

ULL Streamer

User Guide



ULL Streamer User Guide

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1. INTRODUCTION

1.1 Purpose and scope

The purpose of this document is to help the user to configure and test ULL streamer.

1.2 List of Acronyms

The following acronyms will be used throughout this document.

Acronyms	Abbreviations
UART	Universal Asynchronous Receiver and Transmitter
USB	Universal Serial Bus
IP	Internet Protocol

Table 1: Acronyms & Abbreviations

2. SUPPORTED FEATURES



Figure 1: Supported features

- **Encoder and Decoder**
HEVC(H.265) / AVC(H.264) Encoder and Decoder
- **Input/Output**
HDMI Input/Loop Out
DP Output (Loop-Out won't support)
2-channel stereo audio from HDMI-2.0
- **Protocol supported**
UDP, RTMP protocol
- **Input and output resolution**
- Input resolution:

Source	Input source Resolution	Framerate
HDMI	1920 x 1080 (Progressive)	23.976, 24, 25, 29.976, 30, 50, 59.976, 60 FPS
	3840 x 2160 (Progressive)	23.976, 24, 25, 29.976, 30, 50, 59.976, 60 FPS

Figure 2: input resolution

Output Resolution:

Output	Rescale Resolution	Framerate
HDMI	1280 x 720 (Progressive)	50, 60 FPS
	1920 x 1080 (Progressive)	23.976, 24, 25, 29.976, 30, 50, 59.976, 60 FPS
	3840 x 2160P (Progressive)	23.976, 24, 25, 29.976, 30, 50, 59.976, 60 FPS
DP	1280 x 720 (Progressive)	23.976, 24, 25, 29.976, 30, 50, 59.976, 60 FPS
	1920 x 1080 (Progressive)	23.976, 24, 25, 29.976, 30, 50, 59.976, 60 FPS
	3840 x 2160P (Progressive)	23.976, 24, 25, 29.976, 30, 50, 59.976, 60 FPS

Figure 3: output resolution

➤ **Others**

Recording and decode prerecording video

Support point to point low latency streaming below 100ms

Support video encryption and decryption for UDP streaming

Auto start last streaming/recording when reboot the ULL streamer

Rescale the input resolution

Firmware update OTA

3. CONFIGURATION AND USE CASES

The units can be used

1. UDP streaming
2. RTMP streaming
3. Video record
4. File decode

3.1 Device Configuration

Before using ULL Streamer user need to configure IP address to access that device. So first configure different static IP address for different device using below steps. Any device can be taken as encoder or decoder.

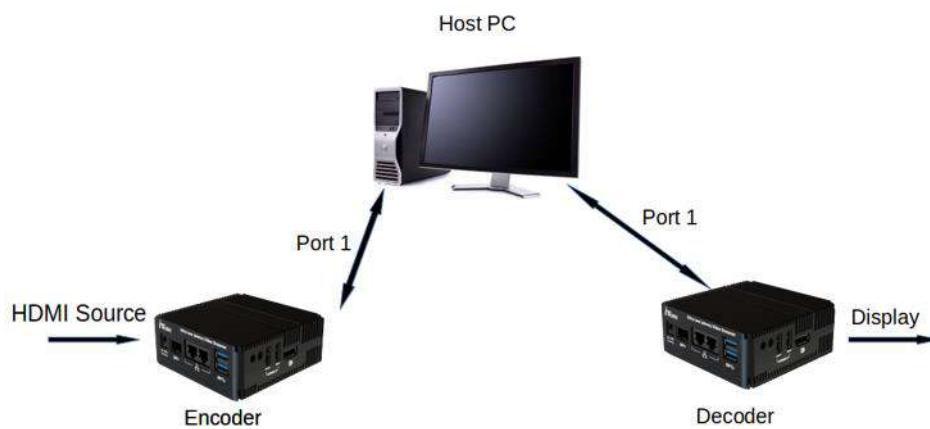


Figure 4: encoder/decoder setup

- Connect Power Cable to Board
- Connect Ethernet cable to ULL streamer and HOST PC as given in above setup.
- Power on the ULL streamer.
- When Device will boot first time it as set as 192.168.1.1 static IP address
- Set static IP address for HOST PC with same series 192.168.1.3
- Ping the ULL streamer IP address from host PC terminal to confirm both are connected. If not user can't able to open web browser
`ping 192.168.1.1`
- On the host PC, run web browser using chrome
`192.168.1.1`
- The following web browser will display



Figure 5: Home page

- Select settings > Ethernet from home page
- Select “PORT1”
- Enter static IP address for port 1 (192.168.1.1 for encoder and 192.168.1.2 for decoder)
- click “Save changes”.

[Note: Static IP address should be different for different board with same network]

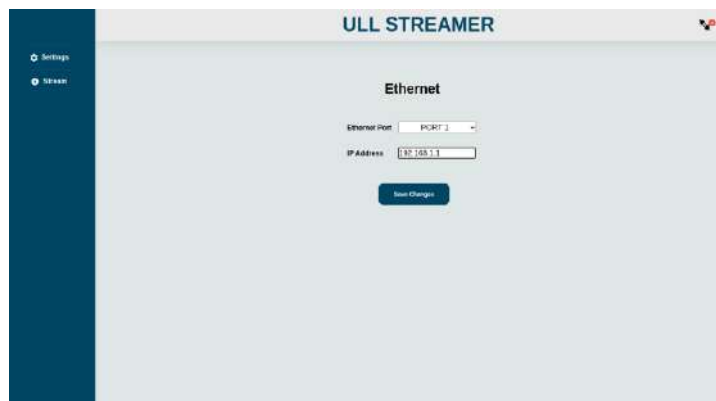


Figure 6 : Ethernet Port 1 Setting

3.2 Rescale Resolution

In Encoder device, using this option user can scale up and scale down the input resolution. To rescale the input resolution follow the steps given below.

- Select Settings > Resolution
- Select the rescale output.
 - Disable
Rescale is disabled. It will take input resolution
 - 1280x720
Rescale the the input resolution to 1280x720
 - 1920x1080
Rescale the the input resolution to 1920x1080

➤ 3840x2160

Rescale the the input resolution to 3840x2160



Figure 7: Resolution setting

Note : Once user configured the rescale output, it will show the previous selected option as default value in resolution setting page.

3.3 UDP streaming

Streaming over ethernet using UDP protocol

Two methods are possible.

1. Streaming with static IP address
2. Streaming with IP address from Intranet

3.3.1 UDP Stream Device requirements

SI No	Items	Description	Qty
1.	Host PC	Host PC with Windows /Linux operating system	1
2.	Ethernet cable	Running with Linux Version 4.1.15 loaded with latest binaries from iWave.	2
3.	HDMI Source	To provide HDMI input to ULL streamer	1
4.	HDMI cables	To connect HDMI input and output	2
5.	Monitor	Display the video from HDMI output port.	1

Table 2: UDP Stream Device requirements

3.3.2 UDP Setup

Connect ULL streamer to HOST PC as in the set up

Host PC , Encoder/Decoder should be in same network

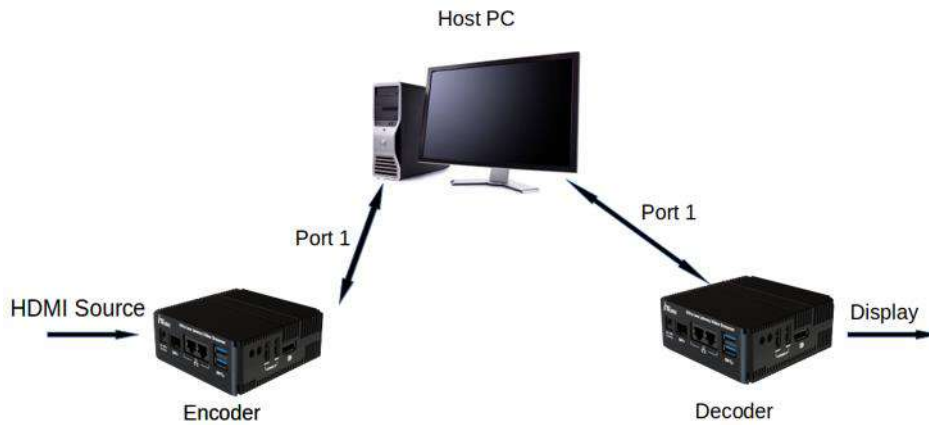


Figure 8 : Setup for UDP streaming with static IP

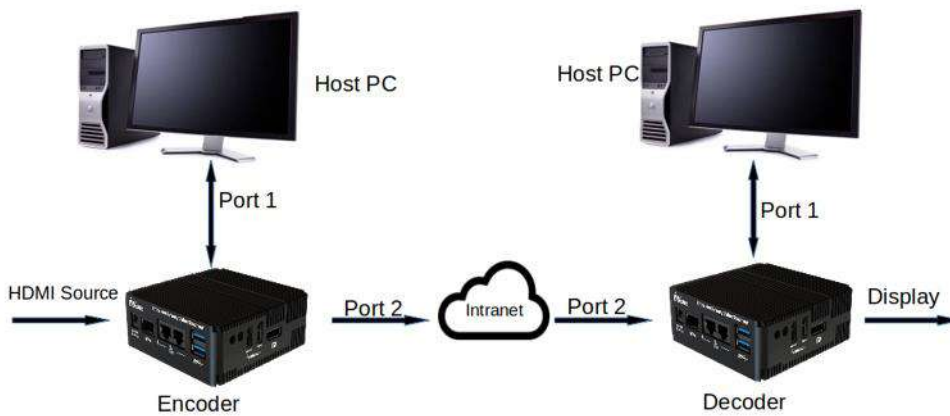


Figure 9 : Setup for UDP streaming with Intranet

- Do the setup as given above and Power on the Encoder and Decoder
- Port1 is used for browser and port2 is used for streaming
- IP address for setup
 1. HOST PC – 192.168.1.3
 2. Encoder PORT 1 – 192.168.1.1
 3. Encoder PORT 2 – 192.168.2.1 / DHCP IP Address
 4. Decoder PORT 1 – 192.168.1.2
 5. Decoder PORT 2 - 192.168.2.2 / DHCP IP Address
- Set IP Address static on Host PC
- On the host PC, run web browser
 - <http://192.168.1.1> for encoder

➤ <http://192.168.1.2> for decoder

In case of encoder or decoder below page will appear



Figure 10: Home page

3.3.3 Port-2 IP address settings for Encoder and decoder

- Select settings > Ethernet from home page
- Select **port2** in ethernet port
- Two select option will be available for PORT2. Static and DHCP
- To set static IP address for PORT2, select “**static**” in type
- Enter static IP address (192.168.2.1 for encoder and 192.168.2.2 for decoder)
- To set DHCP, select “**DHCP**” in type
- It will automatically set the IP address based on MAC address.
- click save changes.



Figure 11 : IP address setting page

3.3.4 Streaming out by UDP Encoder

Follow the below given steps for streaming with UDP protocol.

- Click Stream button from side menu
- Click Encoder



Figure 12 : Encoder

- Click stream over ethernet



Figure 13 : Stream over ethernet

- Select UDP from protocol drop down menu
- Enter IP address of decoder to where need to stream
Ex: 192.168.2.2 [port2 IP address]
- Enter bitrate. Recommended bitrate is 25000
- Select encoder and profile
- Select control rate. Recommended control rate is Low latency
- To stream with Encryption, enable encryption option.
- Video will be encrypted with following encryption key.
“012345678901234567890123456789012345678901234567890123456789”
- To stream with loop out, enable loop out checkbox. When loop out is enabled, it will display the video in Encoder device HDMI output without audio.(Before enable loop out make sure HDMI output is connected , if it is not connected it shows parameter error in response page)

- Start the streaming by clicking “**SUBMIT**” button.

The screenshot shows the 'ULL STREAMER' web interface. On the left is a dark blue sidebar with 'Settings' and 'Stream' options. The main content area is titled 'Stream Over Ethernet' and contains several input fields: 'Protocol' (set to UDP), 'IP Address' (192.168.2.2), 'Port' (5000), and 'Encoder' (H.264). Below these are radio buttons for 'Profile' (Baseline, Main, High), 'Control-rate' (Low Latency, Variable, Constant), and 'Link-bit' (Onegigabit). A blue 'Submit' button is at the bottom.

Figure 14 : UDP Form

- Now response page will appear based on success or failure. Please check “**Response page**” section for different response.
- To receive and decode streaming video refer below section.

Note : For H265 Encoder, profile selector is not available, It takes default main profile control rate option is provided but not tested.

Maximum bitrate tested is 30000 kbps.

3.3.5 UDP Decoder capturing UDP streams

To decode streaming video and display, follow the below given steps.

- Click Stream button from side menu
- Click Decoder

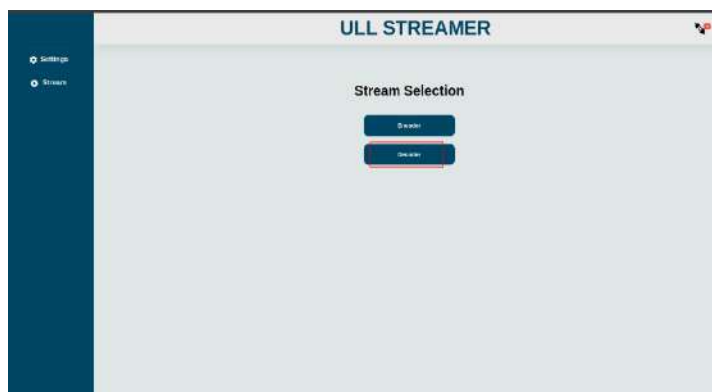
The screenshot shows the 'ULL STREAMER' web interface with the 'Stream Selection' page. The sidebar on the left has 'Settings' and 'Stream' options. The main content area has the title 'Stream Selection' and two blue buttons: 'Decode' and 'Stream'. The 'Decode' button is highlighted with a red border.

Figure 15 : Decode

- There are two methods,
 - UDP decoder and display using HDMI or DP output.
 - Record the received video

3.3.5.1 UDP decoder and display

Receive the streaming video, decode and display using HDMI or DP output

- Click UDP decoder



Figure 16: Decoder page

- Enter IP Address of Encoder from which IP address using for streaming
Ex: 192.168.2.1 [Port2 IP address of Encoder]
- Select encoder from which is streamed from encoder device.
- Select Output option HDMI or DP.
- Select Encryption, if streamed video is encrypted. If decoder parameter is mismatch with encoder parameter it won't display the video.
- Click start button for display the stream.



Figure 17: UDP decoder page

- Response page will appear based on success or failure. Please check “**Response page**” section for different response.
- It will take some time for display the stable video.

- It will start display the streamed video and audio, if decoder device is receive the data. Which is indicated by streaming icon. If decoder is receive the data, it shows green otherwise yellow.
- Also it will show the streaming information like width, height and framerate.

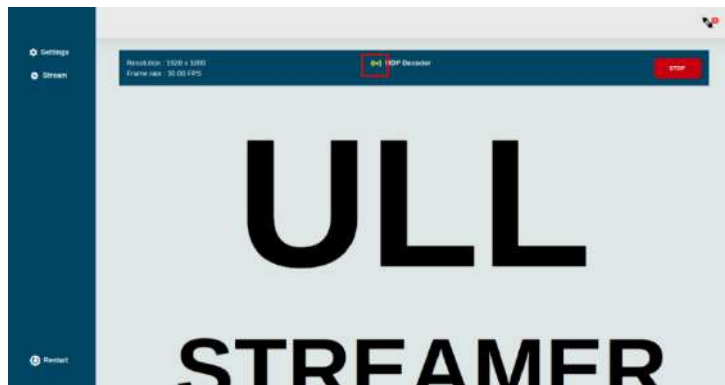


Figure 18: UDP data indication

Note : If it is not display the streamed video, recheck whether selected parameters are correct. If still not display, restart the streaming in both encoder and decoder.

It will restart automatically, when resolution change occurs in encoder device.

3.3.5.2 UDP Record

Receive the streaming video and store in MP4 file container.

- Click UDP Record



Figure 19: UDP Record

- Enter filename with .mp4 extension
- click “start” button.



Figure 20: UDP record page

- Now It will redirect to response page and it will show recording status (success or failure). Please check **“Response page”** section for different response.
- It will start recording once decoder device is receive the data which is indicated by streaming icon in popup. If decoder is receive the data, it shows green otherwise yellow.
- Also it will show the recording information like width, height and framerate.

Note : If decoder stop receiving the video from encoder, it will stop recording.

If encoder starts UDP streaming early and decoder starts streaming after 1 min , sometime it won't display the video need to restart using unplug and plug the ethernet cable or restart streaming in both encoder and decoder.

3.4 RTMP Stream

3.4.1 RTMP Stream requirements

SI No	Items	Description	Qty
1.	Host PC	Host PC with Windows /Linux operating system	1
2	Ethernet cable	Running with Linux Version 4.1.15 loaded with latest binaries from iWave.	1
3	HDMI Source	To provide HDMI input to ULL streamer	1
4	HDMI cables	To connect HDMI input and output	1
5	Youtube/Wowza	RTMP Streamout site	-

Table 3 : RTMP Stream requirements

3.4.2 RTMP Setup

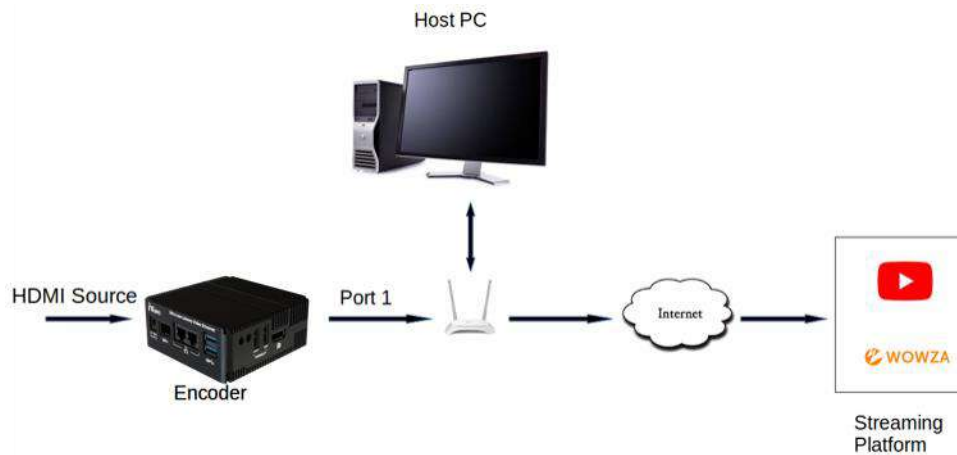


Figure 21 : RTMP Setup

- Do the setup as given above and Power on the Encoder and Decoder
- Port1 is used by browser and port2 is used for streaming
- IP address for setup
 1. HOST PC – 192.168.1.3
 2. Encoder PORT 1 – 192.168.1.1
 3. Encoder PORT 2 – DHCP Server (Port 2 IP Address is get from the DHCP Server)
- On the host PC, run web browser

<http://192.168.1.1>



Figure 22: Home page

3.4.3 Port-2 IP address setting

- Select settings > Ethernet from home page
- Select **port2** in ethernet port
- Two select option will be available for PORT2. Static and DHCP
- Select “**DHCP**” in type
- click save changes.

- It will automatically set the IP address based on MAC address.

3.4.4 Streaming to live platform

Using this user can stream in Youtube or Wowza server. Before streaming, make sure that Youtube/wowza server is configured and got stream URL and stream Key. Refer steps given in **streaming platform configuration** to get stream key and URL.

- Click Stream button from side menu
- Click Encoder



Figure 23: stream selection page

- Click Stream over ethernet



Figure 24: Encoder page

- Select RTMP from protocol drop down menu
- Enter valid RTMP URL and stream key of streaming platform.
- Enter bitrate and profile
- Enable loop out by clicking loop out checkbox .(Before enable loop out make sure HDMI output is connected , if it is not connected it shows parameter error in response page)
- Click “submit” button to start the streaming

- It will redirect to response page and it will show recording status (success or failure). Please check “Response page” section for different response.
- Youtube or wowza will display the streamed video with audio.



Figure 25: Stream over ethernet page

Note : If video is not visible in Youtube, re verify whether URL and stream key is correct. Refresh the Youtube/wowza console and restart the streaming.

3.5 Video encoding and recording

3.5.1 Video record Device requirements

SI No	Items	Description	Qty
1	Host PC	Host PC with Windows /Linux operating system	1
2	Ethernet cable	Running with Linux Version 4.1.15 loaded with latest binaries from iWave.	1
3	HDMI Source	To provide HDMI input to ULL streamer	1
4	HDMI cables	To connect HDMI input and output	1
5	USB device	To save the recorded video	1

Table 4 : Video record Device requirements

3.5.2 Video record Setup

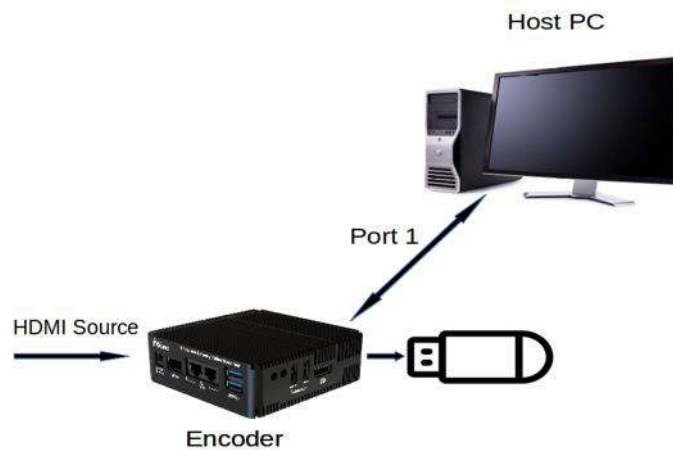


Figure 26 : Video recording setup

- Connect USB device(Pendrive) to the ULL streamer for store recorded files
- Do the setup as given above and Power on the Encoder
- IP address for setup
 1. HOST PC – 192.168.1.3
 2. Encoder PORT 1 – 192.168.1.1
- On the host PC, run web browser



Figure 27: Home page

3.5.3 Recording

It will encode and store the video and audio in file.

- Click Stream button from side menu
- Click Encoder



Figure 28: Stream selection

- Click Video Record



Figure 29: Encoder page

- Enter file name with .mp4 extension
- Enter bitrate. Recommended bitrate is 25000
- Select encoder and profile
- Select control rate. Recommended control rate is Low latency
- click “start” button



Figure 30: Video record form

- It will redirect to response page and it will show recording status (success or failure). Please check “**Response page**” section for different response.
- It will start recording and store it in USB device
- If USB having less then 50 MB storage space, then it will stop the ongoing recording automatically. To check remaining storage in pen drive, click connection status side panel.

Note : Before click start button make sure USB Device is connected

3.6 File decode and display

3.6.1 File stream requirements

SI No	Items	Description	Qty
1	Host PC	Host PC with Windows /Linux operating system	1
2	Ethernet cable	Running with Linux Version 4.1.15 loaded with latest binaries from iWave.	1
3	USB device with the file	To Display the file	1

Table 5 : File stream requirements

3.6.2 File Decoding and Display setup

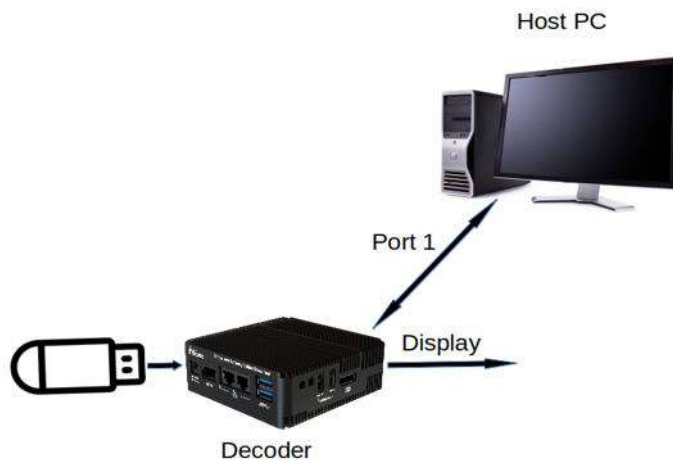


Figure 31 : File Streaming setup

- Do the setup as given above and Power on the Decoder
- IP address for setup

1. HOST PC – 192.168.1.3

2. Decoder PORT 1 – 192.168.1.2

- On the host PC, run web browser
192.168.1.2 [IP address of decoder]



Figure 32: Home page

3.6.3 Decode file and Display

Decode and display the encoded file exist in pen drive. Only support mp4 files.

- Click Stream button from side menu
- Click Decoder



Figure 33: Decode

- Click File Decode



Figure 34: File Decode

- Enter filename of video file which user need to display
example.mp4
- Click “start” button



Figure 35: File Decode form

- It will redirect to response page and it will show display status (success or failure). Check “**Response page**” section for different response.
- It will display the recording file information like width, height and framerate.

3.7 Response Page

1. Streaming/Recording

This message indicates that streaming/recording started successfully without any error. The popup will appear on top with streaming information like resolution and framerate. Also, it will show stop button using that user can stop the current streaming/recording , In that popup user can know which streaming/recording is running



Figure 36 : Response 1

2. Check the video input source

This message indicates that HDMI source is not connected or not getting video from HDMI source. Recheck the connection with connection status side panel.



Figure 37: Response 2

3. Check the parameter

This message indicates that some mismatch in entered parameters. For example if user given wrong URL, stream key, IP address etc. Please enter the valid parameters.



Figure 38: Response 3

4. Streaming is completed

This message indicates that ongoing streaming/recording is completed.



Figure 39 : Response 4

5. UDP Decoder is processing

This message indicates Decoder is waiting for UDP data from encoder

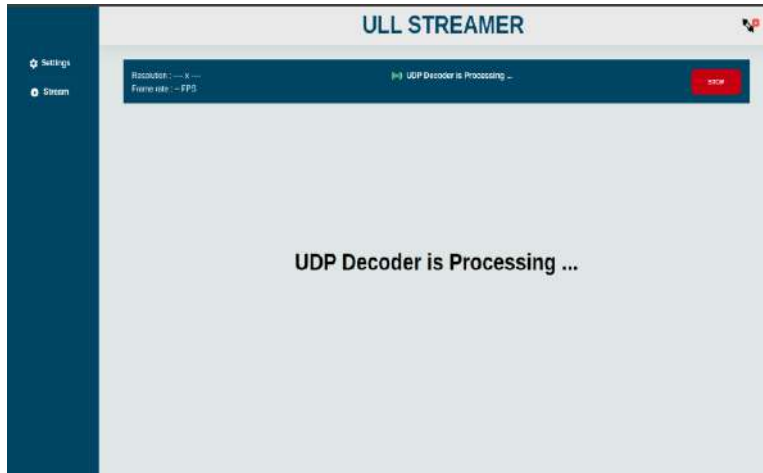


Figure 40 : Response 5

3.8 Connection status

This side bar shows the status of ethernet, USB, HDMI input and DP connection.

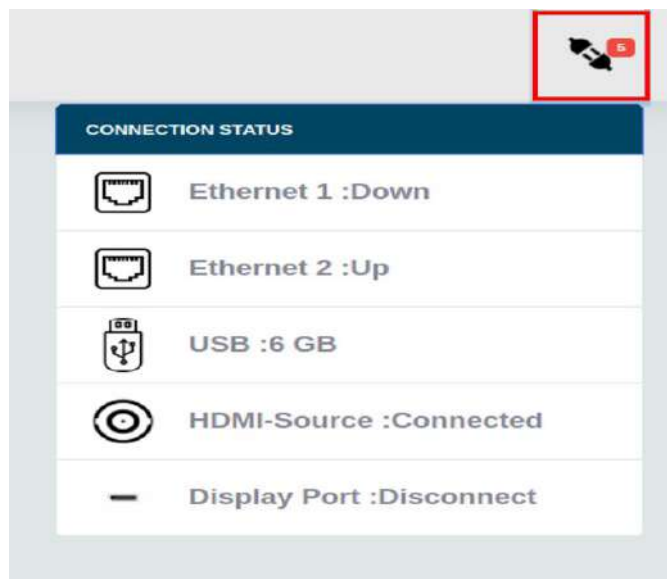


Figure 41 Connection Status

1. Ethernet status

- If ethernet is connected it will show “Up” otherwise it will show status as “Down”.

2. USB device status

- If USB is not connected it will show the remaining storage of USB in GB. Otherwise, show “Unknown” in connection status.

- To check the recorded MP4 video files stored in Pen drive follow the below steps
- Click USB in connection status.
- To check the property of video file, click the file name. It will show File size, Duration, framerate resolution and encoder.
- User can download using “Download” button.

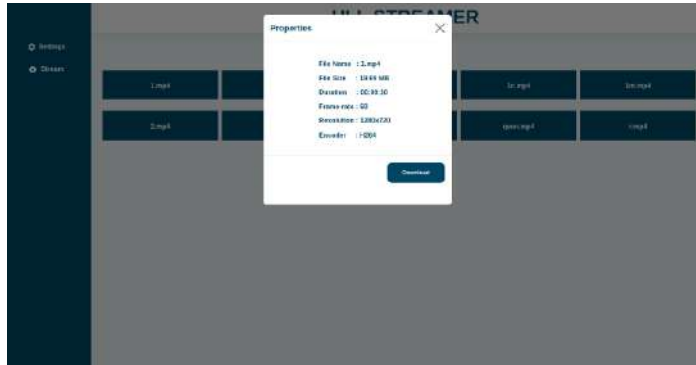


Figure 42: video files

3. HDMI Connection status

- If HDMI source connected it will show status as **“Connected”**. Otherwise, it will show **“Disconnected”**

4. Display Port Connection status

- If Display port connected it will show status as **“Connected”**. Otherwise, it will show **“Disconnected”**

3.9 Restart system

User can restart the ULL streamer device using restart button which will be available in home page.



Figure 43 Restart button

4 FIRMWARE UPDATE

To update the binary to ULL streamer follow the below steps.

- Copy the .swu binary file from deliverables folder to HOST PC.
`<Deliverables path>/Binary/HDMI-ULLStreamer_v1_1.swu`
- Run the localhost in host pc web browser to start the SWUpdate webserver.
`http://“ULL Streamer IP address”:"http port”`

For Example:

`http://192.168.1.2:8080`

- Below shown the webpage will be displayed if the webserver is configured properly.

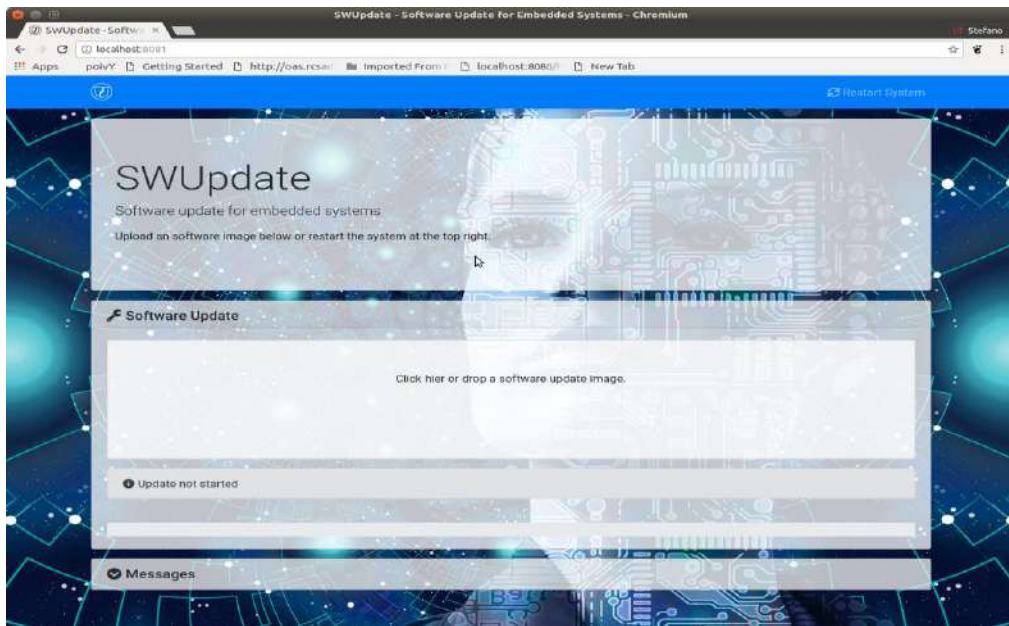


Figure 44: SWUpdate webserver window 1

- Follow the below option to select the .swu image in host pc.

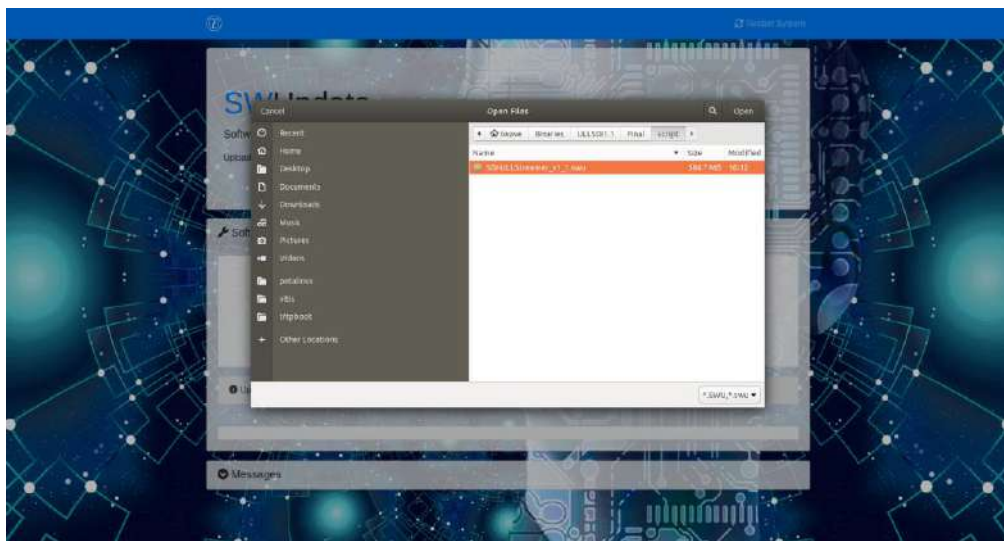


Figure 45: swupdate webserver window 3

- Follow the below option to update the SWUpdate image in webserver. Don't power off the device during firmware update.



Figure 46: SW Update webserver window 2

- Once extraction done it will reboot the ULL streamer.

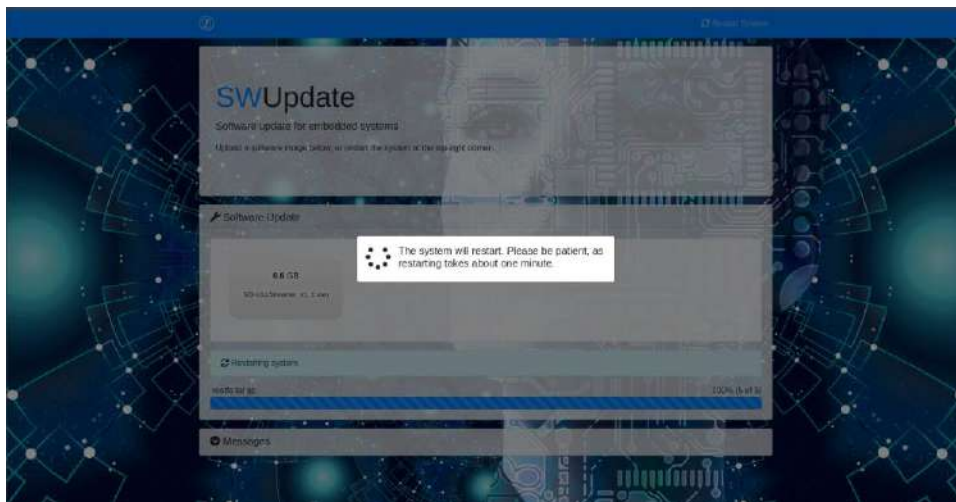


Figure 47 : SW Update webserver window 3

- Once reboot is done it will show normal window [figure: 44]
- Follow “**Configuration and usecases**” section for update IP address setting and streaming

5 STREAMING PLATFORM CONFIGURATION

To stream to different platform, need to do the stream configuration.

5.1 Youtube

To find URL and stream key, refer below link

<https://docs.castr.com/en/articles/2291756-how-to-find-my-youtube-stream-key>

To stream with low latency, check stream latency in stream settings.

Latency achieved with Youtube

Method	Latency
Normal latency	16 sec
Low-latency	5 sec
Ultra low-latency	3 sec

5.2 Wowza Server

To find URL and stream key, follow bellow steps

- Create an account and login with below URL for free trial
[Wowza | Wowza Video Trial](#)
- Click Add Live Stream and create a live stream

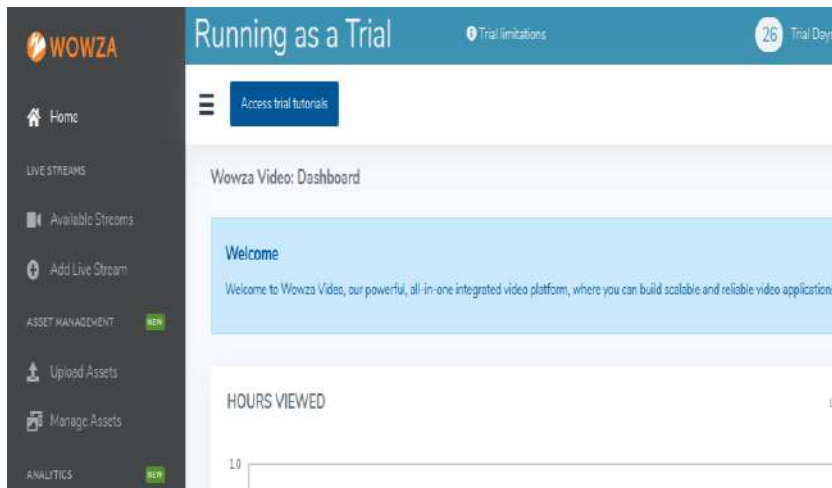
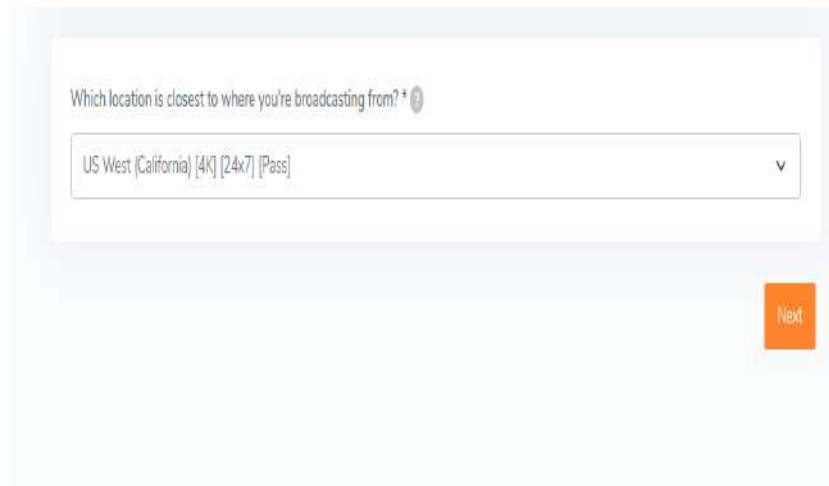


Figure 48: Wowza Server

- Enter Name of the stream and below the name should select which location is closest to your location and click next



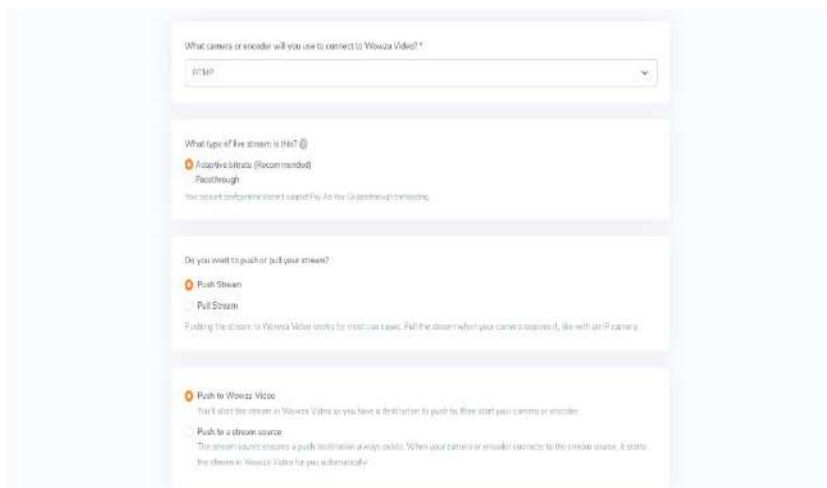
Which location is closest to where you're broadcasting from? *

US West (California) [4K] [24x7] [Pass]

Next

Figure 49 : Wowza form page 1

- Encoder should be RTMP and rest of the things are default



What camera or encoder will you use to connect to Wowza Video? *

RTMP

What type of live stream is this? @

Adaptive bitrate (Recommended)

Passthrough

Do you want to push or pull your stream?

Push Stream

Pull Stream

Push to Wowza Video

Push to Wowza Video

Push to a stream source

Figure 50: Wowza form page 2

- Select which resolution you want and make tick in the source security check box

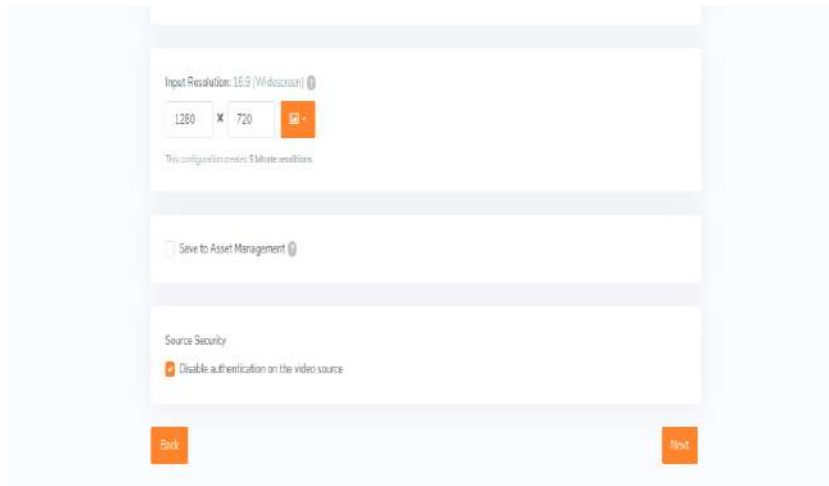


Figure 51 : Wowza form page 4

- Click Next for 3 times to create live stream
- Once created the page is look like below figure

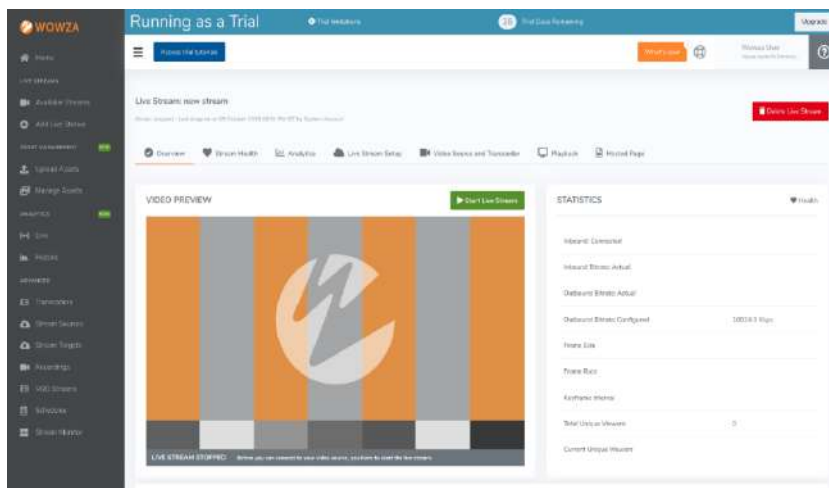


Figure 52:Wowza Streaming Page

- If scroll down you can find RTMP URL and Stream key

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Primary Server	<input type="text" value="rtmp://995ba578a636.entrypoint.cloud.wowza.com/app-6sm75xbc"/>	RTMP URL
Host Port	<input type="text" value="1935"/>	
Stream Name	<input type="text" value="e78b6ff1"/>	Stream key
Disable Authentication	<input type="checkbox" value="Yes"/>	
Player Embed Code 	<pre><div id='wowza_player'></div> <script id='player_embed' src='//player.video.wowza.com/hosted/bqfmfchf/wowza.js' type='text/javascript'></script></pre>	

Figure 53 : Wowza RTMP URL and Stream key

- To start wowza server, click start live stream button

Note: Latency achieved with normal latency is 30 sec and with low latency not tested.