the "Video Source" and change the "Output Format" to "MPTS".

(7) In the "MPTS" tab, set the total MPTS transport rate. This should equal the total transport rate of all channels being fed into the MPTS plus a 20% margin.

(8) Set the destination(s). In the pictured example, the two destinations are ASI out and the UDP address 221.1.2.3, port 6000.

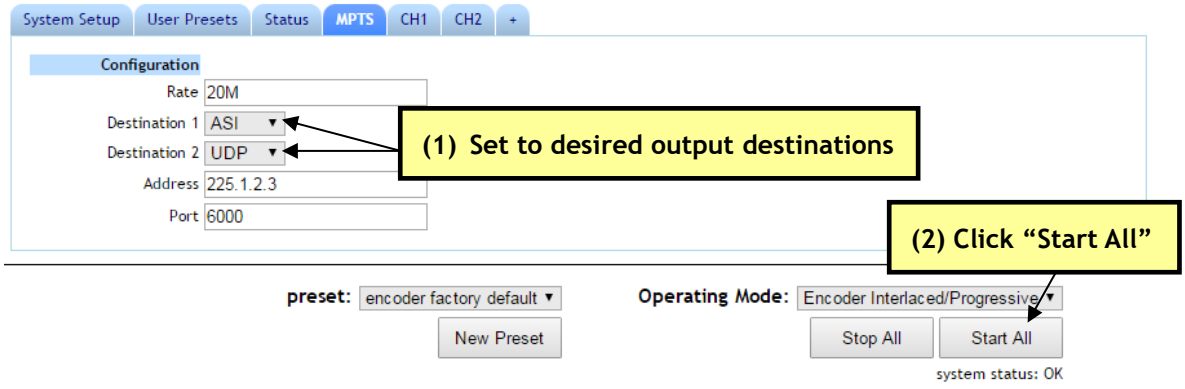

Figure 35 MPTS Tab

(9) Click "Start All" at the bottom of any tab to start encoding. Both streams will now be able to be received via ASI and viewed using VLC media player.

(10) Run VLC on your PC (version used by Z3: 2.1.5)

(11) Select Media – Open Network Stream. In the box, type "udp://@ 225.1.2.3:6000", where "225.1.2.3" matches the values of the computer IP address or multicast address and "6000" is the value of "Dest Port" entered in the MPTS tab.

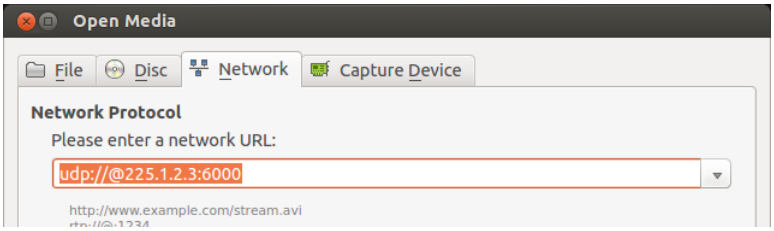

Figure 36 Opening VLC for MPTS Multicast Stream

(12) You will then see channel 1. To view channel 2, go to "Playback -> Program -> 2" in VLC.

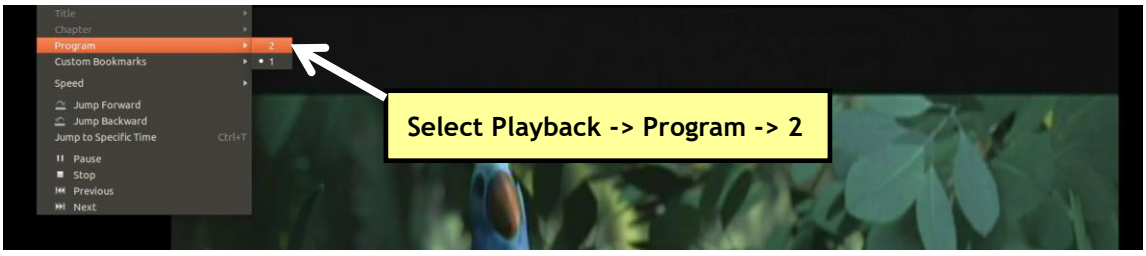

Figure 37 Viewing Channel 2 in VLC

6.17 Encoding Closed Captioning

The DME-05 supports extraction of closed caption data from SDI input. This automatically occurs any time SDI input with closed caption data included is used. To utilize this feature, complete the following:

(1) Connect an SDI signal with closed caption data to the SDI Input (see Section 5.0).

(2) Configure the encoder to output UDP (See Section 6.4).

(3) Open the stream in VLC (See Section 6.5).

(4) In VLC, select “Subtitle – Sub Track – Closed Caption 1”. This configures VLC to use the extracted closed caption data that the encoder has extracted and encoded. You will then see the subtitles on the screen.

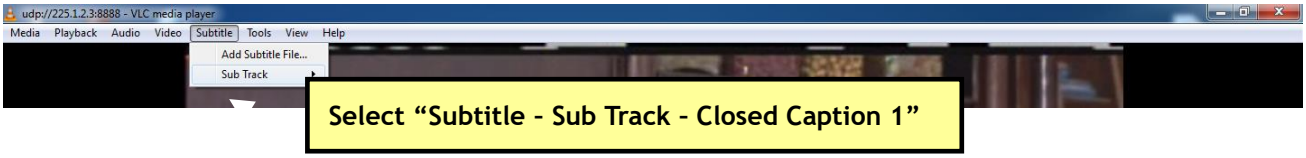

Figure 38 Setting VLC to use the Extracted Closed Caption Data

6.18 Encoding with Forward Error Correction

The DME-05 supports encode of TSRTP streams with Pro-MPEG Forward Error Correction (FEC).

(1) Verify the unit is in encoder mode and connected to a video source.

(2) Open the user interface (See Section 6.3).

(3) At the CH1 tab, the "Output Format" must be set to "TSRTP" in order to use Pro-MPEG FEC.

(4) After setting the "Output Format", the "FEC Enable" dropdown will appear.

(5) Change the value for “FEC Enable” to “True”. This will allow for setting the number of FEC columns and rows. The default setting is 5x5. This is a medium level of coverage that will work in many situations. The number of columns multiplied by the number of rows must be less than or equal to 100, so 10x10 would be an example of the maximum coverage. Keep in mind larger numbers of columns and rows result in a larger latency during decode.

(6) Once “FEC enable” is set to “True” and “FEC Columns” and “FEC Rows” are set to the desired numbers, click the “start” button to begin the stream.

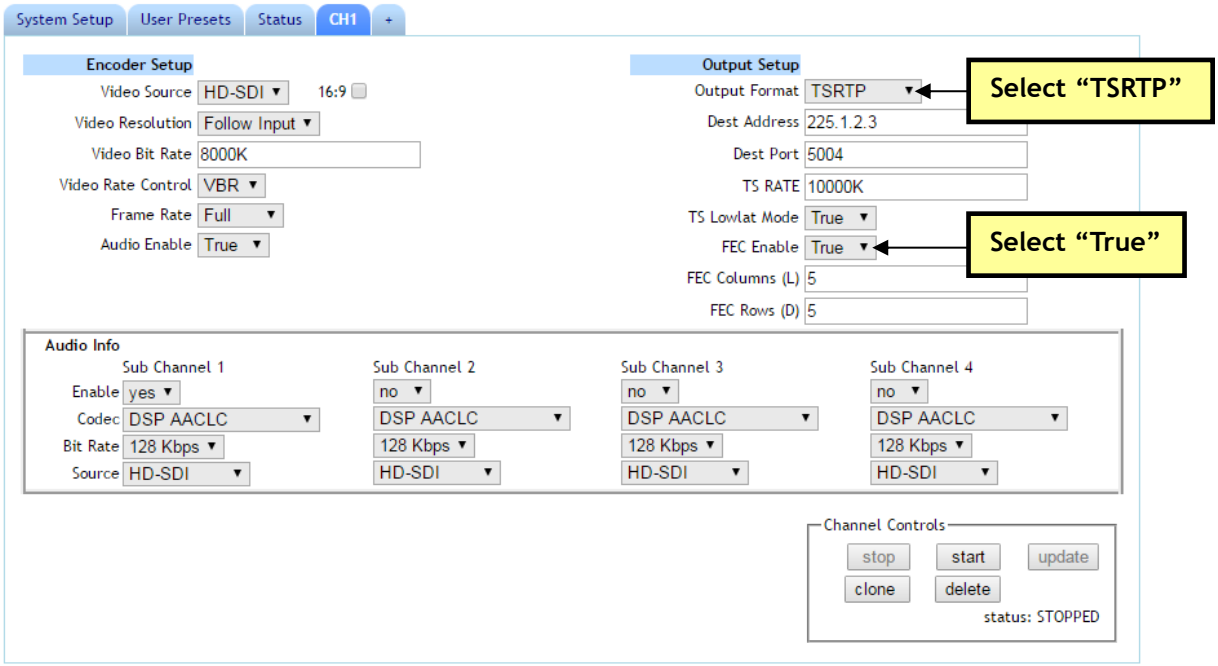

Figure 39 Enabling Pro-MPEG FEC Encode

For more information on testing and verifying FEC using a Z3 Technology encoder and decoder with Pro-MPEG FEC support, please contact your Z3 sales account manager for additional user instructions.

7.0 RUNNING THE DECODER

The DME-05 can also be configured as a video decoder. To see an example of this follow the steps below.

7.1 Set to Decoder Mode

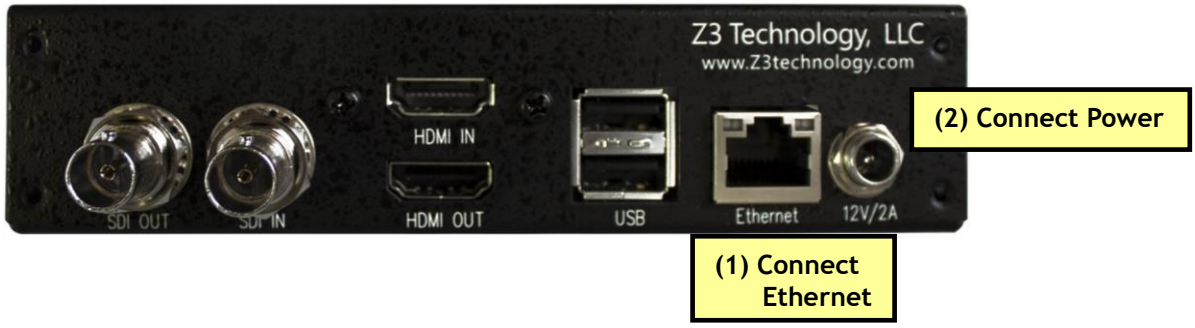

Figure 40 DME-05 Rear Panel Decode Setup Connections

(1) Connect an Ethernet cable from "Ethernet" on the back of the unit to a switch, router or other DHCP server on the same network as your Windows PC. You will use this PC to control the DME-05 and to decode the output stream.

(2) Connect the AC power supply. It will take 45-60 seconds to boot.

(3) Follow the steps in Sections 6.3 to access the user interface.

(4) Change "Operating Mode" in the lower right corner of any tab to "Decoder" using the dropdown menu.

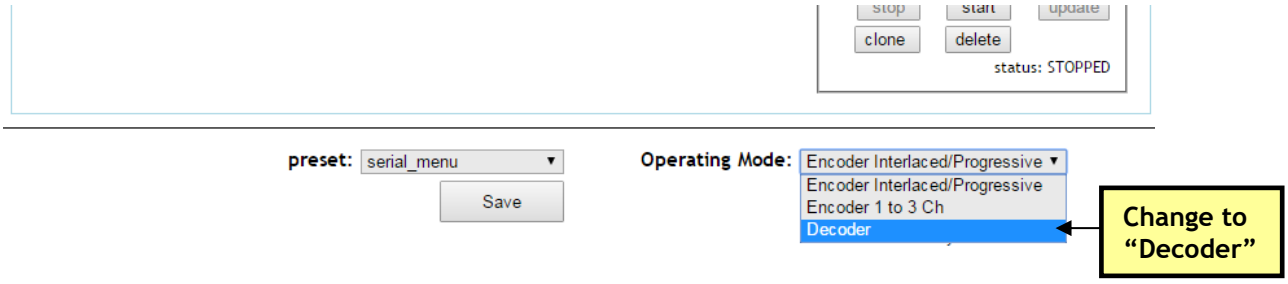

Figure 41 Changing to Decoder Mode

See the following Sections 7.2, 7.3 and 7.4 to set the decoder unit to accept a variety of encoded content formats. See Section 7.5 to output decoded content via HDMI and Section 7.6 to output decoded content via SDI.

7.2 Decoding ASI Input

(1) The SDI connections also support ASI. Connect a BNC cable from your video encoder or other device streaming encoded ASI content to “SDI In” on the decoder unit.

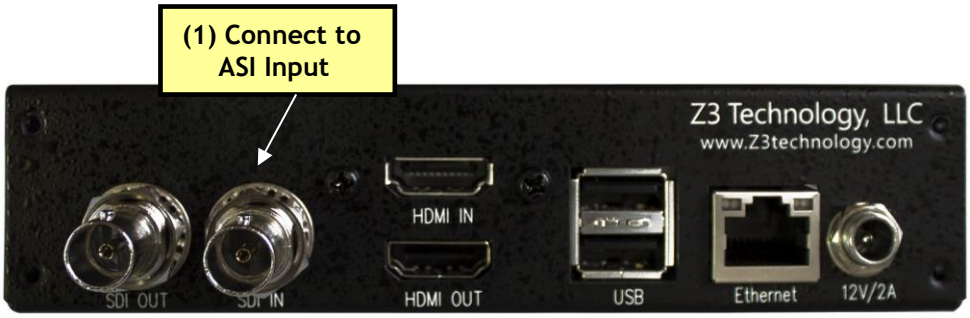

Figure 42 DME-05 Panel ASI Decode Connection

(2) Return to the user interface “CH1” tab.

(3) Set the “Input Interface” to “ASI” using the dropdown menu.

(4) If desired, set “Audio Output” to “ON” using the dropdown menu to allow for audio with the decoded video.

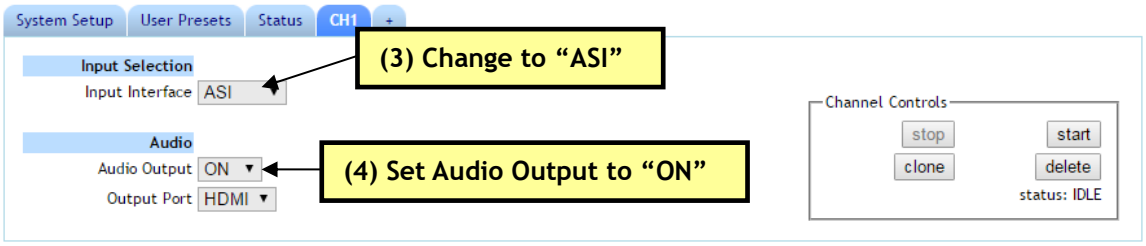

Figure 43 Channel 1 Tab - ASI Decode

7.3 Decoding IP Streams

(1) Return to the user interface “CH1” tab.

(2) Set the “Input Interface” to match the incoming IP stream format using the dropdown menu. In the pictured example “UDP” is selected.

(3) Fields will appear for additional information regarding the incoming IP stream. Enter the “Address” that corresponds to the destination address entered in the encoder. In the pictured example, the decoder is accepting content being streamed to the multicast address “225.1.2.3”.

(4) If the address is a multicast address, the checkbox after “Is Multicast” must be checked.

(5) Enter the “Port” that corresponds to the destination port entered in the encoder. In the pictured example, the encoder is streaming to port “5004”.

(6) If desired, set “Audio Output” to “ON” using the dropdown menu to allow for audio with the decoded video.

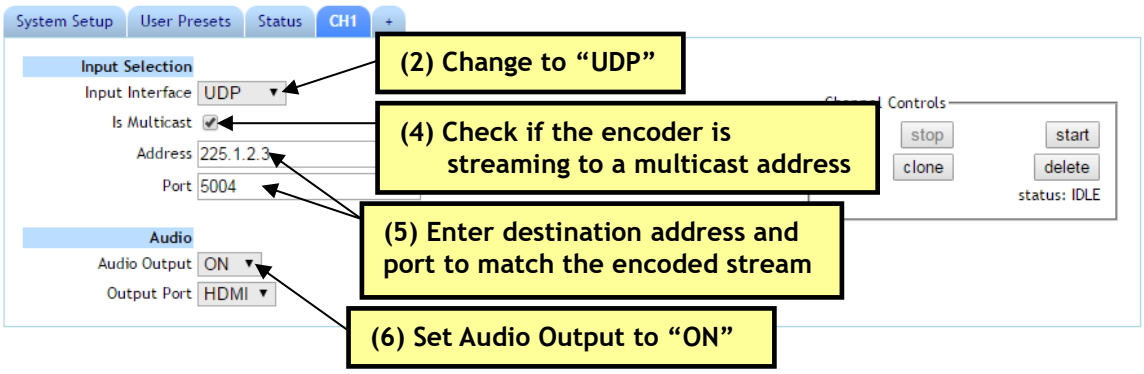

Figure 44 Channel 1 Tab - UDP Decode

7.4 Decoding a .ts File

(1) Follow the instructions in Section 6.14 or 6.15 to save an encoded stream to a TS file. In the pictured example, the file was called "MOV1.ts".

(2) Connect the USB device containing the .ts file to a USB port on the decoder unit.

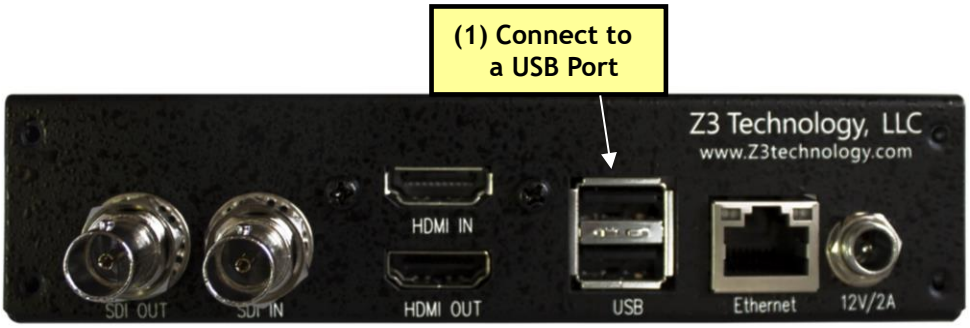

Figure 45 DME-05 Rear Panel USB Connection

(3) Return to the user interface "CH1" tab and change the "Input Interface" to "TSFILE" using the dropdown menu.

(4) In the "Location" text box, enter "/media/sda1/MOV1.ts", where "MOV1.ts" matches the name of the file to be decoded.

(5) If desired, set "File Loop" to "ON" using the dropdown menu so the file will be replayed in a continuous loop once the end is reached.

(6) If desired, set "Audio Output" to "ON" using the dropdown menu to allow for audio with the decoded video.

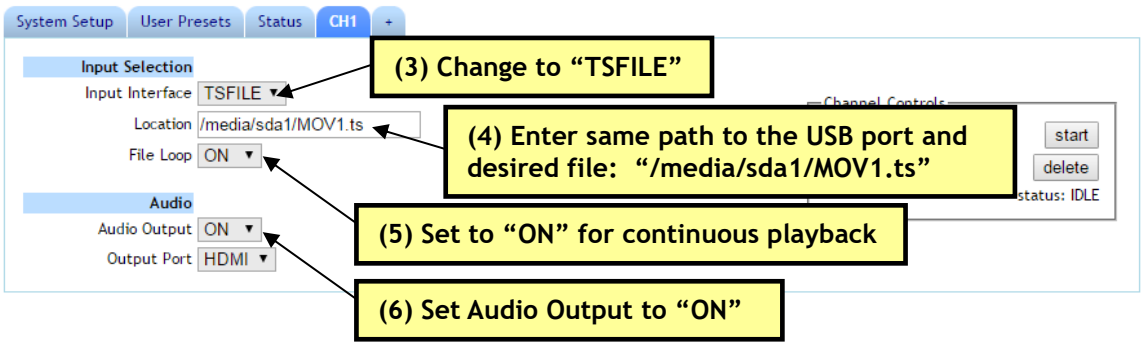

Figure 46 Channel 1 Tab - .ts File Decode

7.5 Output HDMI

(1) Connect an HDMI cable from “HDMI Out” on the decoder unit to an HD TV or monitor.

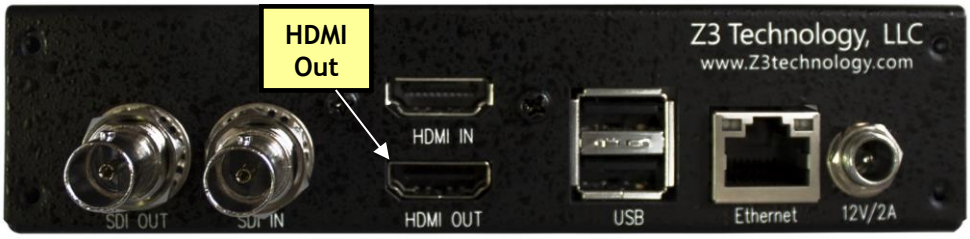

Figure 47 DME-05 HDMI Output Connection for Decode

(2) Return to the user interface System Setup tab. In decoder mode, settings for Display Setup appear.

(3) Select “hdmi” for the “Display Mode” using the dropdown menu.

(4) Verify the “Resolution” and “Layout” are as desired and click the “Set Display” button.

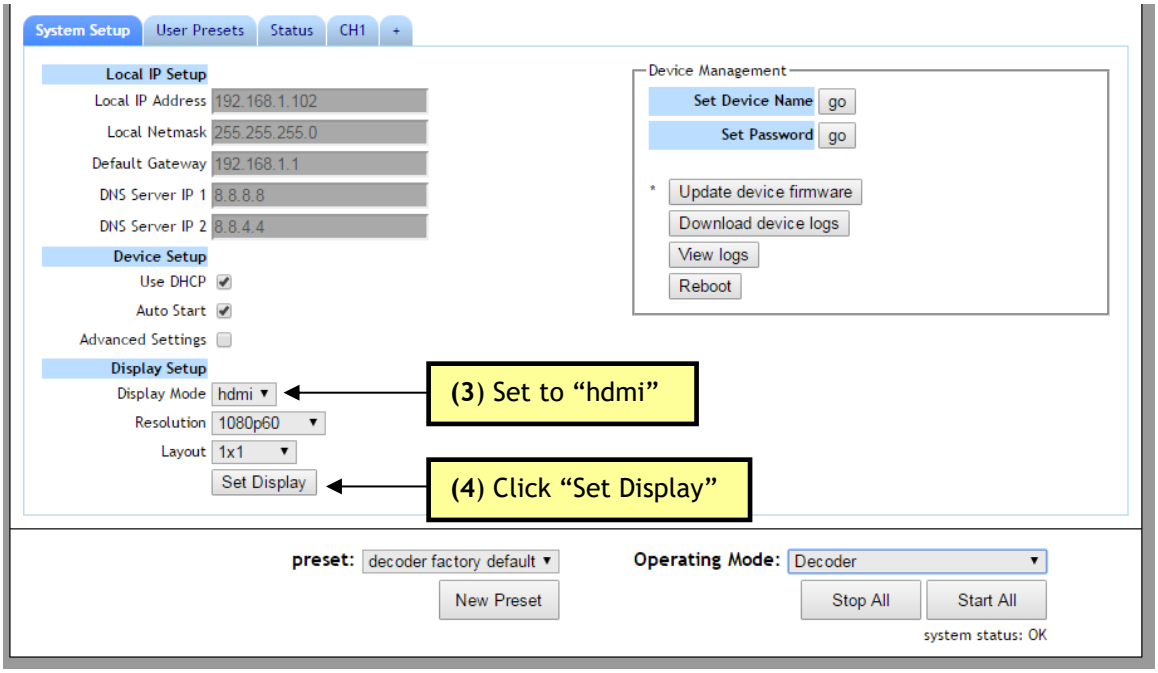

Figure 48 Set Display for HDMI Output

(5) Navigate to the CH1 tab and, if audio is needed, select “HDMI” from the “Output Port” dropdown menu.

(6) Click the “start” button to begin decoding. Video will appear on the monitor after 5-10 seconds.

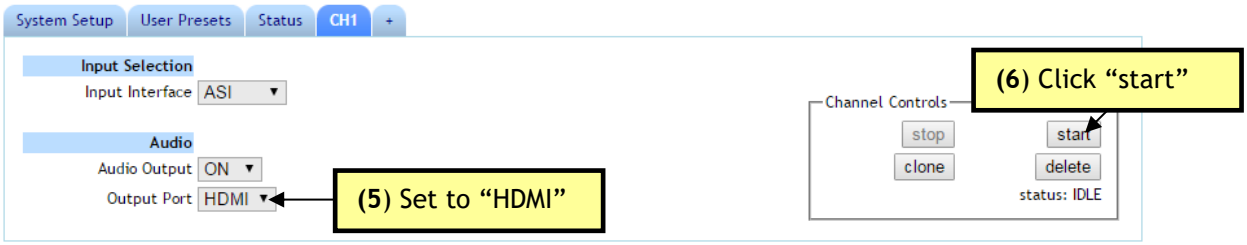

Figure 49 Set Audio for HDMI Output

7.6 Output SDI

(1) Connect a BNC cable from “SDI Out” on the decoder unit to an HD TV or monitor.

Figure 50 DME-05 SDI Output Connection for Decode

(2) Return to the user interface System Setup tab. In decoder mode, settings for Display Setup appear.

(3) Select “sdi” for the “Display Mode” using the dropdown menu.

(4) Verify the “Resolution” and “Layout” are as desired and click the “Set Display” button.

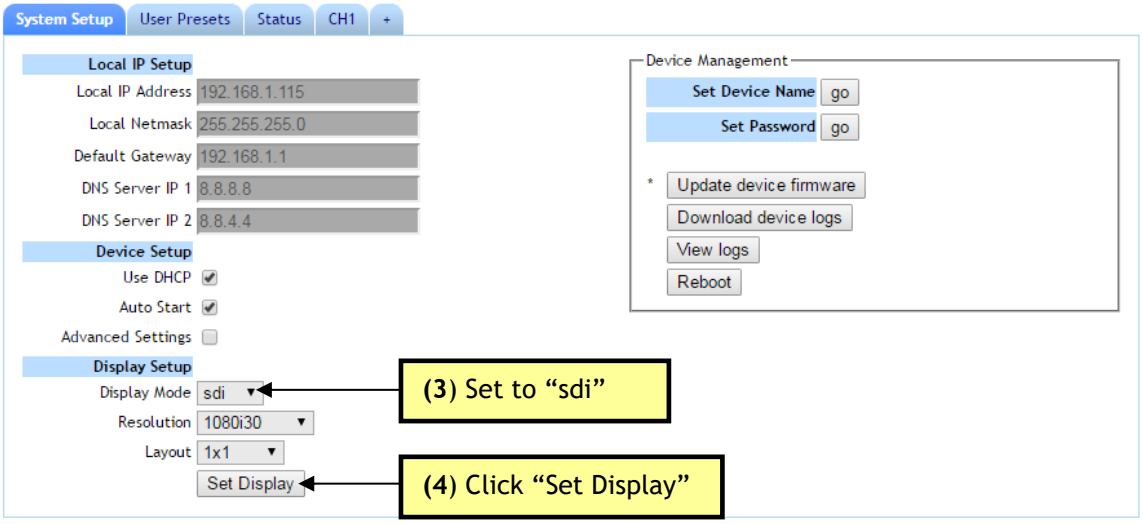

Figure 51 Set Display for SDI Output

(5) Navigate to the CH1 tab and, if audio is needed, select "SDI" from the "Output Port" dropdown menu.

(6) Click the "start" button to begin decoding. Video will appear on the monitor after 5-10 seconds.

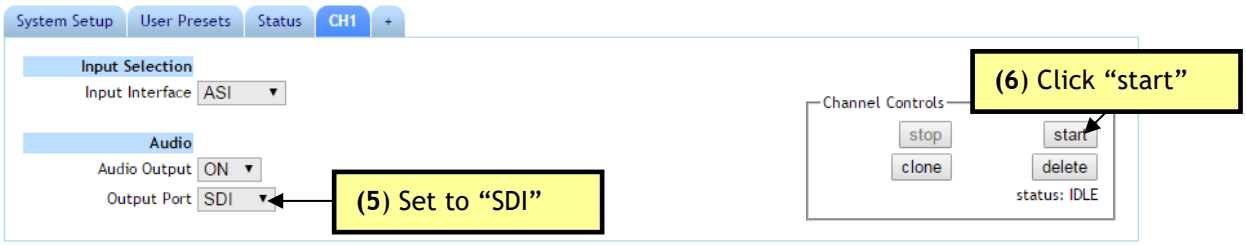

Figure 52 Set Audio for SDI Output

7.7 Decoding with Forward Error Correction

The DME-05 supports decode of TSRTP streams with Pro-MPEG Forward Error Correction (FEC).

(1) Verify the unit is in Decoder mode and connected to a display monitor.

(2) In the CH1 tab, select select "TSRTP" as the “Input Interface”. This will cause the "FEC Mode" dropdown to appear.

(3) Select "AUTO" in the "FEC Mode" dropdown menu.

(4) Set the remaining settings to those corresponding to your incoming stream and desired output.

(5) Click “Start.”

(6) You will see an FEC corrected stream on the display monitor.

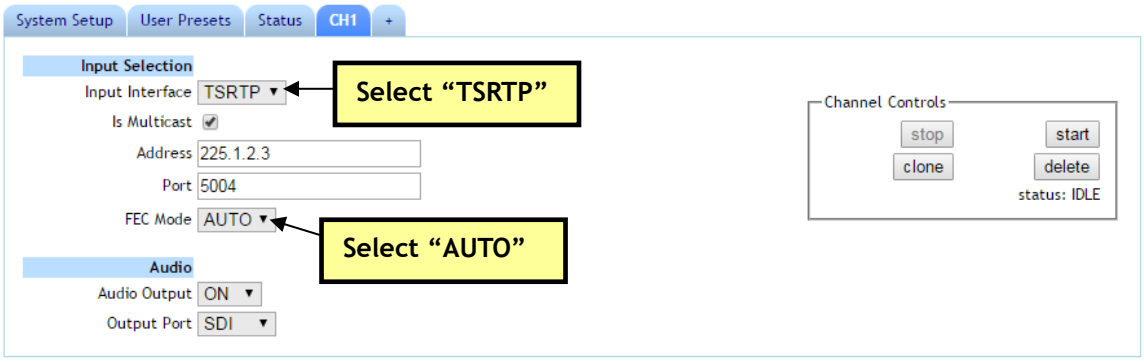

Figure 53 Enabling Pro-MPEG FEC Decode for TSRTP Streams

For more information on testing and verifying FEC using a Z3 Technology encoder and decoder with Pro-MPEG FEC support, please contact your Z3 sales account manager for additional user instructions.

8.0 PERFORMING OTHER OPERATIONS WITH THE DME-05

8.1 Saving Current Settings

If you have a specific configuration you'd like to preserve, you can save it so that when the DME-05 is powered off and back on, it automatically uses those settings.

(1) Click on the User Presets tab.

(2) Click on the "new" button.

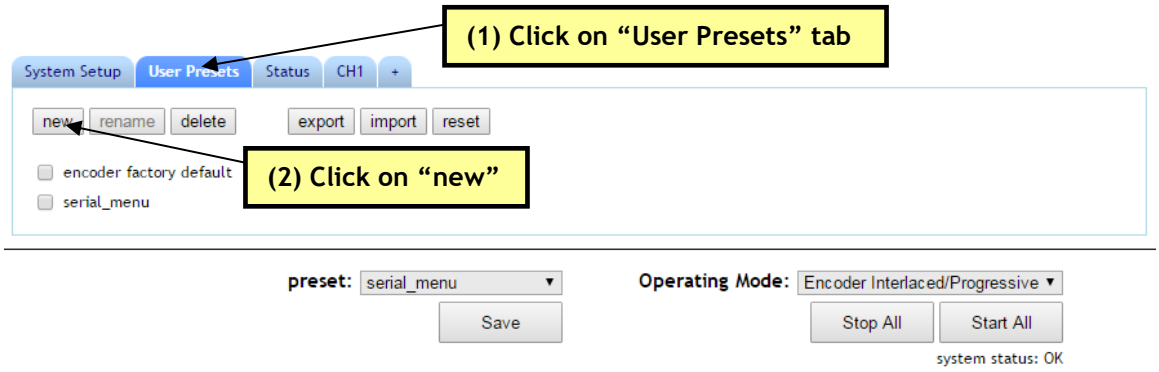

Figure 54 The User Presets Tab

(3) This brings up a new text box to enter the preset name. For this example, type "z3_config1" and click "ok".

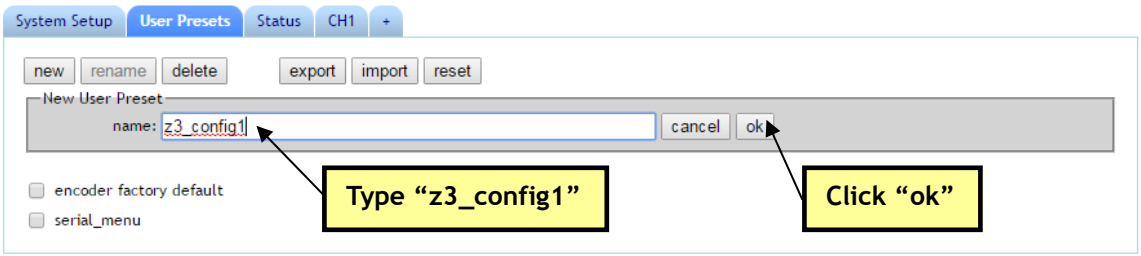

Figure 55 Entering a User Preset Name

(4) Return to the System Setup tab.

(5) Select your newly created configuration from the preset dropdown menu at the bottom of the screen.

(6) As soon as you select "z3_config1", the screen will reload.

(7) Change your desired settings.

(8) Once your changes have been set in this configuration, click on the “Save” button.

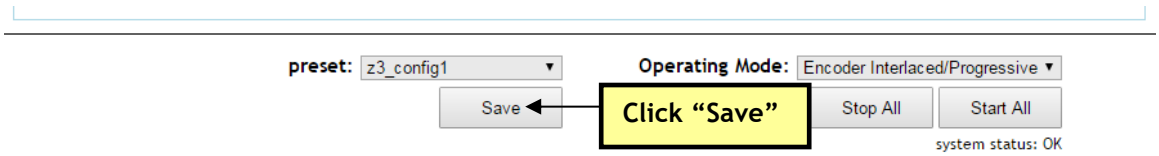

Figure 56 Saving New Settings to a User Preset

(9) A pop-up window appears to confirm the saving of these settings is complete. Click “OK”.

**Note:* *The very first time settings are saved may take up to 30 seconds. This is due to some flash initialization which occurs on the very first configuration save.*

(10) In order for these changes to take effect, the unit must be re-started. Power the unit off then back on and wait 45-60 seconds for the unit to boot up.

8.2 Using a Static IP Address

The encoder supports DHCP (Dynamic Host Configuration Protocol). This is enabled by default, allowing the encoder to dynamically receive an IP address at startup. The IP address that is assigned can be seen through using ZFinder. If you prefer, you can set your encoder to a static IP address. If you would like to have your PC set to a static IP address, you will need to set your encoder to a static IP address as well in order for it to be discoverable by ZFinder.

To set your unit to a static IP address, complete the following steps:

(1) First, you will need to set up a custom configuration so that the manual networking settings are used the next time the system boots up. To do this, see Section 8.1: “Saving Current Settings”.

(2) Return to the System Setup tab.

(3) Select your newly created custom configuration from the “preset” dropdown menu at the bottom of the screen. As soon as you select your configuration, the screen will reload.

(4) Un-check the “Use DHCP” box.

(5) Enter in your desired network settings including “Local IP Address”, “Local Netmask”, “Default Gateway”, “DNS Server IP 1”, and “DNS Server IP 2”.

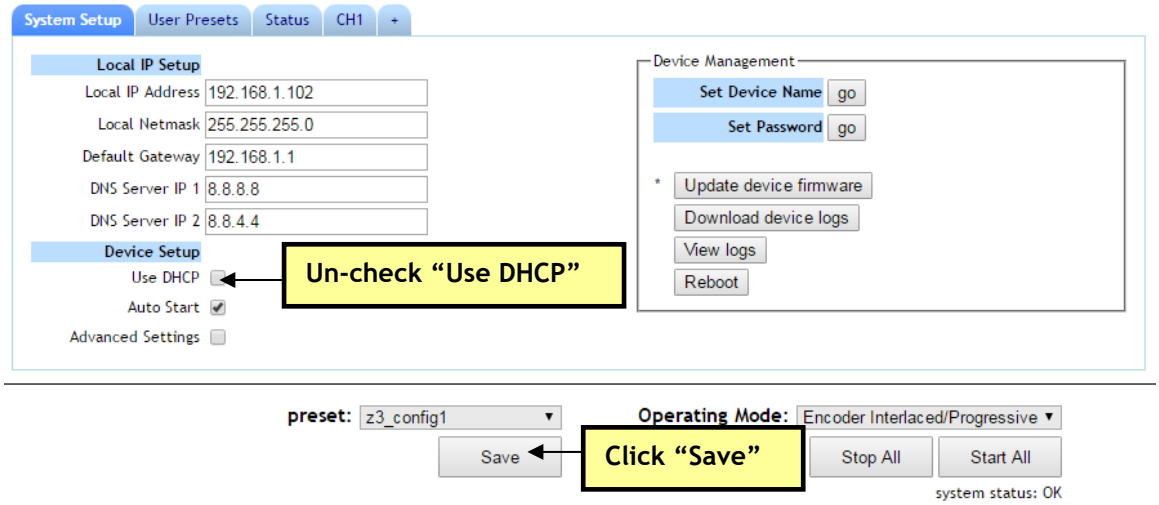

Figure 57 Setting DHCP within z3_config1

(6) Now that DHCP is no longer set in your configuration ("z3_config1" is pictured) and your network settings have been entered, click on the "Save" button.

(7) When you do this, a pop-up window appears reminding the user that, for changes to IP Address / Local Netmask / Default Gateway to take effect, a reboot is required, and asking if a reboot is desired. Click "OK" (and then "OK" in the "Are you sure?" window after that) to start rebooting.

Figure 58 Reboot Reminder for Changing IP Settings

***Note:** The very first time settings are saved may take up to 30 seconds. This is due to some flash initialization which occurs on the very first configuration save.*

8.2.1 Open the User Interface Using ZFinder

(1) Run the "ZFinder" PC Utility on your Windows PC. The ZFinder window appears. ZFinder completes a scan of the network and lists the location of all Z3 systems connected to the network. The DME-05 appears with your manually entered IP address.

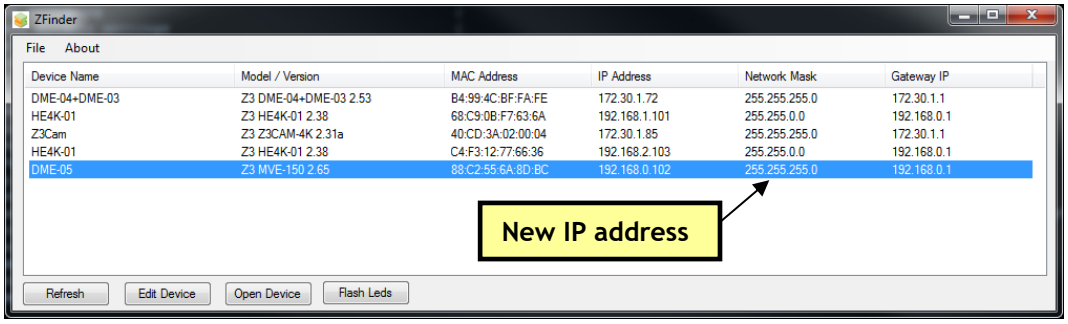

Figure 59 IP Address Shown in ZFinder

(2) Select the DME-05 and then click "Open Device."

***Note:** You may need to also update the network settings on the PC running ZFinder so that the encoder is discoverable. If the unit appears in red, your computer's IP address or Network Mask may not be compatible with the encoder and changes may be required before you can access the user interface.*

(3) A web browser will then open at the IP address of the DME-05 and you will see the user interface.

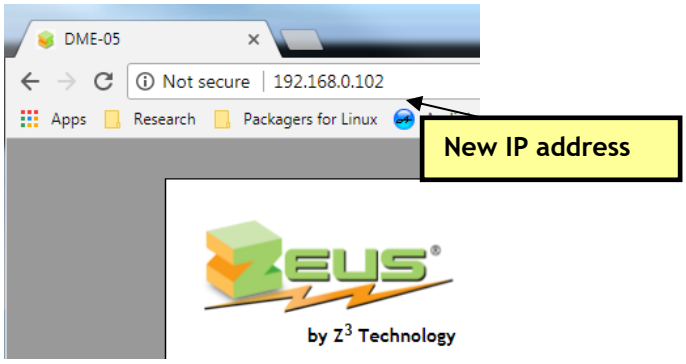

Figure 60 User Interface Using DHCP Address

(4) You can return to the use of DHCP by checking the "Use DHCP" checkbox in the System Setup tab and saving that to the preset.

8.2.2 Opening the User Interface Manually

You can also access the user interface by manually typing your unit's static IP address into a web browser.

8.3 Advanced Settings Mode

A limited range of encoding settings is available by default. Additional settings can be accessed in Advanced Settings Mode for greater customization to your specific application.

8.3.1 Set Up a Custom Configuration

(1) First, you will need to set up a custom configuration so that the advanced settings will remain visible. To do this, see Section 8.1.

(2) Return to the System Setup tab.

(3) Select your newly created configuration from the preset dropdown menu at the bottom of the screen.

(4) As soon as you select your preset, the screen will reload.

8.3.2 Accessing Advanced Settings

(5) Under "Device Setup," check the "Advanced Settings" box.

(6) Click on the "Save" button.

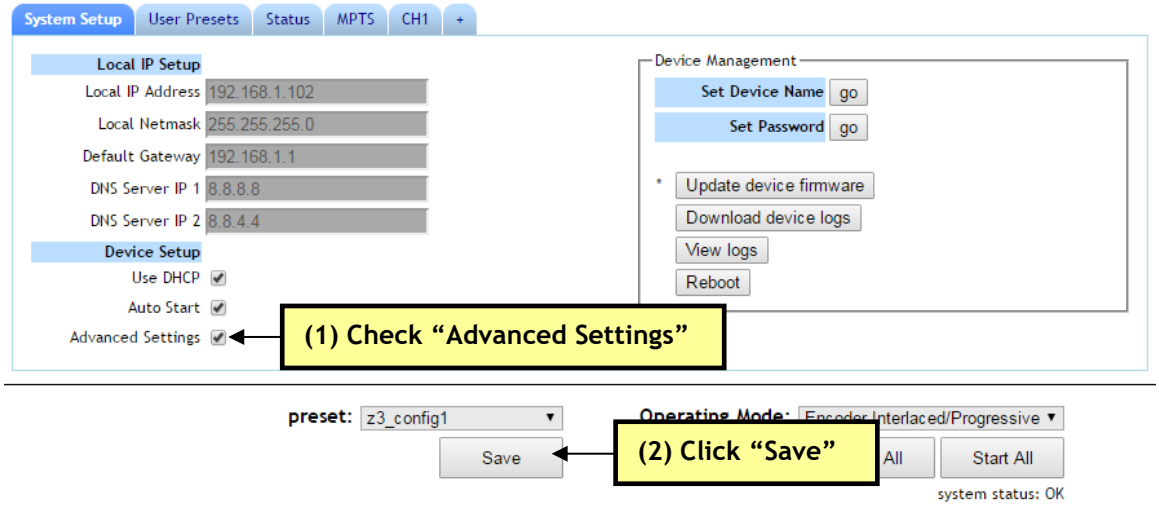

Figure 61 Accessing Advanced Settings

(7) A pop-up window appears with a message that the settings were saved successfully.

(8) Return to your channel tab to set additional encoding configuration parameters for your stream. See Section 9.5 for more information on the advanced settings available for each streaming output.

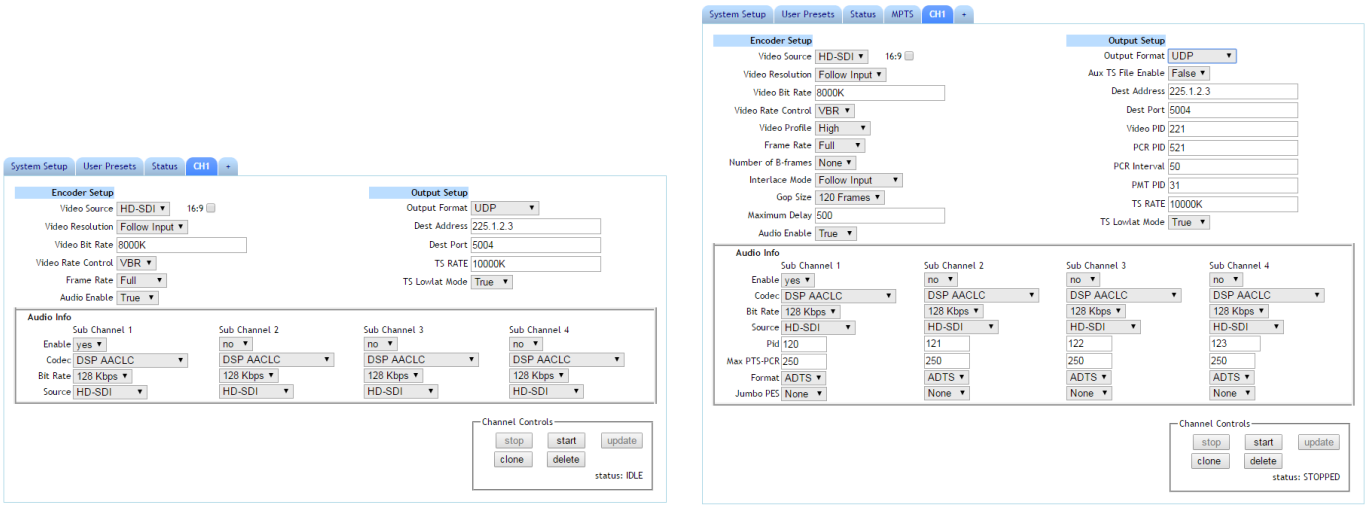

Figure 62 Default UDP Settings (Left) and Advanced UDP Settings (Right)

(9) You can return to the use of limited settings by un-checking the “Advanced Settings” box in the System Setup tab and saving that to the preset.

8.4 Making a Firmware Update

(1) Open the user interface (Section 6.3).

(2) Select “Update device firmware” from the “System Setup” tab under the “Device Management” section.

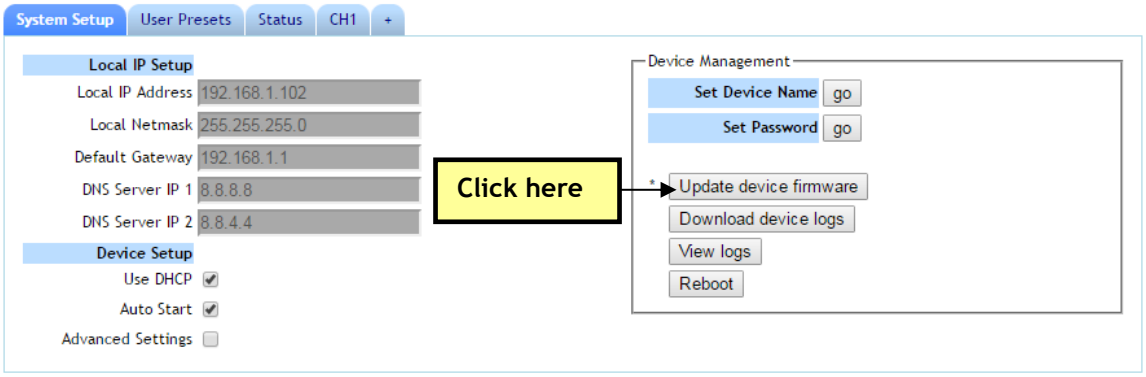

Figure 63 Updating the Device Firmware from the User Interface

(3) This brings you to the update image screen. In this screen, click on the “Choose File” button.

Figure 64 Updater Screen

(4) This brings you to the file selection screen. From here, select the name of the .img file to update with and click “Open”.

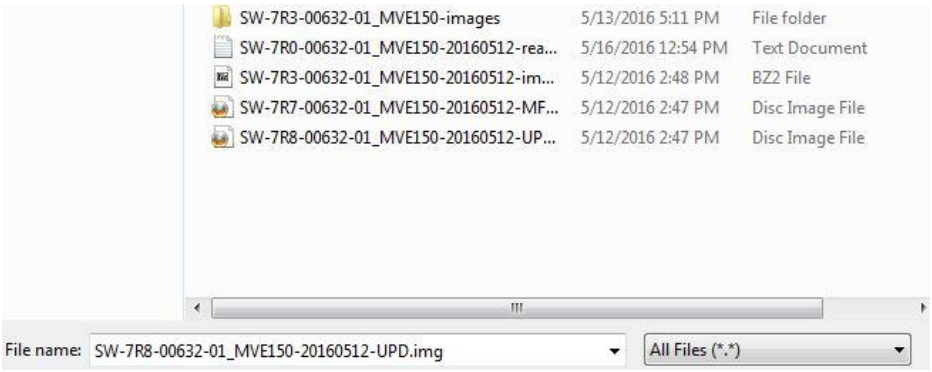

Figure 65 File Selection Screen

The image file to be used will typically have the word “UPD” in the name.

(5) Click the “Upload and Update” button.

(6) You will see screens stating that the image is being uploaded and that the flash is being updated. After about one minute, you should see the main menu again.

(7) Your DME-05 is now updated.

8.5 Using the Password Feature

The DME-05 supports the assignment of a password to restrict access to the user interface.

***Note:** Once a password has been set, it can be changed, but the requirement of a password cannot be undone.*

(1) In the System Setup tab, click on “go” next to “Set Password”.

(2) The change password options appear. Enter the new password twice and click the “change” button.

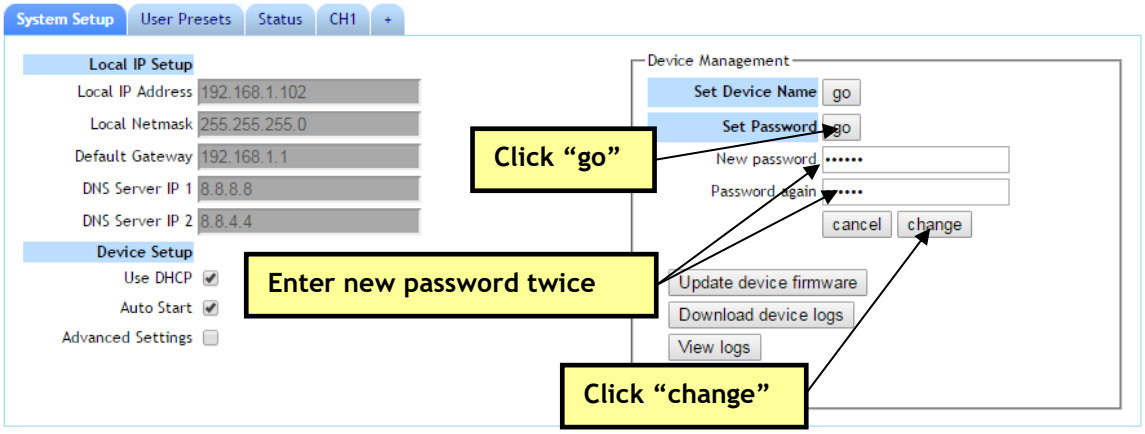

Figure 66 Changing the Password

(3) Wait for the password options to disappear. This indicates that the password has changed.

(4) Refresh or retype the IP address in the web browser. You will then see a prompt for a user name and password. Use “admin” for the user name. This value cannot be edited.

(5) Enter the new password.

Figure 67 Password Entry Screen

(6) You will now be able to access the user interface.

9.0 SUMMARY OF OPTIONS

This section lists the different options that are available in the various menus.

9.1 The System Setup Tab

Parameter	Options (default in bold)	Notes
Local IP Setup		
Local IP Address	192.168.x.y **(192.168.81.68)**	Sets the IP address of the DME-05. Note that a "save" of these settings and a reboot is needed for changes to this value to take effect. When in DHCP mode, this field is not applicable.
Local Netmask	255.255.z.w (**255.255.0.0**)	Sets the netmask of the DME-05. Note that a "save" of these settings and a reboot is needed for changes to this value to take effect. When in DHCP mode, this field is not applicable.
Default Gateway	192.168.a.b (**192.168.0.1**)	Sets the network gateway to use for the DME-05. Note that a "save" of these settings and reboot is needed for changes to take effect. When in DHCP mode, this field is not applicable.
DNS Server IP 1	a.b.c.d (8.8.8.8)	Specifies the primary DNS server to be used for hostname lookup when in static IP mode. When in DHCP mode, DNS information is acquired from the DHCP server and this field is not applicable.
DNS Server IP 2	e.f.g.h (8.8.4.4)	Specifies the secondary DNS server to be used for hostname lookup when in static IP mode. When in DHCP mode, DNS information is acquired from the DHCP server and this field is not applicable.
Device Setup		
Use DHCP	**Checked** Unchecked	Sets whether DHCP is used to dynamically obtain an IP address at start up.
Auto Start	**Checked** Unchecked	Check this box to set the system to automatically start encoding upon powering on.

Advanced Settings	Checked **Unchecked**	Check this box for advanced encode settings to appear on the channel tab.
Device Management		
Set Device Name		Sets a custom name for the unit to appear in the user interface and ZFinder.
Set Password		Sets a password to limit access to the user interface.
Update device firmware Button		Access the Software Updater to update the firmware on your device. An image file of the desired firmware is needed.
Download device logs Button		Extract a set of diagnostic logs that can be provided to Z3 in the event of an issue to be reported. The resulting file is saved on the PC with the user interface open.
View logs Button		Can be used to view system logs. Used by Z3 for debugging.
Reboot Button		Restarts the unit without the need to disconnect power.
Display Mode (Decode Only)	SDI **HDMI**	HDMI and SDI output are supported.
Resolution (Decode Only)	**1080p60**	Sets the resolution to set the display to. **[Note 1]**
Layout (Decode Only)	**1x1**	Determines layout to use for displaying multiple pictures. In most cases 1x1 is used. 2x2 can be used when four decodes are occurring. Other configurations are possible. **[Note 2]**
Set Display Button (Decode Only)		If a display mode, resolution, or layout different from the default is desired, the user would change to the desired value and then click the "Set Display" button.
Note 1: Resolutions supported:		

	1080i30, 1080i29.97, 1080i25, 1080p60, 1080p59.94, 1080p50, 720p60, 720p59.94, 720p50, 480p60, 576p50
Note 2:	Layouts supported: 1x1, 2x2, 4x4, 2x2+4, 1+5, 1+7, 3x3, 1+2PIP, 1+4PIP

9.2 The User Presets Tab

Parameter	Notes
new	Define a new configuration file. Up to nine configurations can be created.
rename	Rename a configuration file.
delete	Delete a configuration file.
export	Export current settings to a file. All presets get saved to the file “settings.z3” on the host PC. These can be subsequently reloaded with the “import” command.
import	Load settings from a previously exported file.
reset	All existing user presets will be erased.

9.3 The Status Tab

Note: May take a few seconds to load after being clicked		
Output Value	**Explanation**	
Video Status		
CH	The channel number (1 or 2)	
Bitrate (Kbps)	Current target bitrate of encoder in Kbps	
Actual Bitrate	Actual bitrate being output by encoder in Kbps	
FPS	Current target frames per second of encoder	
Actual FPS	Actual frames per second being encoded	
Key-frame FPS	Number of key-frames per second (for example, a value of 0.5 means a key frame is inserted every two seconds)	
Width	Width of encoded picture	
Height	Height of encoded picture. A small “i” will appear if interlaced is being encoded.	
Audio Status		
Channel	The channel number (1 or 2)	
Subchannel	Always 1 in this release	
Codec	The codec being used to encode audio for that channel	
Stream Status		
Channel	The channel number (1 or 2)	
URL	URL the channel is being streamed to	
frames	Number of frames sent from encoder to channel since the beginning of encoding. This can serve as a quick sanity check (for example, you can click “Refresh”, count to 10, click “Refresh” again, and you should see an increase of around 600 for 60 frames per second content).	
Input Status		
Input	Input type	
Resolution	Capture resolution for that input	
FPS	Capture frames per second for that input	
Parameter	**Options (default in bold)**	**Description**
Refresh Button		Click button to manually refresh information.
Auto Refresh	Checked **Unchecked**	Sets whether the status tab will automatically refresh information once every ten seconds.

9.4 MPTS Tab*

An asterisk (*) denotes a field available in Advanced Settings Mode. See Section 8.3 to access these fields.

Parameter	Options (default in bold)	Notes
Rate*	1-80M (**20M**)	The total transport rate of the MPTS stream. This should equal the bitrates of all channels going into this stream plus at least a 10% overhead. For example, if two 10Mbps channels are being packed into the MPTS stream, the recommended Rate is at least 22Mbps.
Destination 1*	**NONE** ASI UDP	Used to define where the multiple channels will be routed to after being combined into one stream. In most cases, “ASI” is used. Only one destination can be set to “ASI” at one time. The MPTS can also be used to send this combined stream to a UDP URL. If “UDP” is selected, an IP Address and IP Port box will appear.
Destination 2*	**NONE** ASI UDP	An optional second destination for the MPTS streams. Only one destination can be set to “ASI” at one time.
IP Address* (UDP Destination Only)		IP address that the encoder is streaming to.
IP Port* (UDP Destination Only)		The port that the encoder is streaming to.

9.5 The CH1 Tab (Encode)

An asterisk (*) denotes a field available in Advanced Settings Mode. See Section 8.3 to access these fields.

Parameter	Options (default in bold)	Notes
Encoder Setup		
Video Source	HDMI1 **HD-SDI**	The input source for channel 1 is *HDMI only*. An SDI source is only supported by using the channel 2 tab. HD-SDI selection supports HD-SDI and 3G-SDI resolutions.
16:9	Checked **Unchecked**	For any SD resolutions (NTSC, PAL), checking this forces the aspect ratio to be "16:9" in the output (otherwise a default value of 4:3 is used). This value is ignored for HD resolutions.
Video Resolution	**Follow Input** 176x144 – 1920x1080	The encode resolution for channel 1. If this resolution is different from the capture resolution, resizing will occur. "Follow Input" generates the resolution based on the capture resolution (see Note 1 for resolutions supported).
Video Bitrate	100 – 12000K (**8000K**)	Textbox for entering video bitrate. For example: 1M = 1,000,000 bits per second 1000K = 1,000,000 bits per second 2.5M = Not a Valid Format
Video Rate Control	**VBR** CBR	Selects the encoder rate control mechanism. VBR (Variable Bitrate) means that the encoding bitrate can fluctuate within the bitrate statistical period. CBR (Constant Bitrate) means that a stable encoding bitrate is ensured within the bitrate statistical time.
Video Profile*	**High**	The H.264 profile of the bitstream.

	Main Baseline	Generally High is used for 1080p, Main for D1, and Baseline for less than D1.
Frame Rate	**Full** Half Quarter Sixth	Used to encode at less than the input frame rate (for example, an input frame rate of 30fps with "Half" selected would cause an output stream of 15fps). If interlaced input is used then this is used to reduce the number of fields being encoded. **[Note 2]**
Number of B-frames*	**None** 1 2	The number of B-frames. A value of "None" means B-frames are disabled.
Interlace Mode*	**Follow Input** Progressive Progressive HQ Interlace	This allows the user to specially handle interlaced input. "Follow input" is the default option – it will leave interlaced input as is. "Progressive" will convert the interlaced input to a progressive picture. This can be used to improve quality if playing back on a PC player. "Progressive HQ" activates a special high quality deinterlacer. Since this requires extra cycles, this is available only for D1 input and below. Applying it to input larger than D1 could result in unpredictable behavior. "Interlace" can be used to make progressive input interlaced.
GOP Size*	10 – 240 Frames (**120 Frames**)	I-frame frequency. The number of frames in each Group of Pictures (GOP) **[Note 3]**
Maximum Delay*	0 – 9999 (**500**)	Number of ms to buffer. The higher the value, the smoother the encode, but also the higher the latency.
Audio Enable	**True**, False	Selecting "True" enables encode of audio

		along with video. Selecting “False” disables encode of audio.
Audio Info (Entries for each of the four sub channels within the HD-SDI source)		
Enable	**yes (Sub Channel 1)** **no (Sub Channels 2-4)**	Used to select which sub channel should be used for the audio source. Only one sub channel can be enabled.
Codec	**DSP AACLC (Sub Channels 1-4)** DSP AACHE V1 DSP AACHE V2 ARM AACLC ARM AACLC MPEG-2 ARM AACHE ARM AACHE V2 ARM MPEG1L2	The codec to use for audio. The bitrate range for AACLC is 32Kbps – 384Kbps (though staying above 64Kbps is recommended for best results). The bitrate range for AACHE and AACHE V2 is 32Kbps – 64Kbps.
Bitrate	12 – 384 Kbps **(320 Kbps – Sub Channel 1)** **(128 Kbps – Sub Channels 2-4)**	The bitrate of the audio.
Mode	Mono **Stereo**	Select between stereo and mono inputs.
Source	Follow Video HDMI1 **HD-SDI (Sub Channels 1-4)** HD-SDI 1+2 HD-SDI 3+4 HD-SDI 5+6 HD-SDI 7+8 None	Where to get audio for that sub channel.
RTP Port (RTP/RTSP Only)	0 – 9999 **(8892, 8894, 8896, 8898)**	If RTP format is selected, the port number associated with that audio channel.
PID* (UDP, TSRTP, TSFILE, MPTS & ASI Only)	0 – 999 (**120,121,122,123**)	If UDP format is selected, the PID to use for that audio channel.
Max PTS-PCR* (UDP, TSRTP, TSFILE,	0 – 9999 (**250 - Sub Channels 1-4**)	Allows user to specify a smaller interval than 250ms between PTS and PCR. This is

MPTS & ASI Only)		for systems that require tighter PTS-PCR intervals. It is generally recommended to leave this value at 250. Certain decoders may require a value of Max PTS-PCR similar to the video delay. If an issue is encountered with a specific decoder, please try setting this value to the same value as video delay.
Format* (UDP, TSRTP, TSFILE, MPTS & ASI Only)	**ADTS (Sub Channels 1-4)** LATM	Audio output format
Jumbo PES* (UDP, TSRTP, TSFILE, MPTS & ASI Only)	**None (Sub Channels 1-4)** 1 AUs 2 AUs 3 AUs 4 AUs	Optimizes audio transfer bit rate by allowing the user to set the number of audio Access Units (AU) per transport stream Packetized Elementary Stream (PES) packet
Output Setup		
Output Format	RTP/RTSP **UDP** RTMP TSRTP TSFILE FILE MPTS* ASI	Output format of encoded stream. If UDP is selected, check the value of TS Rate to make sure it is in line with expectation. TSRTP allows for streaming and recording to TS file simultaneously. TSFILE will write audio and video to a TS file. If this is selected, type the path/name of the file in “Dest Address” (Ex: to write to a USB connected to the RPS: /media/sda1/test.ts) FILE will write raw .h264 and raw .aac to 2 separate files. If this is selected, type the path/name of the H264 file in “Dest Address” (Ex: /media/sda1/test.h264). If audio is enabled, a companion .aac file is then created (for example, for “test.h264” a companion file “test_0.aac” is created). MPTS can be used to encode one more streams to DVB-ASI out. This is not supported in the current release. Contact

		Z3 for optional upgrade information.
Aux TS File Enable* (UDP, TSRTP, MPTS* & ASI Only)	True **False**	Set to True to allow the same UDP or TSRTP stream to be saved to a .ts file.
Output Device (Aux TS File* & TSFILE Only)	**No Storage Devices Found** /dev/sda1 /dev/sdb1	Click this field to select the USB storage device for .ts file destination. IT auto-populates based on storage devices detected. If one USB device is connected, "/dev/sda1" corresponds to either port. If two USB devices are connected, "/dev/sda1" corresponds to USB device that was connected first and "/dev/sdb1" corresponds to the USB device that was connected second. Only one of the two USB ports can be selected at a time.
File Prefix (Aux TS File* & TSFILE Only)	**MOV**	Textbox to enter desired file name for .ts file. Entered text will be followed by a number starting with zero in the recorded file name.
Eject Button (Aux TS File* & TSFILE Only)	(up arrow icon)	Click to eject the USB when finished recording.
Dest Address (For all but MPTS & ASI)	x.y.z.w **(225.1.2.3)**	IP address that the encoder is streaming to.
Dest Port (For all but FILE, MPTS & ASI)	0 – 9999 (**5004**)	The port that the encoder is streaming to.
Video PID* (UDP, TSFILE, MPTS* & ASI Only)	0 – 999 (**221**)	PID assigned to video in the TS stream.
PCR PID*	0 – 999 (**521**)	PID assigned to PCR in the TS stream.

(UDP, TSFILE, MPTS* & ASI Only)		
PCR Interval* (UDP, TSFILE, MPTS* & ASI Only)	0 – 999 (**50**)	PID assigned to PCR in the TS stream.
PMT PID* (UDP, TSFILE, MPTS* & ASI Only)	0 – 999 (**31**)	PID assigned to PMT in the TS stream.
TS Rate (UDP, TSRTP, TSFILE, MPTS* & ASI Only)	125K – 20000K (**10000K**)	The rate of the transport stream. Normally, this value should be set to 1.25 * (video bitrate + audio bitrate). This can be set to higher values to allow leeway for times when many bits are needed to encode. This can be especially useful for ensuring smooth playback at lower bitrates (see Section 6.12, "Adjusting the UDP TS Rate").
TS Lowlat Mode (UDP & TSRTP Only)	**True** False	Selecting "True" causes the TS muxer to instead send packets out as soon as it receives them rather than buffering them. This results in lower latency at the expense of decreased network efficiency and a less smooth bitstream. There is a limit of 5Mbps for TS Lowlat Mode. Cannot be used with Auxiliary TS File. Must be set to "False" for stream to be compliant with ISO 13818-1 systems specification for transport stream timing.
FEC Enable (TSRTP Only)	**True** False	Selects whether Pro-MPEG Forward Error Correction (FEC) is enabled.
FEC Columns (L) (TSRTP Only)	**5**	Allows for setting the number of FEC columns. The number of columns multiplied by the number of rows must be less than or equal to 100.
FEC Rows (D)	**5**	Allows for setting the number of FEC rows.

(TSRTP Only)		The number of columns multiplied by the number of rows must be less than or equal to 100.
Authentication (RTMP only)	**Disable** Enable	Supports entering an authentication User name and Password for RTMP. When enabled, a "User" and "Password" text box appear. The user then enters the appropriate User name and Password.
User (RTMP Only)		User name to enter when "Authentication" enabled.
Password (RTMP Only)		Password to enter when "Authentication" is enabled.
Channel Controls		
stop		Stop current encode session.
start		Start encode session.
update		Can be used to change the bit rate without stopping/restarting an encode session (see Section 6.8, "Changing the Bitrate and Frame Rate Dynamically").
clone		Duplicate CH tab (can be used to quickly copy CH1 values to CH2, for example).
delete		Used to delete excess tabs created by clone.
(status)	IDLE, STOPPED, RUNNING, POLLING	Current status of the encoder. "POLLING" indicates "start" was pressed and the encoder is waiting for valid input data to be detected.
Note 1: Encode Resolutions Supported: QCIF (176x144), WQVGA (320x180), QVGA (320x240), SIF (352x240), CIF (352x288), 2-CIF (352x576), 640x360, VGA (640x480), 4-CIF (704x576), 16:9 PAL (1024x576), D1 PAL (720x576), D1 NTSC (720x480), 720p (1280x720), XGA (1280x1024), 1080 (1920x1080)		
Note 2: If input is interlaced, the Frame Rate Divider will divide the number of fields used. This means, a		

conversion to progressive is done. This allows for a reduction in bits needed / processing power without introducing extra jerkiness when there is motion in the video. For example, if the input is 1080i at 60 fields per second (30 frames per second), Frame Rate Divider has the following effect:

Frame Rate Divider	Output	# fields used	frame rate
Full	1080i	60	30
Half	1080p	30	30
Quarter	1080p	15	15
Sixth	1080p	10	10

Note 3: GOP Sizes Supported:

10, 12, 15, 25, 30, 50, 60, 100, 120, 200, 240 frames

9.6 The CH2 & CH3 Tabs (Encode)

A second channel can be accessed in order to encode from multiple video sources simultaneously. Create the “CH2” tab by clicking the “+” tab. Please see CH1 values for a detailed explanation. The CH2 tab will be identical to CH1, except for the default values of various parameters as shown below.

A third channel can only be created in the “Encoder 1 to 3 CH” operating mode. Create the “CH3” tab by clicking the “+” tab. Please see CH1 values for a detailed explanation. The CH3 tab will be identical to CH1, except for the default values of various parameters as shown below.

Parameter	CH1	CH2	CH3
Dest Port	5004	5006	5008
Audio PID	120-123	124-127	128-131
Audio RTP Port	8892 - 8898	8900 - 8906	8908 - 8914
Video PID	221	222	223
PCR PID	521	522	523
PMT PID	31	32	33

9.7 The CH1 Tab (Decode)

Parameter	Options (default in bold)	Notes
Input Selection		
Input Interface	RTP **UDP** TSRTP TSFILE FILE ASI	Where to get input for channel 1. See the description in "Output Format" in the Encode section for details.
Is Multicast	**Checked** Unchecked	If decoding from a multicast address, check this. This will cause an "Address" box to appear where the user can type the multicast address the decoder should connect to.
Address (Multicast Only)	x.y.z.w **(225.1.2.3)**	The multicast IP address that the decoder retrieves data from (used when "RTP" or "UDP" is selected for the Input Interface and "Is Multicast" is checked).
Port (RTP & UDP Only)	0 – 9999 (**5004**)	The port the decoder retrieves data from.
Location (TSFILE & FILE Only)		If decoding from a TSFILE or raw FILE, this specifies the location and name of the file (example: /media/sda1/example.ts).
File Loop (TSFILE & FILE Only)	ON **OFF**	Specifies whether to loop back to the beginning of the file when the end is reached.
FEC Mode (TSRTP Only)	**AUTO** OFF	Selects whether Pro-MPEG Forward Error Correction (FEC) is enabled.
Audio		
Audio Output	**On** Off	Set to "Off" for video only streams.

Output Port	**AUTO** HDMI SDI	Where to output video. AUTO picks up from which port is being utilized. HDMI and SDI supported.
Channel Controls		
stop		Stop current encode session.
start		Start encode session.
clone		Duplicate CH tab (can be used to quickly copy CH1 values to CH2, for example).
delete		Used to delete excess tabs created by clone.
(status)	IDLE, STOPPED, RUNNING, POLLING	Current status of the encoder. "POLLING" indicates "start" was pressed and the encoder is waiting for valid input data to be detected.

9.8 The CH2 Tab (Decode)

Create the "CH2" tab by clicking the "+" tab. Please see CH1 values for a detailed explanation.

The CH2 tab will be identical to CH1, except for the default values of various parameters as shown below:

Parameter	CH1	CH2
Port	5004	5006
Audio Output	ON	OFF

9.9 Values Appearing at the Bottom of All Tabs

Parameter	Options (default in bold)	Notes
preset	**serial_menu** encoder factory default decoder factory default --- new preset --- (any user-defined profiles)	The configuration file to use. serial_menu = last value saved in interface enc/dec factory default = factory settings Can also add more profiles by clicking on "new" in the User Presets tab.
New Preset Button		Click to create a new user preset.
Save Button		Click to save value that was selected.
Operating Mode	**Encoder Interlaced/Progressive** Encode 1 to 3 Ch Decoder	This selects the operating mode of the unit: "Encoder Interlaced/Progressive" is the default mode of operation – it can be used to encode up to two channels. "Encode 1 to 3 Ch" is used when it is desired to encode a single input in three different ways. For example, as a 1080i, D1, and CIF stream. "Decoder" is used to select decode mode.
Stop All		Stop encode on all channels.
Start All		Start encode on all channels.
system status:	**OK**	

APPENDIX A: Configuring the Wowza Server for RTMP

In this section, configuring Wowza Streaming Engine™ version 4.1.0 is described.

To configure Wowza to work with RTMP streaming from your encoder, the following steps are needed:

(1) Log in to the Wowza Streaming Engine Manager Home page by typing http://localhost:8088, where "localhost" is the IP address of the server (in this User's Guide, 192.168.0.4).

(2) Click on "Server" in the top band of options. On the left column, click on "Performance Tuning" and then "Java Settings". Click "Edit" and then change "Java Heap Size" to "Production Level" and "Java Garbage Collection Settings" to "Concurrent collector". Click on "Save.":

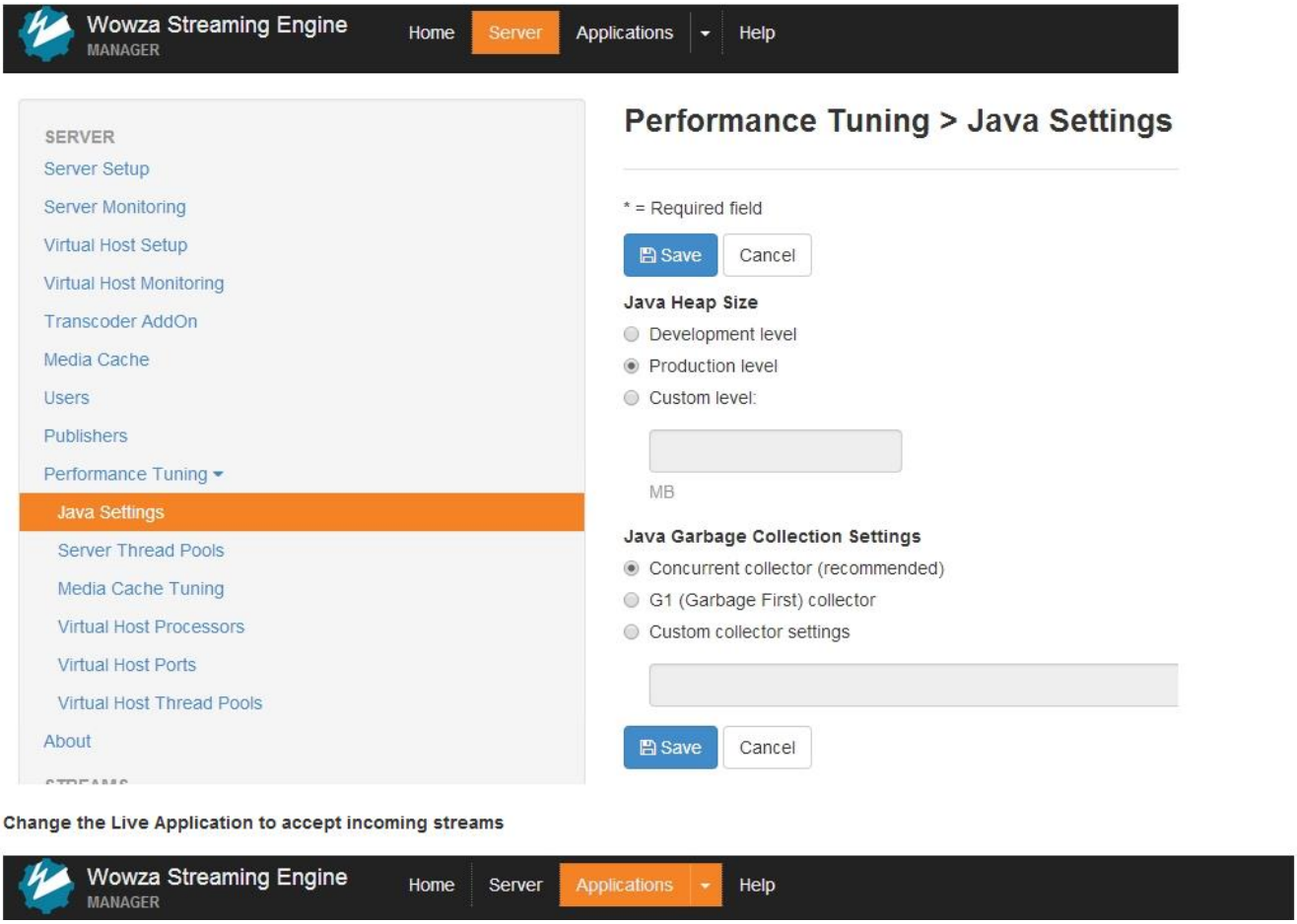

Figure 68 Wowza Performance Settings

(3) Click on “Applications” in the top band of options. On the left column, click on “live” and then “Incoming Security”. Click “Edit” and then make sure “RTMP Publishing” and “RTSP Publishing” are both set to “Open” and “Client Restrictions” is set to “No client restrictions.” Then click “Save”:

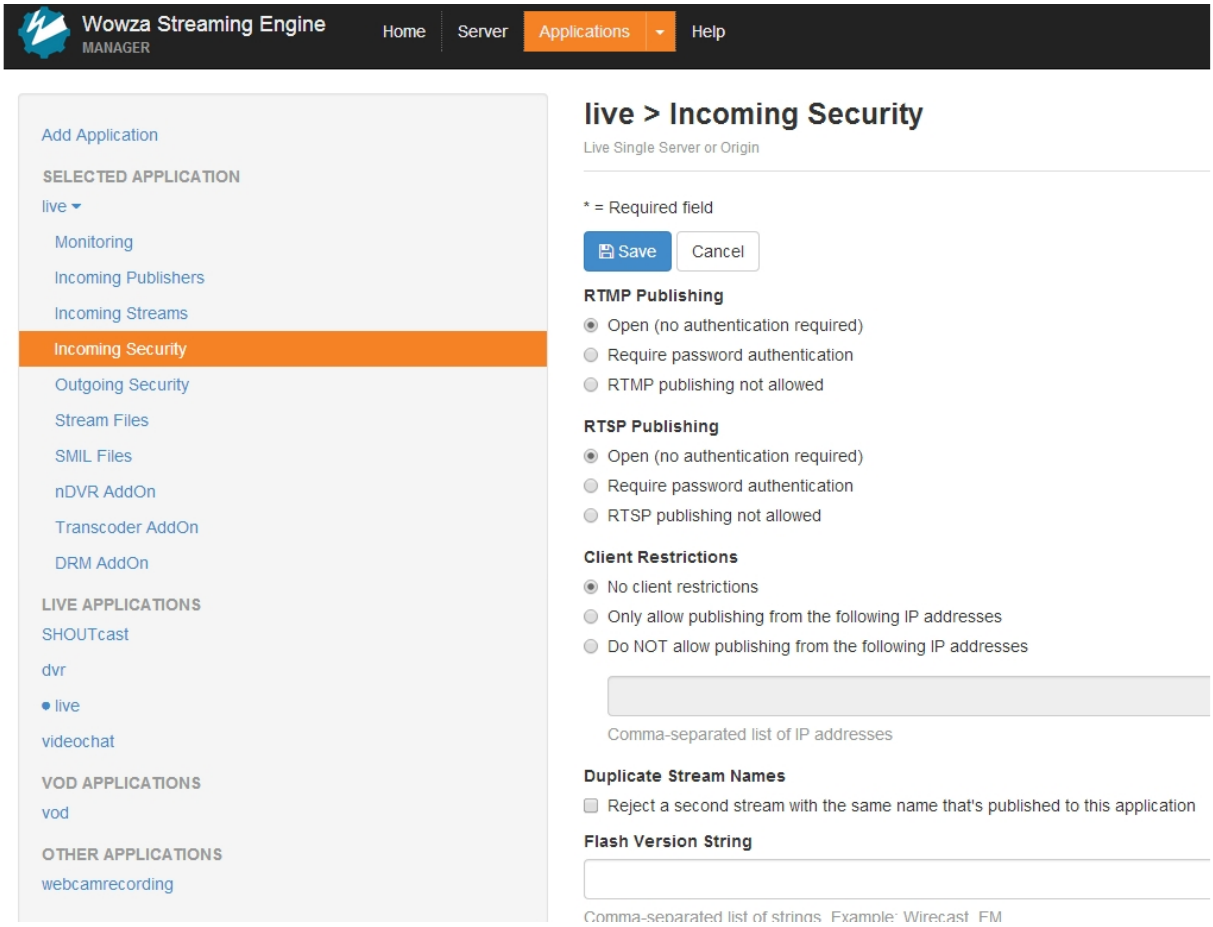

Figure 69 Wowza Security Settings

The Wowza server is now configured to work with your ZEUS® encoder.

Note: *You can also specify “Require password authentication” for “RTMP Publishing.” In this case, “Authentication” on the channel tab needs to be enabled and a valid Wowza user name and password needs to be entered to successfully access Wowza.*

If you still run into issues, verify the Firewall on your PC with the Wowza server is turned off.

APPENDIX B: Troubleshooting

- **Problem:** *HTTP-based user interface does not come up*

  -Is the Ethernet cable plugged into the DME-05 solidly (do you see the link light on the Ethernet cable which indicates data is being transmitted)?

  -Does the DME-05 IP address and PC IP address have the same first two values (or, if netmask is set to 255.255.255.0, the same first three values)?

  -Do the DME-05 and the PC running VLC have the same netmask? (Default value in the DME-05 is 255.255.0.0)

  -Can the DME-05 and the PC see each other?

  -Try pinging the DME-05 from the PC.

  -Try pinging the PC from the DME-05 (serial interface required for this – see Z3 for more details on this).

  -Are all firewalls on the network turned off?

  -Try connecting the PC directly to the board without any routers, etc.

- **Problem:** *Do not see video in VLC (UDP)*

  -Does the IP address set in "Dest Address" equal the IP address of the PC running VLC?

  -Does the port number in "Dest Port" equal the value entered in the URL for VLC?

  -Does the video coming out of the source match the resolution in the encoder settings?

  -Is the PC fast enough for 1080p decode on VLC?

  -Does the PC have enough DDR to handle 1080p decode on VLC?

  -Is VLC version 1.00 or later?

- **Problem:** *Do not see video in VLC (RTP)*

  -Is VLC 2.1.5 or later being used?

- **Problem:** *My multicast stream is not reaching multiple networks*

  -By default the TTL value of a multicast stream sent from the DME-05 is set to 1. You can change the TTL value for multicast addresses by adding "/#" to the end of your multicast address, for example, to set the TTL to 5, you could enter "225.1.2.3/5" for the "Dest Address".

When contacting Z3 Support for additional support, please click the "Download device logs" button in the System Setup tab of the user interface at the time the problem occurs and send the resulting .tgz file, along with screenshots of the CH1/CH2/Status tabs to Z3 Technology.

Z3 Technology's Express Limited Warranty will be void if the label on the hardware bearing the Serial Number is removed, tampered with or defaced. You can view Z3 Technology's full hardware warranty at http://z3technology.com/Support/ZEUS-HW-Warranty.html.