S2 4K Video Encoder

USER MANUAL

Changsha KILOVIEW Electronics CO., LTD

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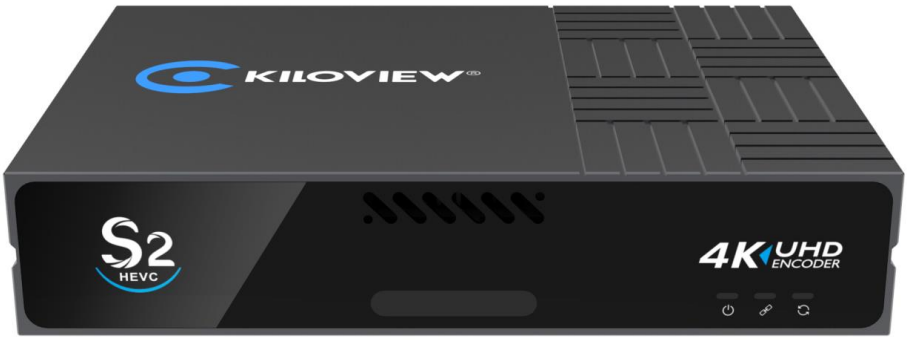
1. Product Introduction

S2 is an UHD 4K HDMI video encoder, which supports up to 4Kp60 input and H.265 (HEVC)/H.264 high-performance encoding with Gigabit wired network transmission. Also, it supports the most protocols including NDI|HX/SRT/RTMP/RTMPS/HLS/UDP/RTSP, etc.



1.1 Advantages

✧ **UHD and low latency**

- With H.265 HEVC encoding, S2 realizes lower encoding bitrate and save more than 40% bandwidth comparing with H.264.
- Support 1000Mbps Ethernet port (with PoE).
- Low encoding latency less than 34ms.
- Resolution up to 4KP60Hz input supported.

1.2 Parameters

Model	**S2**
HDMI input	HDMI2.0
Analog audio interface	1*3.5mm Line in
USB interface	USB2.0
Video interface	1 channel HDMI input，1 channel HDMI loop
Network	1000M Ethernet
POE	Support
Streaming protocols	RTSP/RTMP/HLS/TS-UDP/SRT/NDI|HX
Video resolution input	Up to 4KP60
Video encoding	H.264/H.265
Encoding resolution	4KP30
Audio encoding	AAC/G7.11
Management method	Web management
Power	DC 12V/1A
Working temperature	-20℃~60℃

2. Operation Guidance

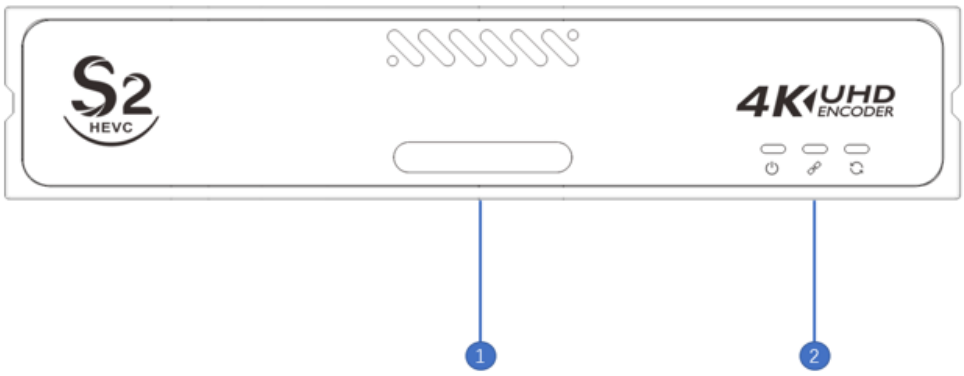
- **Installation and connection**

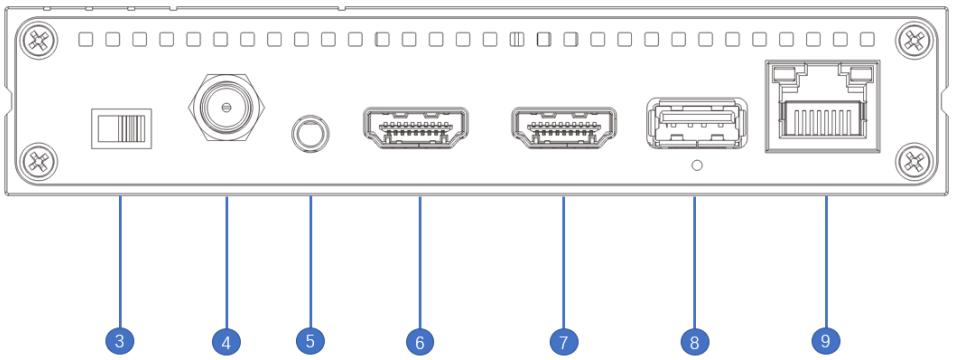
  Connect the power, Ethernet cables and video input source correctly, power on the device.

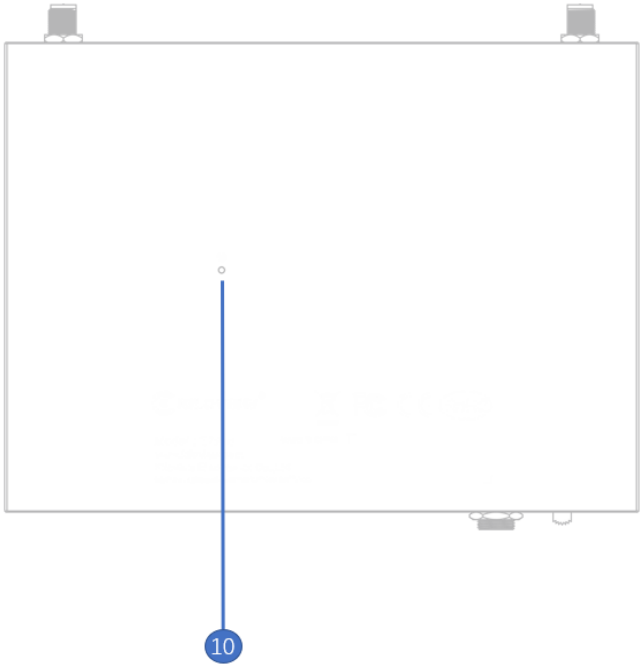
- **Network connection and configuration**

  The simplest way is to access the unit via Ethernet through default IP address (192.168.1.168) to login the WEB page for setting (default username and password: **admin/admin**).

3. Device Interface Description







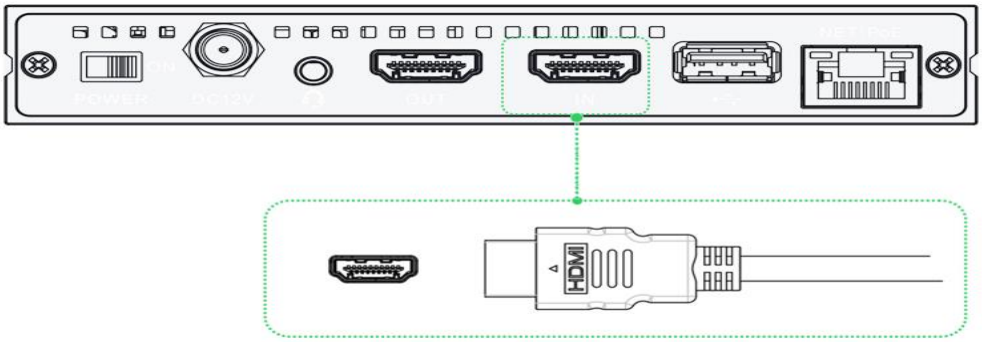
1. Tally	2. Status Indicator	3. Power Switch	4. Power Port
5. 3.5mm Line In/Line Out	6. HDMI Loop	7. HDMI Input	8. USB Expansion Port
9. 1 GbE port with PoE	10. Reset		

Name	Color	Status	Description
POWER	White	Always on	Power connected
		Flashing	Power off or failure
		Off	No power supplied or power failure
LINK	White	Quick flashing	Network connected
		Slow flashing	Network connection abnormal or restore factory setting indication (Run light will be flashing as well)
		Off	Network disconnected or abnormal
RUN	White	Flashing	Working normally
		Always on	Indication for device restore factory (Link light will be flashing as well)
		Off	Working abnormal or not start

4. Installation and Connection

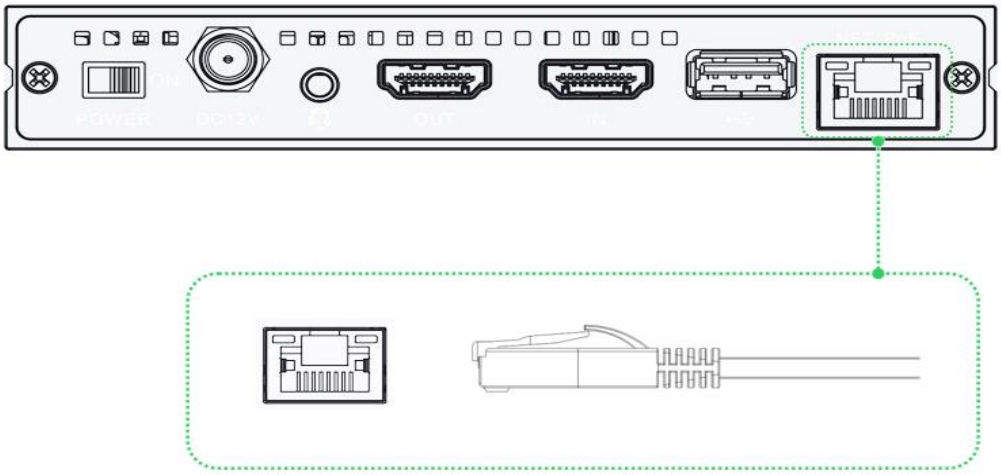
4.1 Video signal connection

Connect HDMI signal from a source (such as camera) to the device HDMI port through a cable.



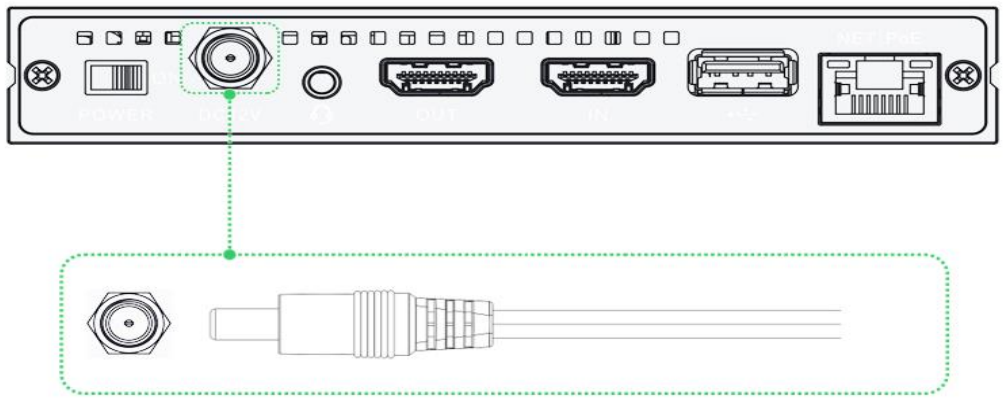
4.2 Network connection

Connect the network cable to Ethernet of the device, and connect the other end to the network switch or directly to the network port of the computer.



4.3 Power connection

Using the power adapter (DC 12v) to connect to the power connector of the device. Turn on power switch, the power light will be on and the device starts working, which will take 30~40s.



⚠ ***Note: If your switch supports POE power supply, there is no need to connect to the power supply.***

5. Login and Network Configuration

5.1 Device login

5.1.1 The default management IP address for the device

The default management IP address of the encoder is 192.168.1.16, which could be used as device management all the time and no effects on the device business IP address. Net mask is 255.255.255.0.

5.1.2 Computer network configuration

Click "network and Internet setting" -- "Network and sharing centers" — "Ethernet" — "Internet agreement version 4" —Use below IP address, enter 192.168.1.* manually (* refers to the number from 1 to 255 besides 168) and net mask, click "Login".

5.1.3 WEB management page login

Open the WEB browser, directly input the encoder's IP address (default is 192.168.1.168) or the URL http://192.168.1.168 and press "Enter" to open the login interface. Fill in the username and password, the default username is admin, the default password is admin, and then click "Login".

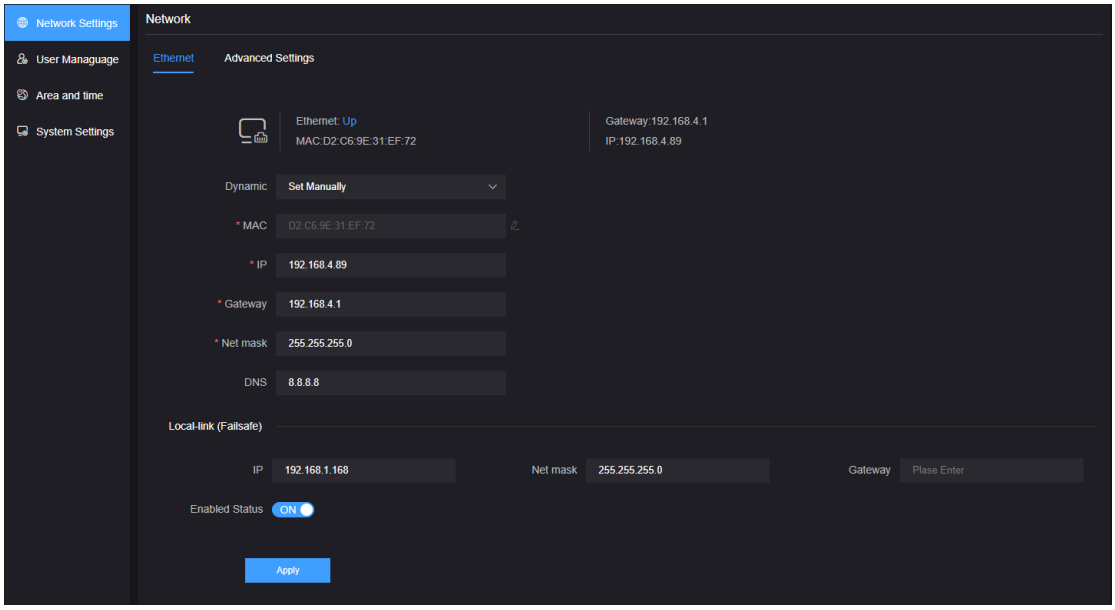
⚠ ***Note: Due to the browser compatibility issues, it may cause the webpage display abnormal, it is recommended to use Chrome and Firefox.***

5.2 Network configuration

5.2.1 Ethernet

After login, you could configure internet IP by DHCP or manually (Default is DHCP). This IP address could be used for network streaming and device management.

After configured IP address, you could directly visit this IP address to login into the device.



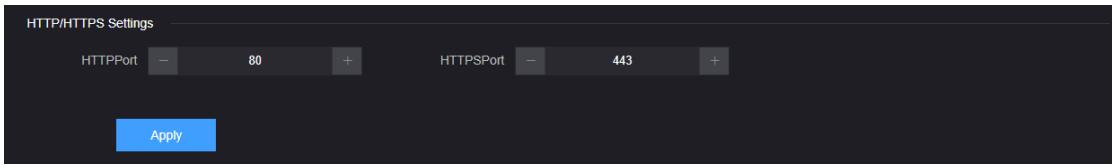
There are two ways to get the address, one is DHCP, and the other is manually. To use DHCP, please ensure that the router or switch has enabled the DHCP service. This method is simple and convenient, but the IP obtained by DHCP changes continuously, and you cannot directly know what IP address the encoder gets. To select manually, you need to enter a fixed IP to the device, and this IP address is fixed as long as the device does not restore the factory settings, this method is more stable. Therefore, the two methods have their own advantages, and can be selected accordingly.

5.2.2 Advanced setting

HTTP/HTTPS setting

The default web service port is 80 (https port is 443). You can change it (range: 1-65535) accordingly. After revised corresponded port, visit device configuration page. You need to add the changed port behind the device IP address before you visit. For example, the device normal login IP address is 192.168.1.168, change Web service port from 80 to 90, HTTPS service port from 443 to 450, then enter 192.168.1.168:90 or https://192.168.1.168:450 to visit device respectively.

By HTTPS, if the web browser prompts certificate errors which is caused by the browser certificate security authentication, you will need to add it to the safe list of the browser.



Routing strategy

The object of operation of routing strategy is the data packet, which is for routing release and reception. According to the needs, the data packet transmission path can be changed according to a certain strategy. When the device is connected to multiple network links, the different data link can be sent according to the appointed network link through designated strategy, which improves the utilization efficiency of the link.

⚠ ***Note: This operation requires professional person have a good understanding of the current network routing table or network well. Incorrect configuration may cause device abnormal.***

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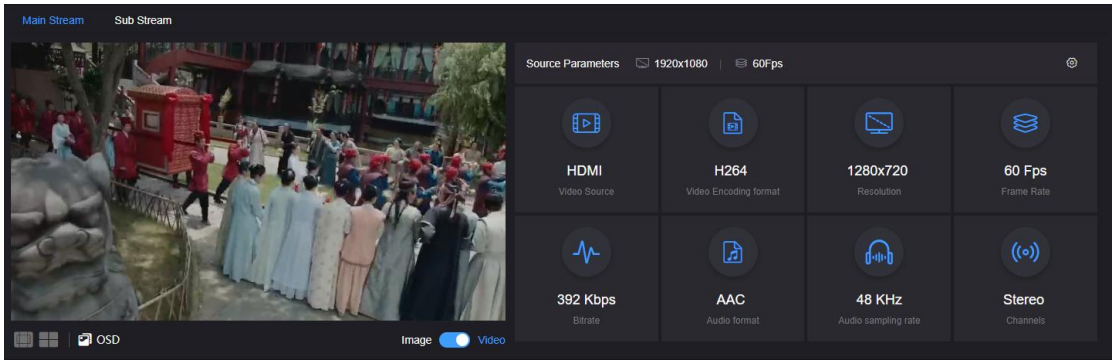
6. Parameter Configuration

6.1 Status column

In the status column, the left window is for preview of the video source either with image or video picture. When preview with image, you will see image stream, which refresh every 3 seconds. When preview with video, you will see smooth video. You can control and switch image steam and video stream through the switch. If the

preview window is displayed in black, it means the video source has not been detected by the device, and you need to check whether the input cable is plugged in correctly. The icon and in the lower left corner of the preview window can realize the functions of safety frame and centerline for the preview video.

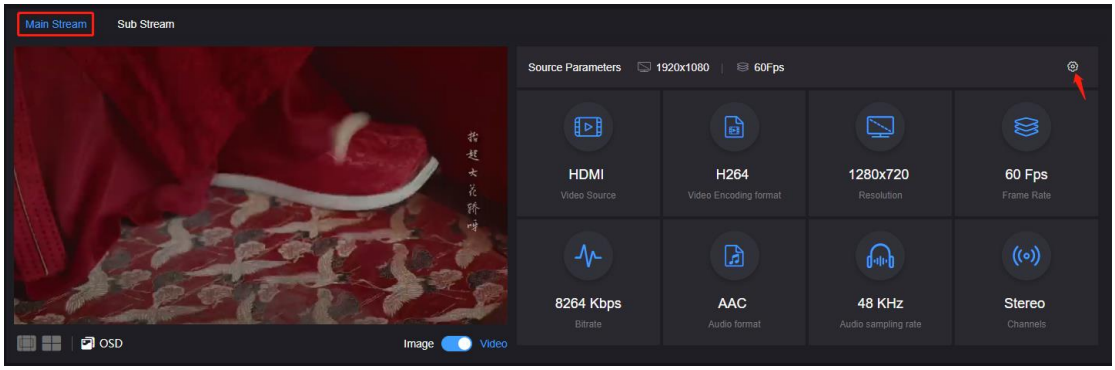


The parameters for main stream and sub stream are showed at the right window. You can switch the pages through clicking main stream and sub stream in the upper left corner. Brief introduction of the relevant encoding parameters as below:

- Video source parameters: Display the resolution and real-time bitrate of the video source
- Video source: Display the interface of the source
- Encoding format: Display the encoding format of the source
- Resolution: Display encoding resolution of the source
- Framerate: Display encoding framerate of the source
- Real time bitrate: Display the realtime changes of the encoding bitrate
- Audio format: Display audio format of the source
- Audio sampling: Display encoding audio sampling of the source
- Channels: Display encoding audio channels of the source

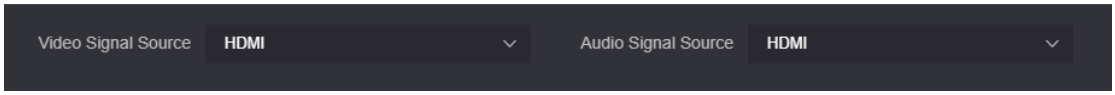
6.2 Audio & video encoding setting

Click setting button on the dashboard, enter the video encoding setting Webpage.



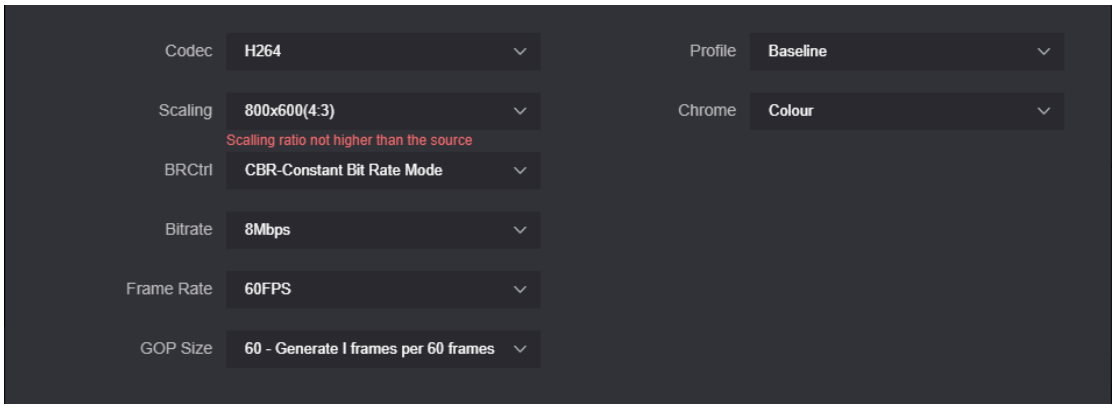
6.2.1 Audio and video signal source setting

There is only one HDMI input for the device, video source is HDMI by default. For audio source, you can select HDMI embedded audio or analog Line In. Default setting is HDMI embedded audio.



6.2.2 Video encoding parameter

Main stream encoding parameters configuration as follows:



- Two ways of encoding mode, the main stream and sub stream both can be

H264 or H265.

- “Scaling” has 7 options for choice. Default setting is “Default size”, that is, the video size after encoding is the same as the input video size. You can also set to encode low resolution input into high resolution output, and similarity, high resolution input can be encoded into low resolution output.

- “Color”: “With color” and “Monochrome”. Monochrome is black and white color, “With color” remains the original color. Default setting is “With color”.

- “Profile”: High profile, main profile, baseline. They are set according to platform supported encoding profile. High Profile is the highest compression efficiency, that is, under the same bitrates, image quality is the best; Baseline is the most widely supported; default setting is High Profile, which should be based on the actual platform supported.

- “Bitrate control”: CBR-Constant bitrate and VBR-Variant bitrate. From literal meaning, CBR is stable and unchanged bitrate, while VBR is constantly changing according to actual content. Generally, network transmission adopts CBR to guarantee transmission quality, while file storage uses VBR to guarantee file quality. Default setting is CBR-Constant bitrate.

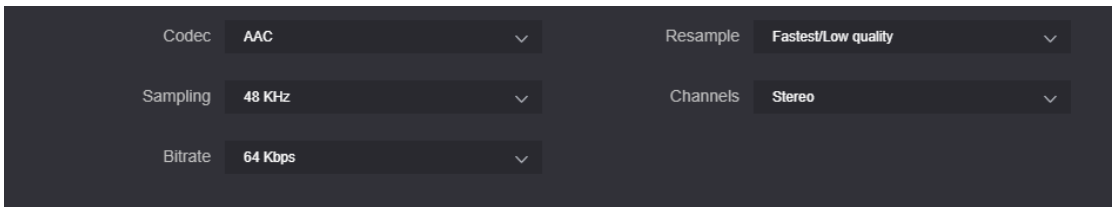
- “Bitrate” supports self-define bit rate and adjustable 20K-25M. After selected self-define bit rate, you can set self-define bit rate from 2K to 100M. Theoretically, the higher bitrates, video quality after encoding is better. But specific setting should be based on actual network situation, which can’t be

higher than your own upstream bandwidth.

- “Framerate” is adjustable from 24FPS to 60FPS and customized framerate supported. For customized customized framerate, you can assign framerate manually after encoding, in theory, it shouldn’t be higher than the original framerate.
- “GOP size” has seven options and supports user-defined adjustment. It is adjustable according to actual situation, default is 60, and normally it could meet the most majority of needs.

6.2.3 Audio encoding parameter

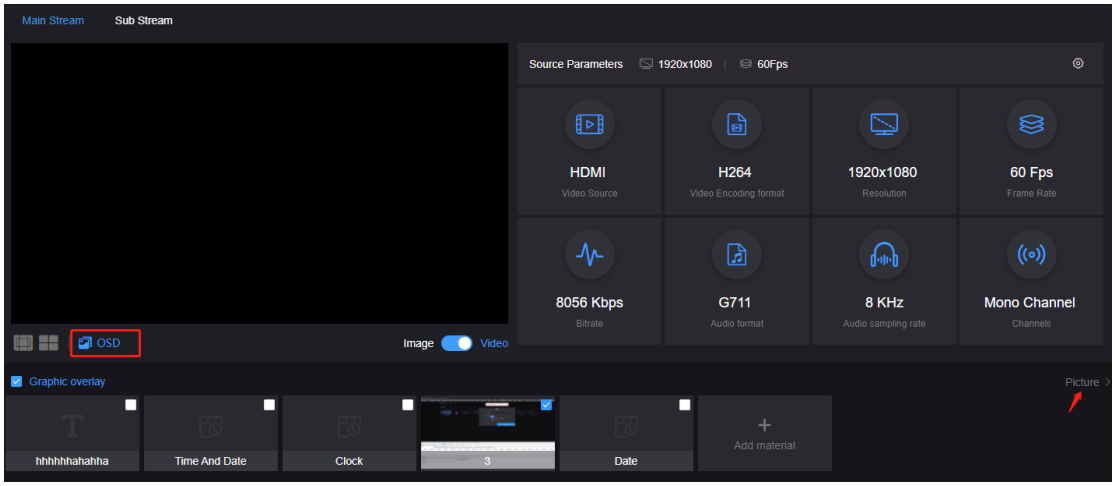
Audio encoding modes include AAC and G.711, optional. Audio sampling is chosen according to actual situation. Channels consist of “Stereo” and “Mono”. Encoding bitrate is adjustable between16K-256K, default is 64Kbps.



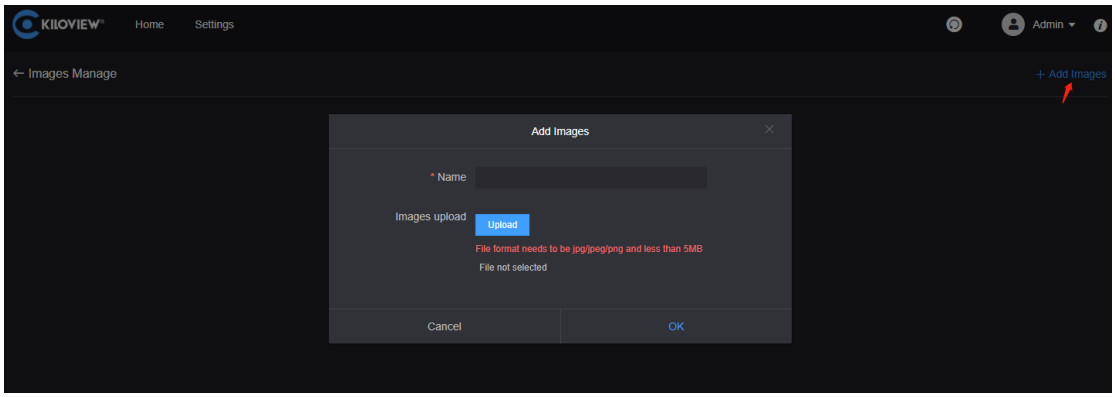
6.3 Text and OSD overlay

6.3.1 Text overlay

1）Enter “OSD” — “Image management” — “Add image”.

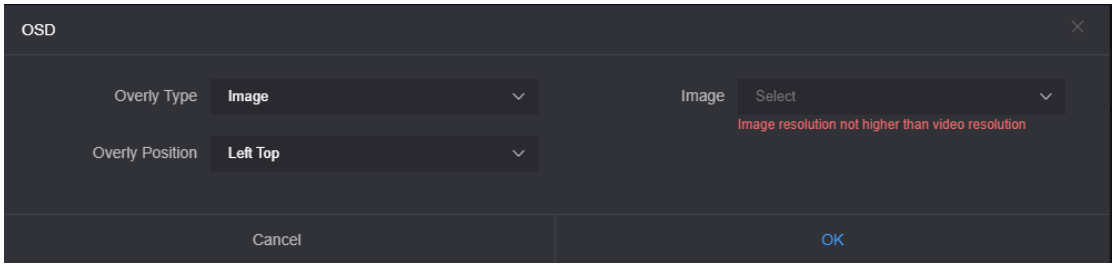


2) Fill in "image name" in the pop up window, choose the image to upload, and then save. You can check the image and information listed under the Image list.



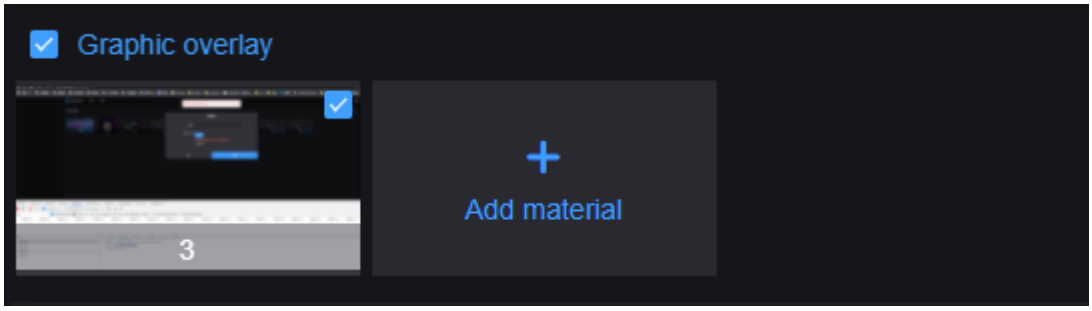
3) Click image management back to image overlay page, click add image.

4) Go to the overlay setting pages, overlay type select image, and then click the image and the position you need overlay, click ok.



5) The configured image overlay will be shown at the station column, check the

image overlaid, and finally check image overlay to make it effect.



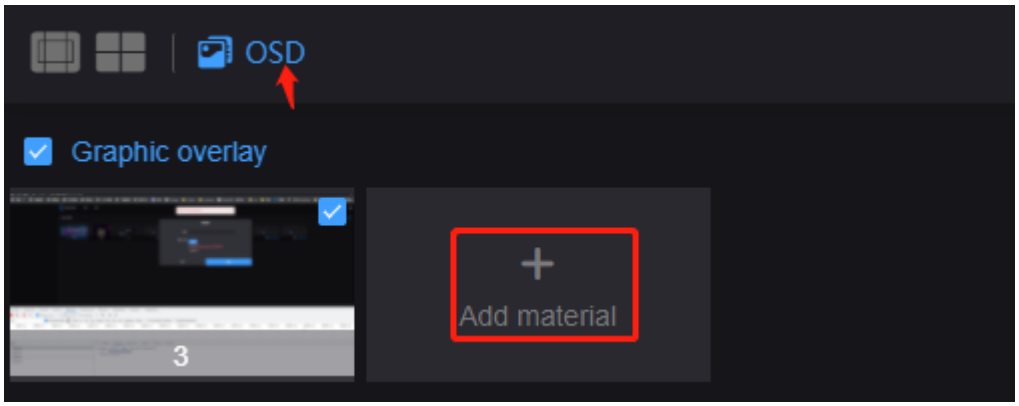
⚠ ***Note:***

- ***The number of uploaded images can not be over 10 due to the limites of storage space, and the maximum size of a single image is 5M.***
- ***The resolution of uploaded image can not be over the video.***

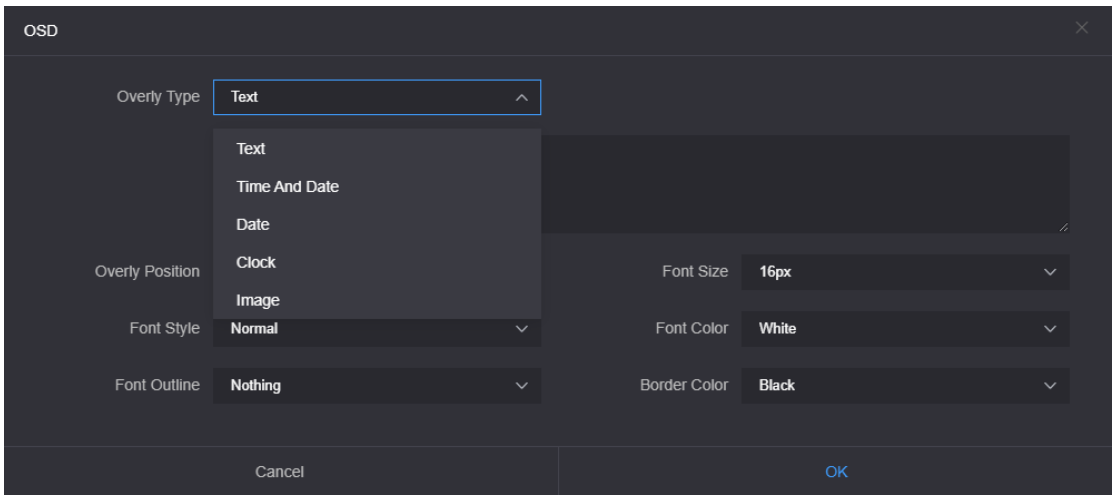
- ***For the image format, only JPEG and PNG supported.***
- ***You can't see the effects of image and text overlay in the preview window, which can only be displayed on the computer by decoding output with software or decoder.***

6.3.2 OSD overlay

Click "OSD" - "text overlay" - "add"



Go to the configuration page, to choose overlay item to set overlay functions for "Image", "Time and Date" and "Text" respectively.



- Overlay type: "Text, Date, Time, Date/Time, and Image" for options.
- Overlay position: There are seven preset display and self-defined positions for optional, which should be based on your actual needs for selection.
- Horizontal position: When the overlay position is customized, adjust the character offset based on the horizontal offset setting.
- Vertical position: When the overlay position is customized, adjust the character offset based on the vertical offset setting.
- Font size: Three auto size for options. "Auto Large font", "Auto Medium" and "Auto Small". Adjustment from 9px to 96px also supported.

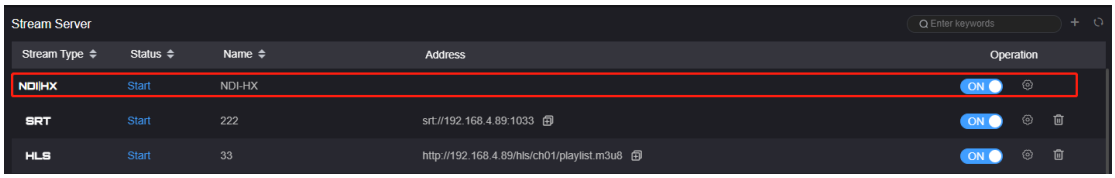
- Font style: Normal or Bold.
- Font outside: Adjustments from 0 to 10px.
- Font color: Text color for optional.
- Frame color: Text frame color for optional.

7. Streaming Service

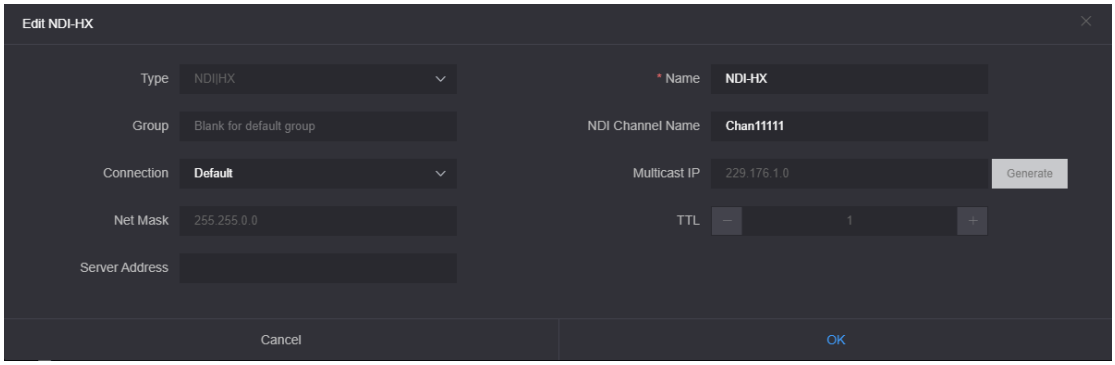
S2 supports the most common streaming protocols include RTSP/RTMP/HLS/TS-UDP/SRT/NDI|HX. One code stream can run up to 8 stream services at the same time, which means it can push the video stream to 8 different live platforms. There are two code streams (the main stream and sub stream) for S2, so S2 can stream up to 16 different live platforms at the same time.

7.1 NDI|HX

S2 supports NDI|HX2, it is enabled by default. Click [on] to enable or disable NDI|HX stream service.



Click setting button in the end of stream service for stream configuration.



Name: English letters and numbers

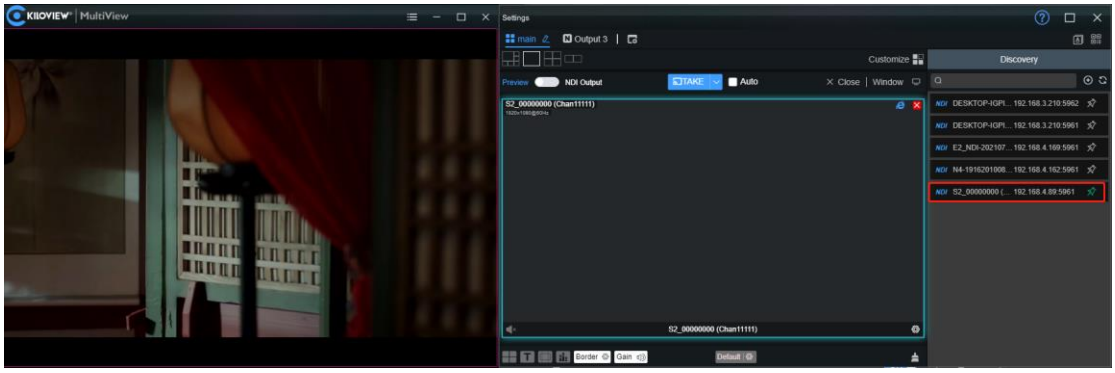
Group： To configure the devices to a group, the name of the group can be the combination of letters and figures. Multiple groups configuration is allowed and the group names should be separated by comma (,). The default group name is "public". You could set a specified group name, other devices need to search this device through specified group name, which avoids being searched at will by other devices via internet.

NDI channel name: When there are multiple NDI sources in the same network, you can modify the channel name with different parameters to identify each device correctly.

Connection： Two ways of connections: unicast and multicast. Default is unicast for transmission. Unicast is for one to one communication between device, while multicast is device to a group communication mode, that is to say, device that joined in the same group can receive all the data from device.

Server address: You can register the discovery of source in the discovery server. For operation steps, you can refer to the discovery server chapter .

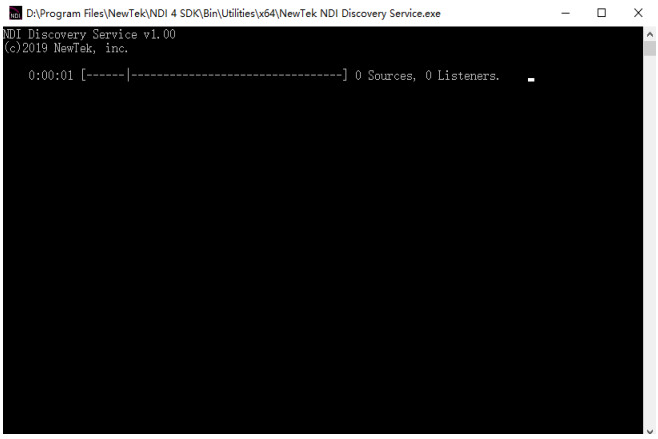
After configured, you can discover and output through NDI connected software. You can distinguish different NDI source through device name and channel name.



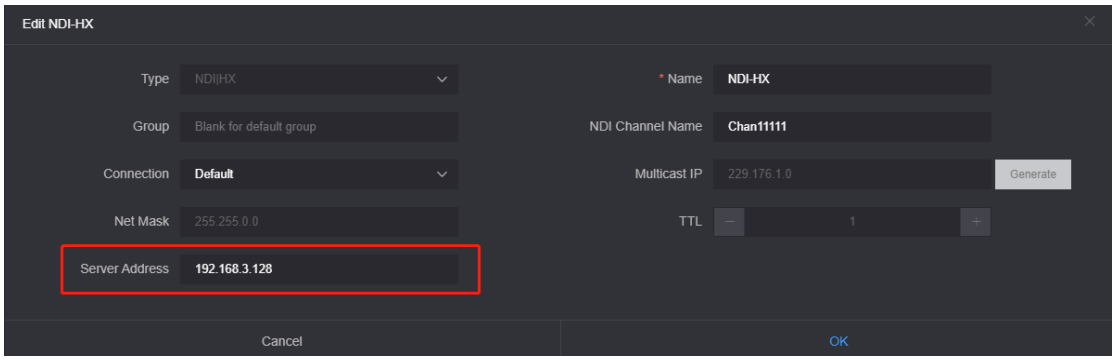
7.2 NDI discovery server

The NDI discovery server can replace the NDI discovery function with a server. The NDI sources are registered to the server, then the receiving end can gets the NDI sources from the server. Or configure the function to send the output streaming to the receiving end in other network segment.

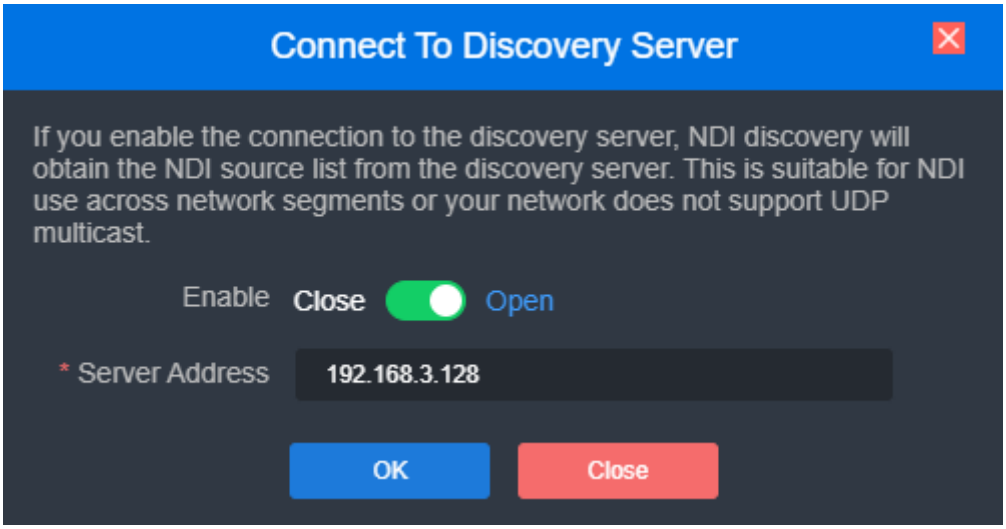
Enter the link (https://ndi.tv/sdk/) on the computer serving as the server to download and install the NDI SDK. After installation, run the file: Bin\Utilities\x64\NDI Discovery Service.exe



Configure the receiving IP address in the discovery server for your S2, and it will be registered to the server. It is recommended that the receiver IP address configured as a static IP address to prevent the disconnection due to IP reassignment.



Click "Discover server" on the decoder webpage to enable the function, and configure the discovery server IP address to the IP address of the computer. Then the NDI streams are registered to the server in the receiver.

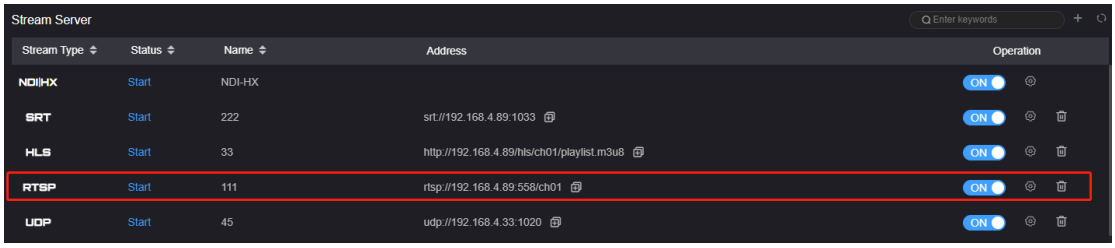


Note: After enabling the discover server, the mDNS auto-discovery function is invalid. The output streams from the encoder can only be sent to the designated server, and the receiving end must register to the same discovery server to pull the NDI streams.

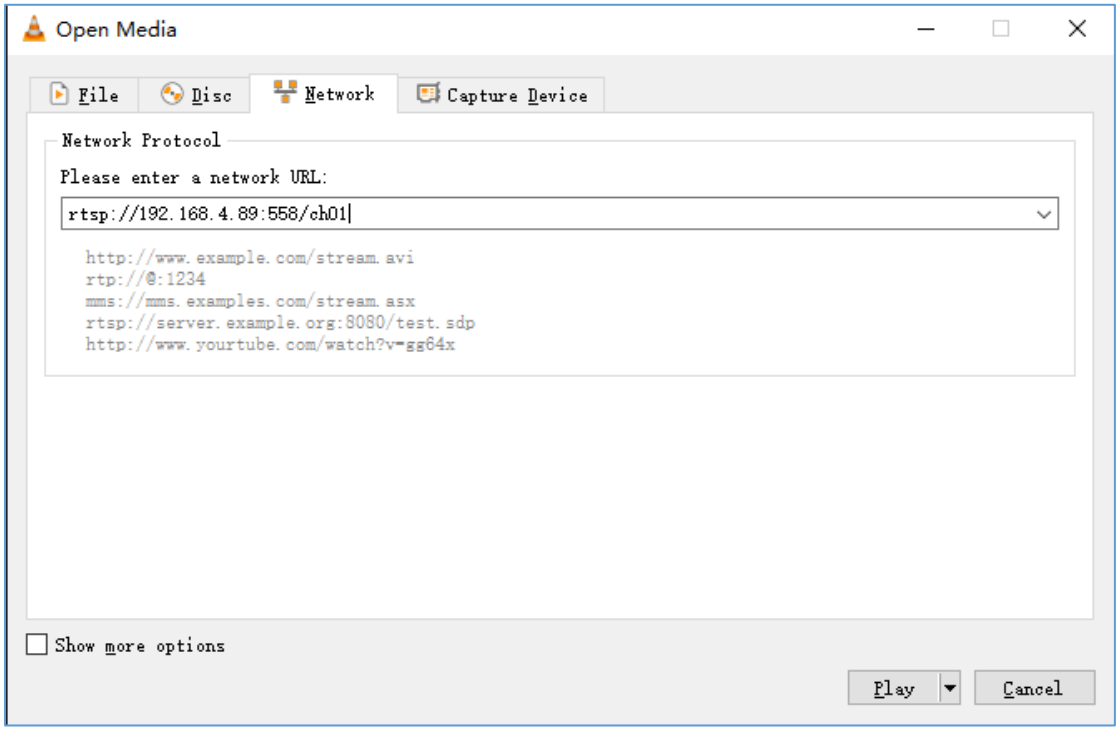
7.3 RTSP

Add an RTSP stream in the S2 encoder, if it is not decoded and there will be no additional load on the device. As shown in the below, if the IP address of the device

is 192.168.2.33, then the stream address of the RTSP service is rtsp://192.168.2.33:554/ch01. That is, you can directly pull as many RTSP streams as IP addresses the encoder has.



Under the same LAN, you can pull RTSP streams by VLC on the computer to test whether the encoding is normal and view parameter information, etc. After installing and opening VLC, click "Media"-"Open Network Streaming" and fill in the URL of the encoder's RTSP service.

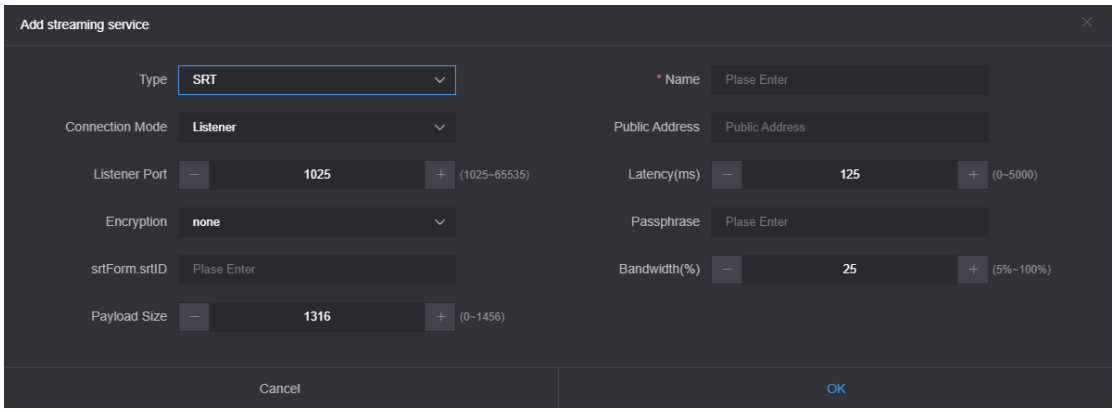


Note: The URL cannot contains Chinese, and the content needs to be copied completely, and the punctuation cannot be missing.

7.4 SRT

1) Click + to add a SRT stream service..

2} Fill in the pushing address and port, click "Save". Then SRT pushing is working.



Setting parameters means the following (It can be set according to the network situation, and select the default configuration generally):

- Handshake mode: Caller, Listener and Rendezvous. In general, the Caller and Listener mode are used. In the LAN, the encoder and the decoder can use the Caller and the Listener at will. After one end uses the Caller mode, the other end uses the Listener mode. In Internet transmission, the one end with the public IP address will be the Listener.
- Public IP address: Set IP address of the receiver.
- Port: Set the listening port corresponding to the receiver.
- Transport delay: Set it based on the performance of the current network, the delay value can be set on both the SRT source device and the SRT target device. The final SRT transmission delay will be the larger one of the two values.
- SRT streaming ID: SRT streaming identification.

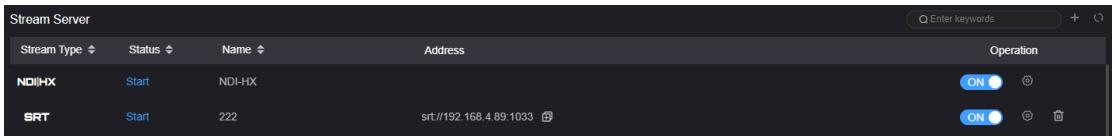
- Encryption mode: AES-128, AES-192, AES-256.
- AES key: Encryption key can be 10-32 letters or numbers combination.
- Bandwidth overhead: It is set as the percentage value based on network link quality. Using this value to multiply the total bitrate of the audio and video encoded by the encoder, this will get the occupied maximum bandwidth allowed by Bandwidth Overhead. This value plus the total of video and audio bitrate is the threshold of the current SRT transmission bandwidth, and also the maximum bandwidth that SRT stream can be used. From the perspective of "overhead", it is the extra "invalid" bandwidth to be used in addition to the media content required for transmission (which can be understood as the payload), but it is different from our common protocol overhead, TCP header overhead, UDP header overhead. The bandwidth overhead here is not a fixed 20~60 bytes TCP header overhead or 8 bytes UDP header overhead. It changes in real time according to the network conditions. The worse the network link conditions are, the more overhead needs for normal transmission. The range is 5%~100%, and the default overhead is 25%.
- Load size: Sending data packet size, it is optimal that the receiver should equip with the same size. The default size is 1316, which is the optimal packet for the encoder.

Network highest packet loss rate (%)	RTT Multiplier	BW Overhead	The lowest SRT delay (when RTT≤20ms)
≤1	3	33	60
≤3	4	25	80

≤7	5	20	100
≤10	6	17	120

Note: The data in the form is the reference delay value under different packet loss. When RTT > 20ms, it requires to increase the delay appropriately.

Save the settings, then a SRT-TS pushing address will be added. The encoder starts to initiate a handshake connection to the receiver.



7.5 RTMP pushing(live streaming)

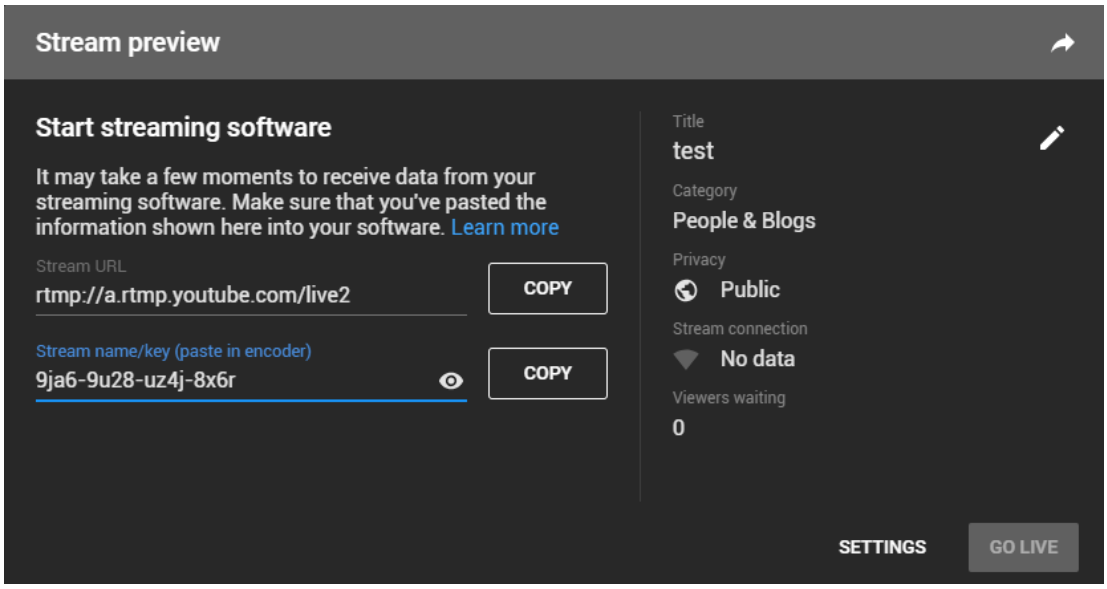
Using RTMP pushing, the first thing is to make sure platform providing RTMP pushing address, otherwise our encoders couldn’ t do RTMP pushing. (Currently, some live streaming apps cannot provide RTMP addresses)

Note: The RTMP pushing must be pushed from the encoder to the platform. The computer/decoder then pulls the RTMP stream from the platform for playback. The encoder cannot directly push the RTMP stream to the computer/decoder for playback.

1) YouTube live streaming

“Streaming point” is the RTMP address given by platform (Take YouTube as an example).

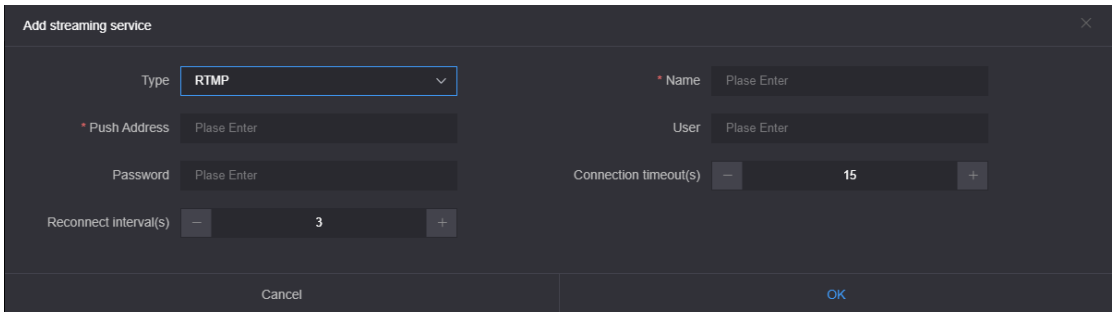
Login to YouTube, get below address:



Streaming point should be like Server URL+ Stream ID/key,

For example: rtmp://a.rtmp.youtube.com/live2/9ja6-9u28-uz4j-8x6r

2) After getting the RTMP URL address, login to the webpage of the encoder, and click "Add a stream service" to add a stream under the "H.264 main stream". Select RTMP in the pop-up window and fill in the URL address into the push address (The format is: rtmp address/live code), and then click "OK". If the pushing is unsuccessful, please check the network of the encoder.



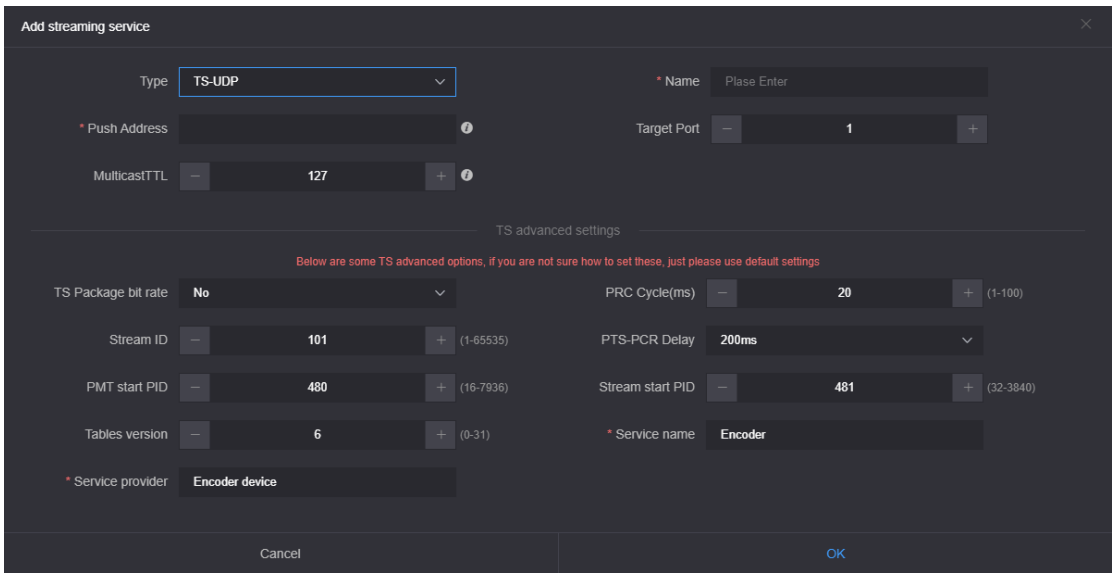
3) If the video can be displayed on YouTube, the pushing is successful, otherwise please check the network and other configurations.

7.6 TS-UDP Pushing (unicast and multicast)

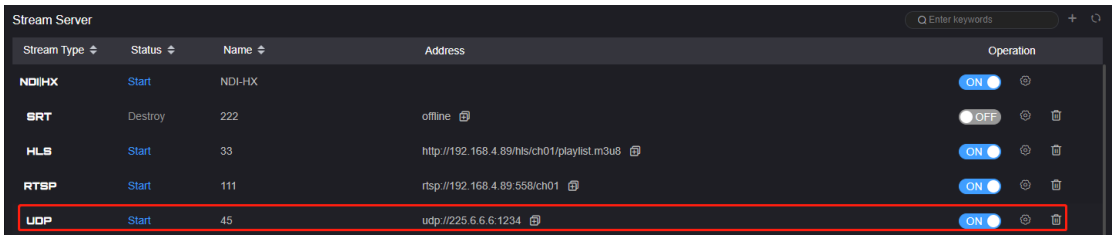
Click “+” to add a stream service and selects “TS-UDP pushing”.

The TS-UDP pushing including unicast and multicast. If use unicast, the "Push Target Address" is the IP address of the device that receives the TS stream, and the "Target Port" is a port that not conflict with the ports of other services, and the "Multicast TTL" does not need to be modified. Unicast pushing can only be decoded and played at the target address; if use multicast, fill a correct multicast address (address range: 224.xxx ~ 239.xxx) in the "Push Target Address". "Target Port" is a port that not conflict with the ports of other services. For other parameters, if there is no special requirement, it is recommended to use the default values.

Note: Multicast streams can only be decoded and played under the same network segment. Both the encoder and the player need to be configured with a gateway.



After finishing setting, it will come up an URL address from TS-UDP pushing, which could be decoded through VLC or other decoding player. If the multicast is decoded and played on the computer, please remember to close firewall and configure the network with a gateway.

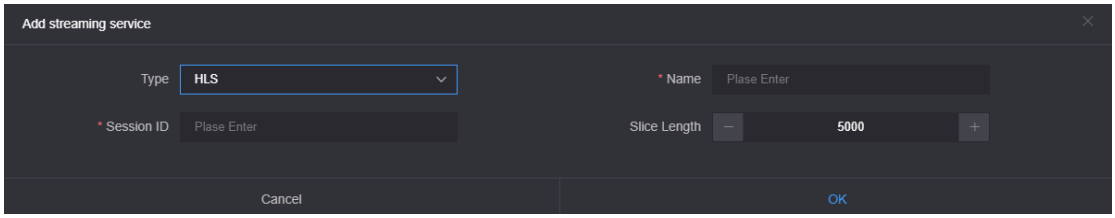


Note: When configure the multicast and get the URL is udp://225.6.6.6:1234. If use VLC Player to play, please insert an @ in the URL, that is, udp://@225.6.6.6:1234.

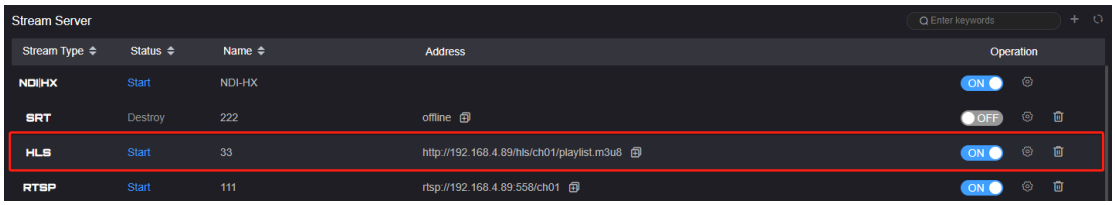
7.7 HLS service

Using HLS service, the first thing is to “add a stream service”, then click right-side SET icon of “HLS service” for setting.

Very simple to set. If no special requirements, no need setting, only enable service.

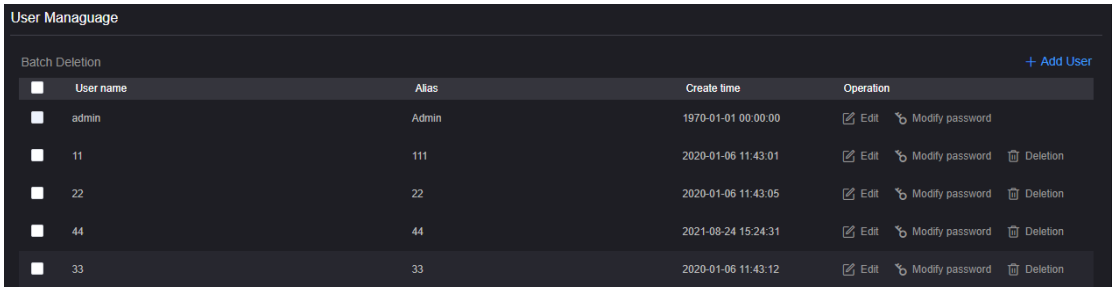


Once enabling service, it will get one HLS Publish point. You could watch it through VLC and other players using this address.



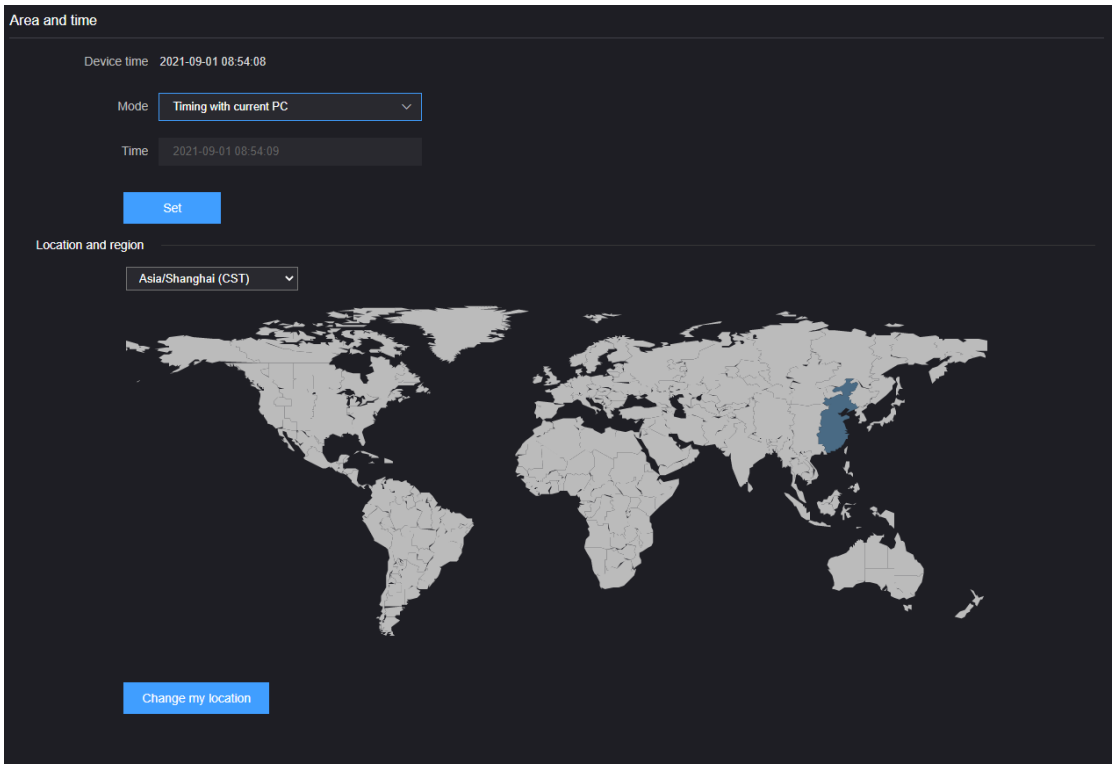
8. User Management

To add and delete users, change the password, etc.



9. Area and Time

Click “Location & Time” to change the time. If there no special requirements, please select “Synchronize From This PC” and click “SET”.



10. System Settings

10.1 Language

Click the language window to switch the system language, currently it supports simplified Chinese, traditional Chinese and English.

10.2 Restore

If users change parameters that lead device cannot work (The typical situation is changed network address, so it cannot login to the device), users could restore

factory setting to default value.

There are two ways to restore the factory settings

① Webpage "Settings"> "Basic Settings"> "Restore Factory Settings";

② RESET button: press and hold the reset button on the bottom of the device for more than 5 seconds, the device will restore the factory settings, which will lead to a hard restart of the device, it lasts about 3 minutes.

10.3 Reboot

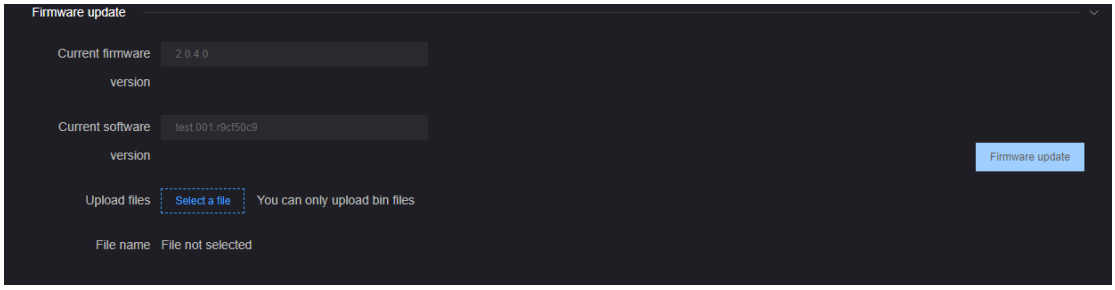
Click in the upper right corner of the webpage, the device software restarts, which is equivalent to restarting the device, and it lasts about 1 minute.

10.4 Firmware upgrade

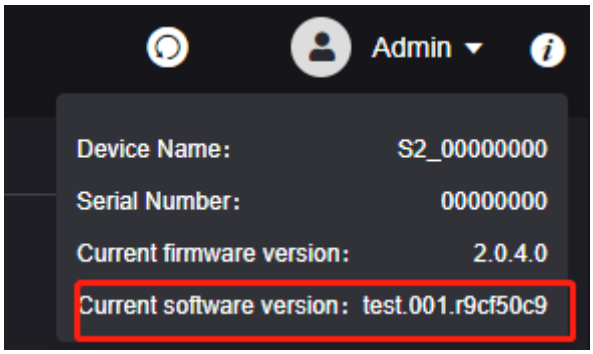
Our product will be constantly improved, so we will continue to upgrade the functions of the device and fix bugs. Please download the latest firmware at our website “Support” - “Download center”.

Click "Basic Settings" - "Update Firmware" in the device webpage to upgrade the firmware. After uploading the firmware to the device, click "Upgrade". The upgrading will last about 2-3 minutes (depending on the size of the firmware and network conditions), and the device will automatically reboot. Remember not to power off during the upgrading, otherwise the upgrade will fail and the device will

be abnormal. Please contact our support team for help if needed.



After the upgrade is completed, please check the current firmware version in the upper right corner is consistent with the latest version to ensure that the device upgrades successfully.



Note: It is recommended to use the WINDOWS system when upgrading, and use Google or Firefox to login to the device webpage.

Thank you for reading.

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