Live Streaming Encoder

YUK9001

USER MANUAL

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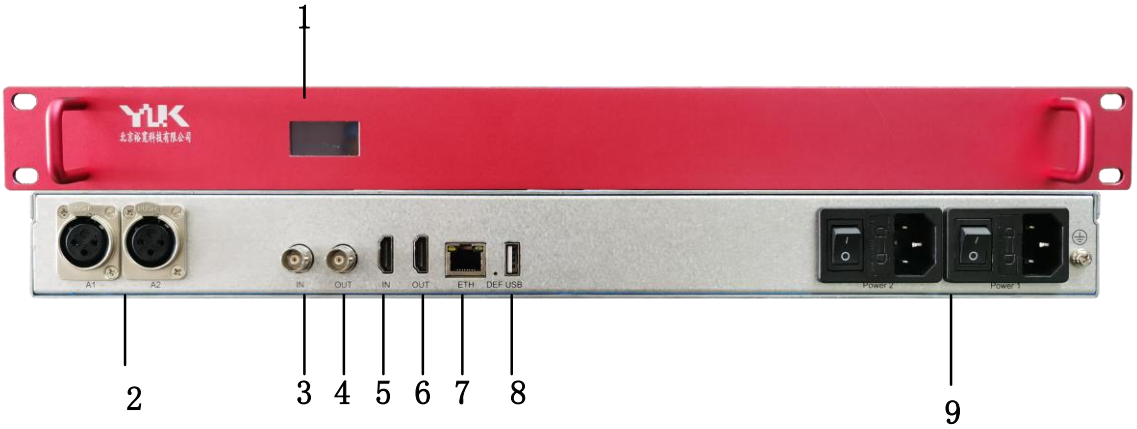
1 Product Introduction

YUK9001 streaming encoder is a product independently developed by Yukuan Technology Ltd. This product are all embedded solutions using Huawei HiSilicon chips, which have the advantages of low power consumption and high reliability, and support 7x24 hours of uninterrupted work. It can be widely used in network live broadcasting, IPTV system, wireless image transmission, teaching recording, video conferencing, monitoring and other fields. In addition to the basic encoding and streaming functions of traditional encoders, the system also supports special effects editing, broadcast guidance, network decoding, file recording, video carousel and other functions.

2 Panel Introduction



1 - LCD Display

2 - A1/A2 : analog audio input

3 - SDI input

4 - SDI loop out

5 - HDMI input

6 - HDMI output

7 - RJ45 port, used for network management and data sending receiving

8 - USB port, used for upgrading and file input

9 - two power supplies

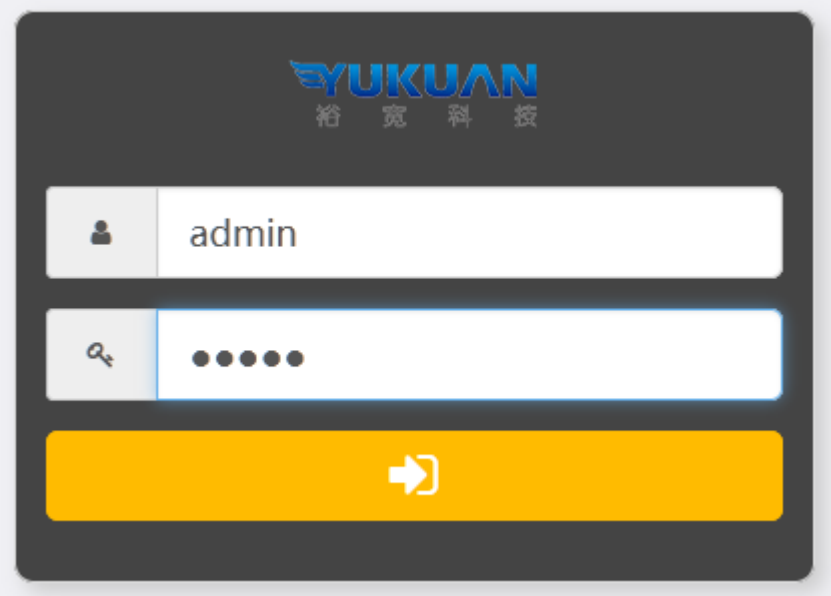
3 Start using

3.1 Connect to power and network

- Connect the encoder to the ethernet switch through the network cable
- Use the included power supply to connect the encoder
- The default IP of the encoder is **192.168.1.217**

3.2 Login in device

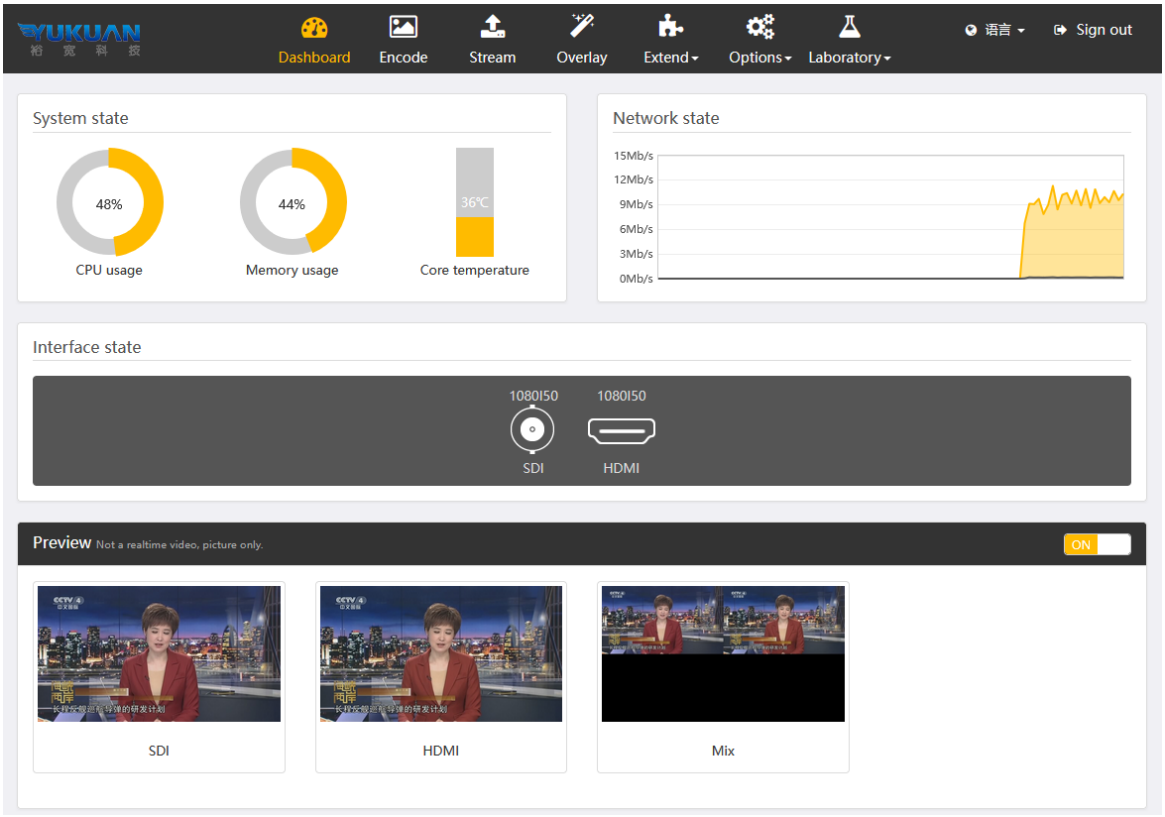
Visit **http://192.168.1.217** through a browser (recommended chrome browser)
Encoder default login **account: admin Password: admin**



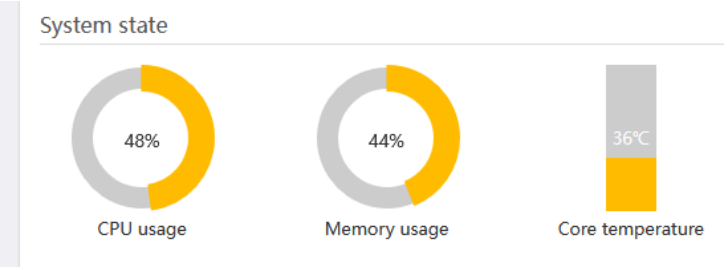
3.3 Connect signal

Before starting to use, first connect the video source device you need to encode to the encoder through the HDMI or SDI interface , make sure the power of the video source device is turned on, and the output resolution is within the range supported by the encoder.

4 Dashboard



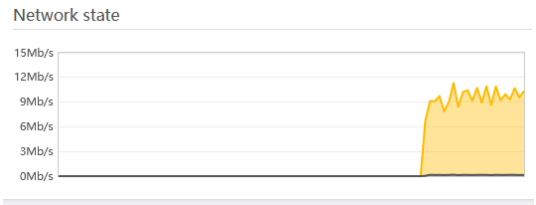
4.1 System status



The system status is divided into 3 parts:

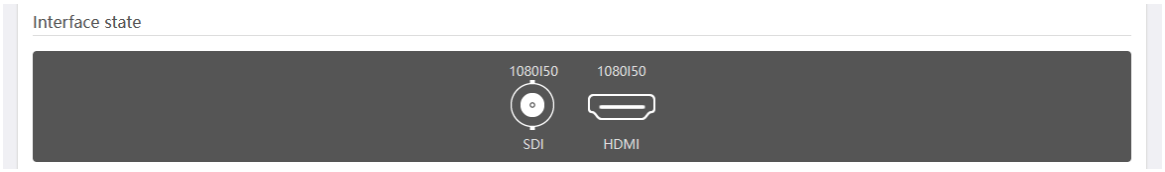
- CPU usage: It is generally recommended not to exceed 85%. If it exceeds, please close unimportant functions.
- Memory usage: When the recording function is not enabled, the memory usage will usually stabilize at a fixed value. When the recording is turned on, the linux system will use all the memory for disk cache, which will show 100% here, don't worry, the linux system will automatically manage the recycling.
- Core temperature: The embedded core temperature is different from the cpu temperature we usually know. In the embedded environment, it usually needs to exceed 100 degrees to be at risk, so here we usually recommend not exceeding 70 degrees, otherwise the use environment needs to be improved.

4.2 Network status



The network status shows the real-time upstream and downstream status of the network card, orange represents the upstream rate (output stream), and black represents the downstream rate (input stream).

4.3 Interface status



The upper part of the icon is the current input status, and the lower part is the port name.

When the input source changes, the current input source resolution and frame rate will be displayed here.

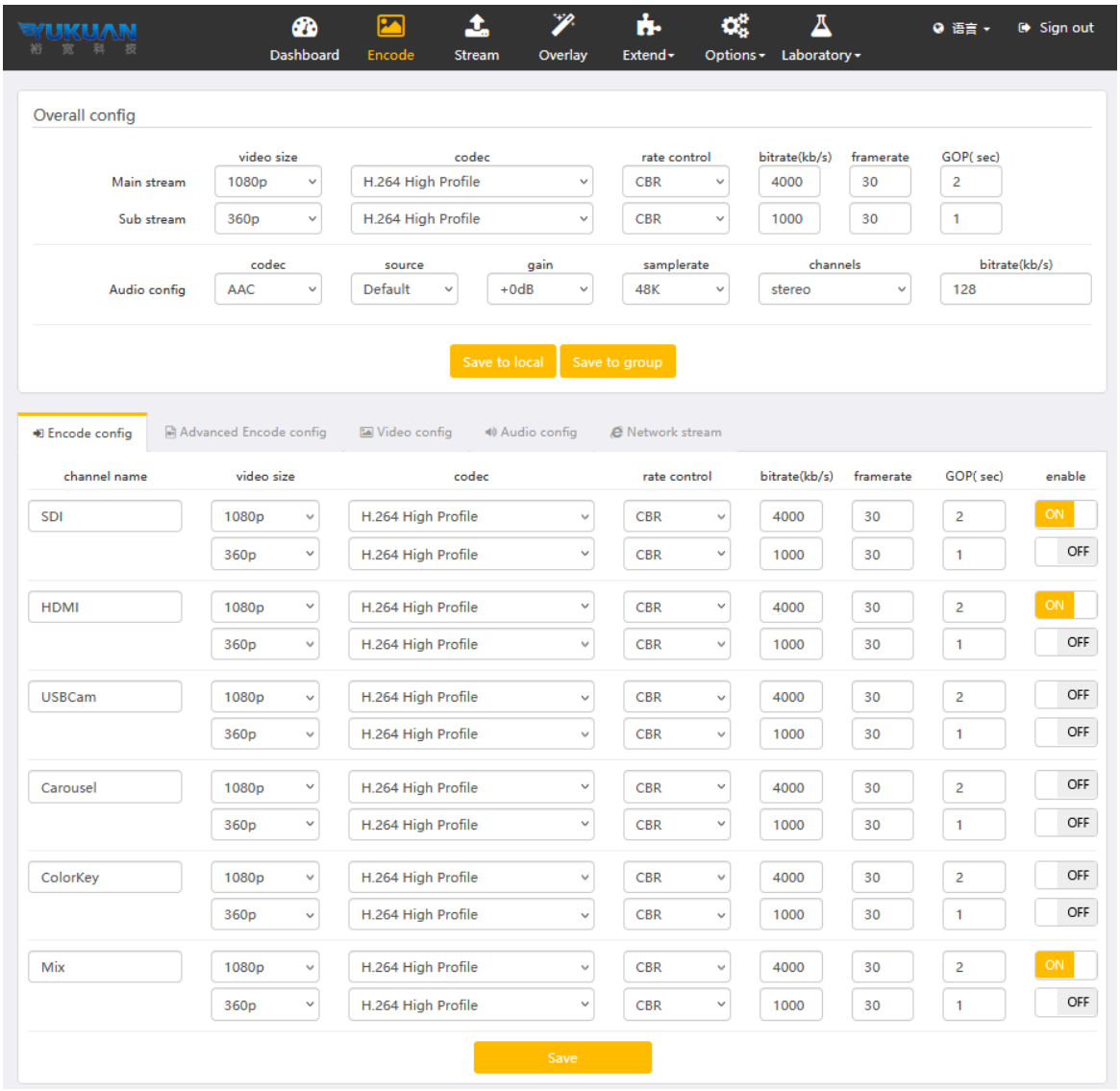
4.4 Preview

In order to be compatible with different browsers and to protect the performance of the user's computer, the preview here uses jpeg refresh technology instead of real-time video streaming, so you may feel stuck and delayed, which is a normal phenomenon.

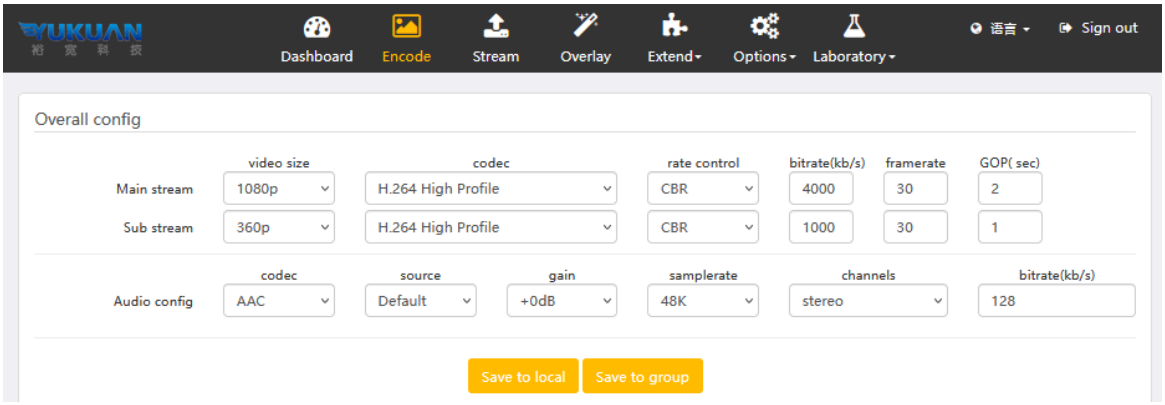
The switch button in the upper right corner can be used to turn off the preview function. In the mobile network state or in the remote desktop environment, turning off the preview is conducive to smooth operation.

Only the channels that are enabled are displayed here. If the channels that are disabled by default are enabled (the network input channel needs to enable decoding at the same time), then the current image of the corresponding channel will also be displayed in this area.

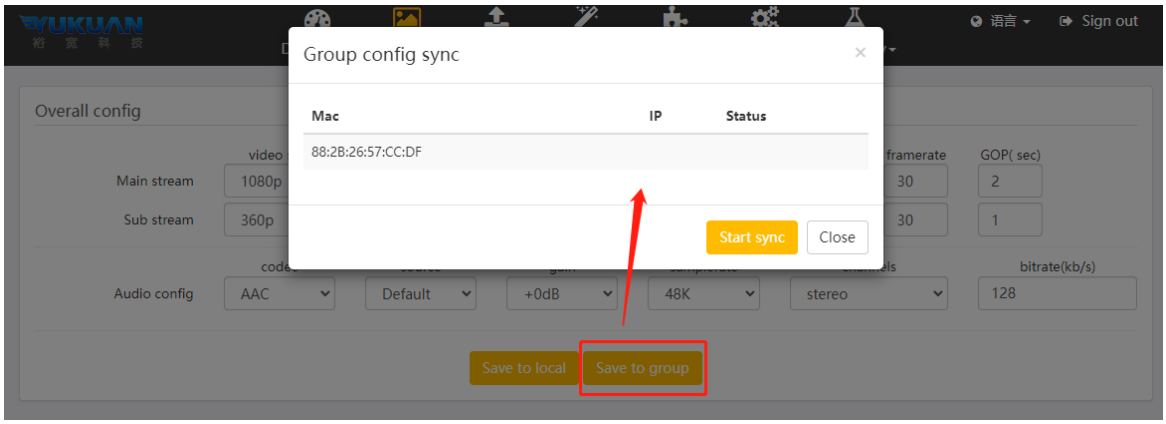
5 Encode settings



5.1 Overall configuration



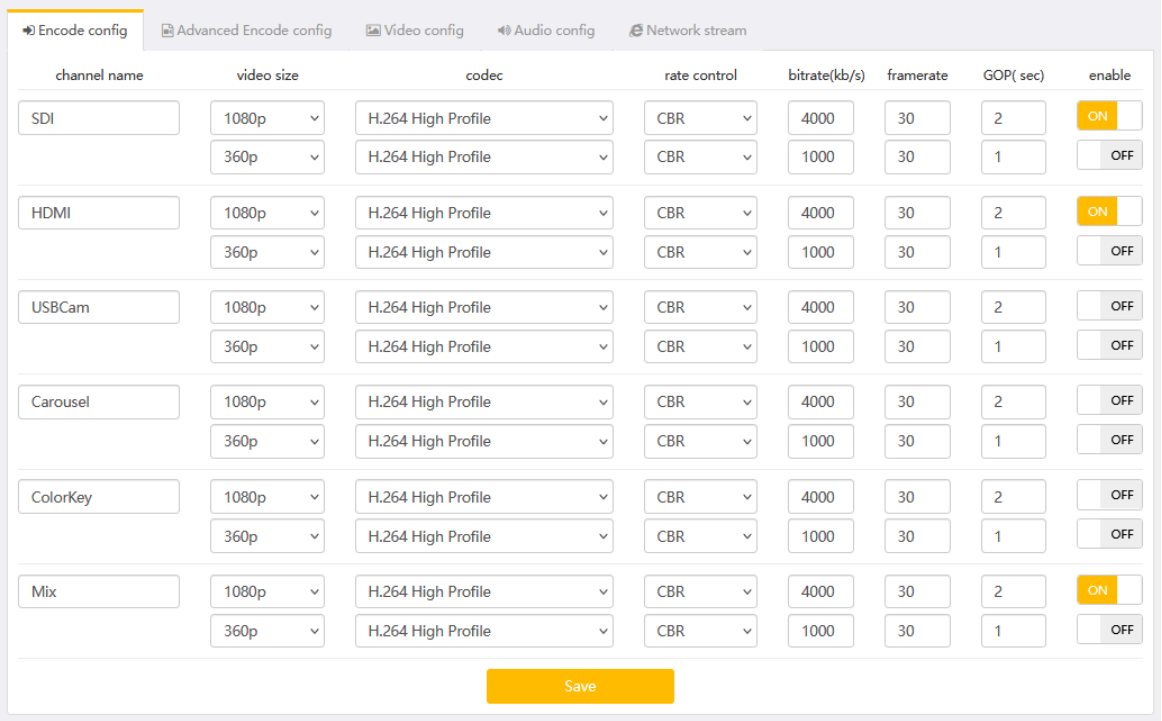
The basic parameters of audio and video encoding are shown here, which are used to quickly and uniformly modify the encoding settings of all channels. After configuring the overall parameters, click the "Save to local" button to automatically set the parameters of all channels to be the same as the overall parameters.
If there are other encoders in the same LAN, if you need to update the parameters of these encoders in batches, then You can set the group IDs of these encoders to be the same (the default is 0). After configuring the overall parameters, you can click the "Save to group" button to perform batch updates, as shown in the figure below:



Click the "Start sync" button at this time, the encoders in the group will automatically synchronize the encoding parameters according to the overall parameters, and the synchronization progress will be fed back in real time on the interface.

Note: When you need to test the 4K encoding capability, please do not use the overall configuration operation, which will exceed the upper limit of system performance.

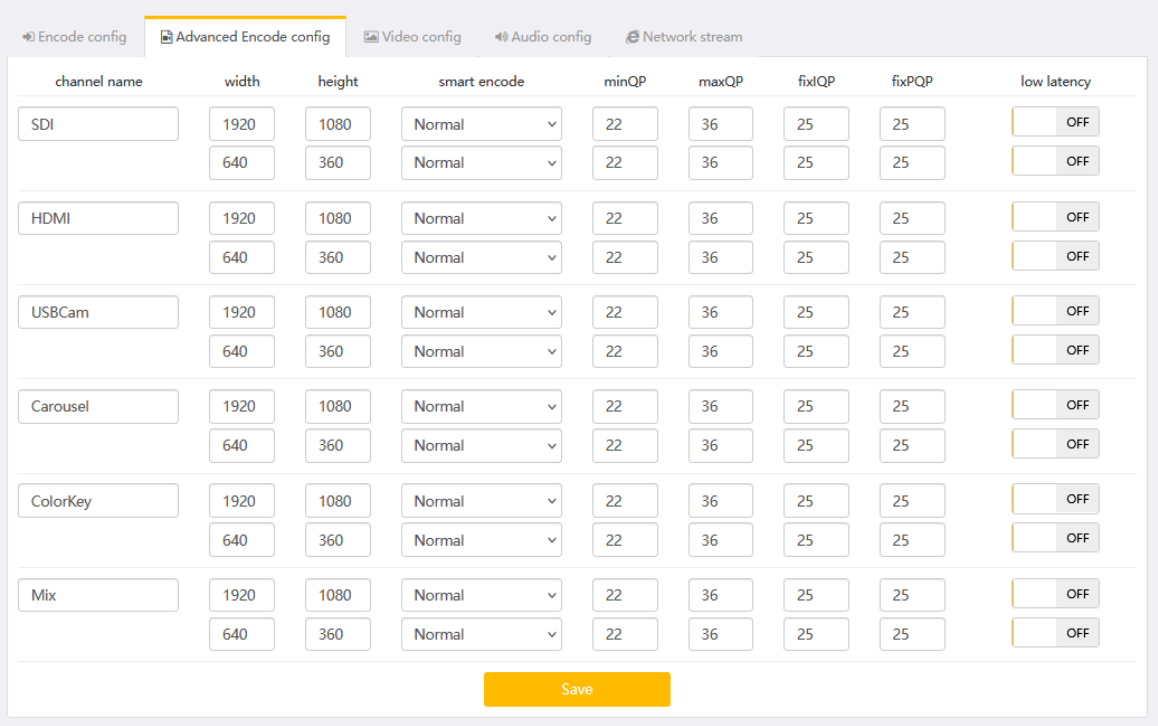
5.2 Encode configuration



This is consistent with the parameters in the "Overall configuration" section, but each corresponds to an encoding channel, and each channel can be set to a different encoding parameter. The first line of each channel parameter is the main stream encoding parameter, and the second line is the auxiliary stream encoding parameter.

- **channel name**: It can be displayed on pages such as "running status", which is convenient for distinguishing management.
- **video size**: Encoding resolution, which can be different from the input resolution. Common resolutions are listed in the list. If you need other resolutions, please refer to "Advanced Encoding Configuration" below
- **codec**: Here you can choose the codec and profile of video encoding
- **rate control** : CBR, VBR, AVBR etc. are optional. If you are not sure which one to choose, it is recommended to use AVBR, which can get the best effect in most scenes.
- **bitrate**: Video bit rate, unit kbps
- **framerate**: 1~60 frames
- **GOP**: GOP is also called key frame interval. Note that the unit here is seconds and supports decimals.
- **enable**: master switch of the channel

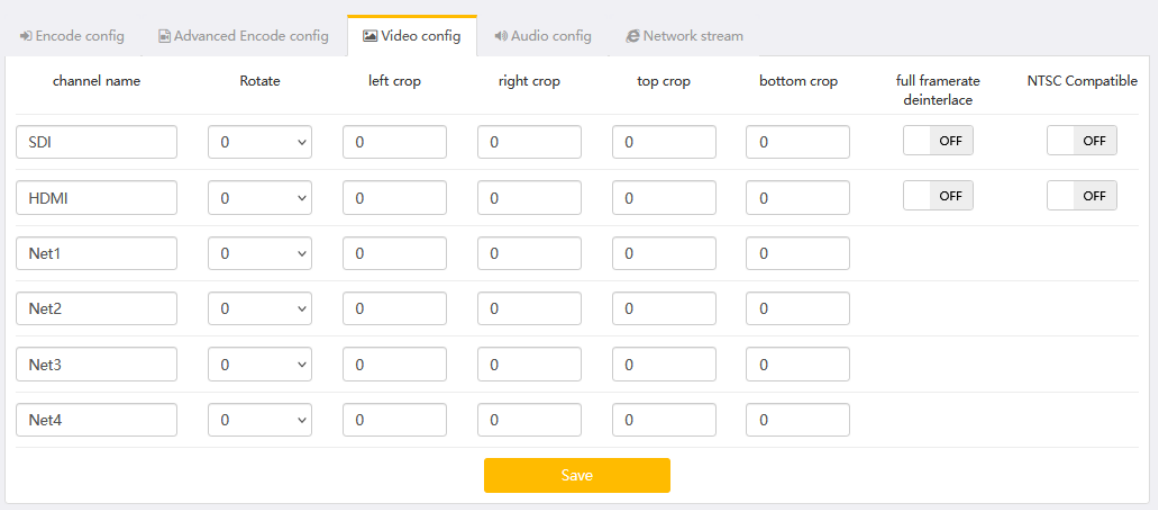
5.3 Advanced Encode configuration



Here you can set some advanced parameters about video encoding:

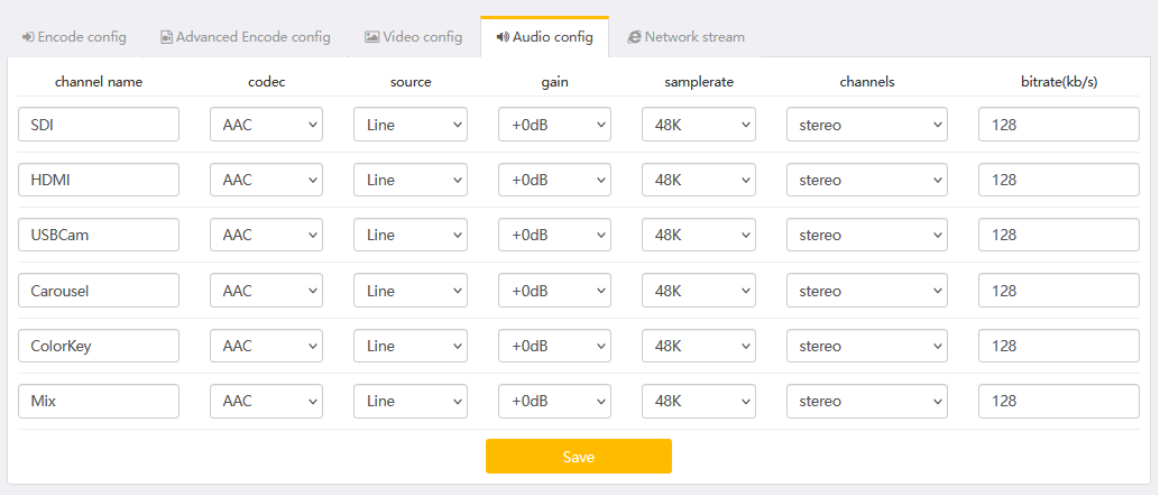
- **width, height**: To set the resolution not in the encoding parameter resolution list. After setting here, the “video size” in “Encoder configuration” will display blank, which will not affect the operation.
- **smart encode**: Advanced P frame mode, which can improve the coding quality without changing the bit rate, but it will increase the key frame interval, smartP is more suitable for static scenes, and DualP is more suitable for high dynamic scenes. Note that when this is enabled, the ROI function will fail.
- **minQP, maxQP**: To set the quality range of video encoding in VBR rate control mode.
- **fixIQP, fixPQP**: To set the quality of I frame and P frame in FixQP rate control mode.
- **low latency**: To enable or disable this function, it will take effect after restarting. Enabling low-latency encoding can reduce the encoding delay, but the scaling capability will be lost, and the encoding resolution must be consistent with the input resolution.

5.4 Video configuration



- **rotate:** This function can be used for acquisition and processing of special input devices, such as mobile phones, which can rotate the input image.
- **Crop:** You can crop the input video, the unit of the input value is 'pixel', be careful not to exceed the range.
- **Full framerate deinterlace:** When the input source is an interlaced video, de-interlacing can be performed without loss of frame rate, without frame interpolation.

5.5 Audio configuration

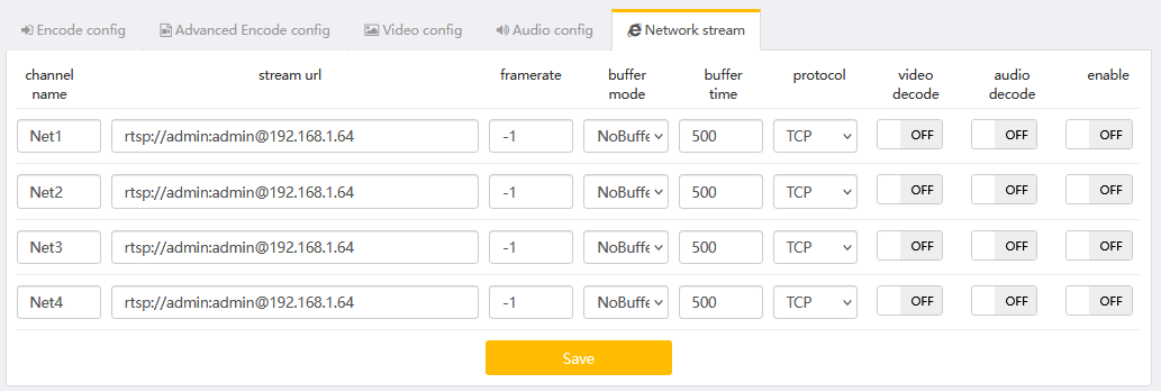


- **codec**: optional value "AAC, PCMA, MP3, MP2, OFF", when "OFF" is selected, the output stream only contains video.
- **source**: The audio source that can select the channel is HDMI or Line, and the line input of some models requires an additional audio board.
- **Gain**: Perform digital gain processing on the input audio data. Because it is digital processing, it may affect the sound quality. It is recommended to adjust the volume

at the source as much as possible.

- **samplerate**: optional "16k, 32k, 44.1k, 48k".
- **channels**: optional "stereo, mono"
- bitrate: audio encoding bit rate, unit kbps, it is recommended to set 128 or higher for 48K stereo.

5.6 Network stream configuration



It supports inputting a network stream, and then converting and outputting the network stream, or transcoding output. For example, most surveillance cameras on the market only support RTSP streams. In order to push the surveillance camera streams to RTMP-SERVER, it is necessary to transfer RTSP streams to RTMP streams.

The video encoding of the input network stream must be H.264 or H.265, and the audio must be AAC PCMA MP2 MP3. If it is only for streaming, since no re-encoding is performed, the video quality and audio quality of the network stream will not be changed, nor will the output bit rate be changed.

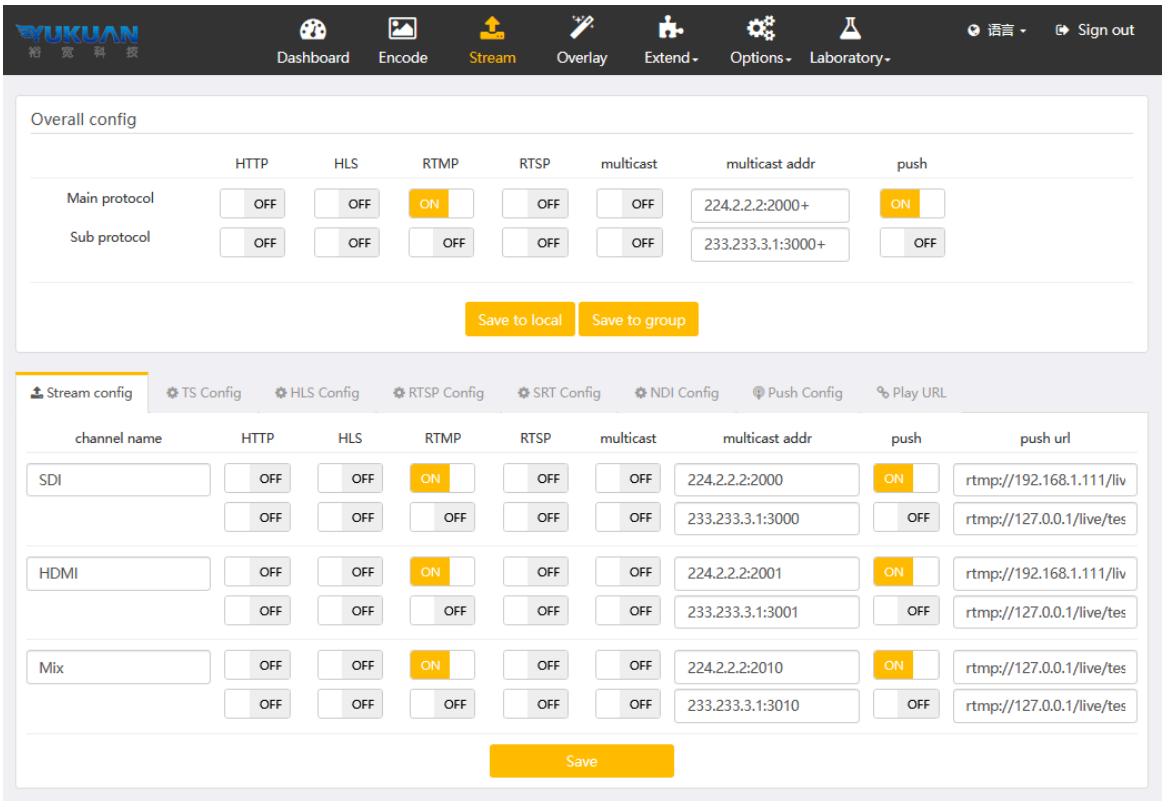
When transcoding output, you need to turn on the "video decode", and then set the encoding output resolution, encoding method, bit rate control mode, bit rate, frame rate, GOP interval and other parameters in the "encode config" column.

- **stream url:** For IPcam, usually rtsp address. In fact, you can fill in the stream address of any protocol (rtmp http srt udp etc.).
- The reference format of the srt protocol is srt://ip:port?mode=caller&latency=50
- **framerate:** Since some cameras do not describe the video frame rate in the protocol, the encoder cannot normally calculate the frame rate when controlling the transcoding frame rate, and the user needs to fill it in manually. In most cases, just keep -1 here, and the encoder will automatically judge. When it cannot make a decision, it will give up the frame rate control and transcode according to the input frame rate.
- **buffer mode:** "NoBuffer": no buffering, decode immediately after receiving data. "Normal": with a small buffer, decode according to the receiving rate. "Sync": with a large buffer, decode synchronously according to the timestamp.

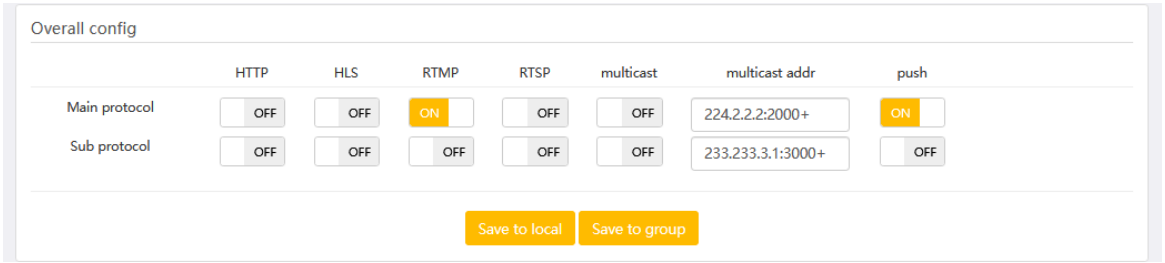
- **protocol:** Only for rtsp settings, "UDP TCP" can be selected, and it is recommended to choose "TCP", that is rtp over rtsp mode, which can ensure data integrity and prevent packet loss.
- **video decode:** Video decoding switch, if there is no need to transcode, only the protocol (such as rtsp to rtmp), there is no need to open it here.
- **audio decode:** Audio decoding switch, if there is no need to transcode, only the protocol (such as rtsp to rtmp), there is no need to turn it on here.
- **enable:** The master switch for the input channel of this network.

Since the audio codec of the HiSilicon solution will take up more CPU resources, it is recommended to enable the audio decoding switch only when the audio needs to be transcoded or mixed into the Mix channel.

6 Stream output configuration



6.1 Overall configuration



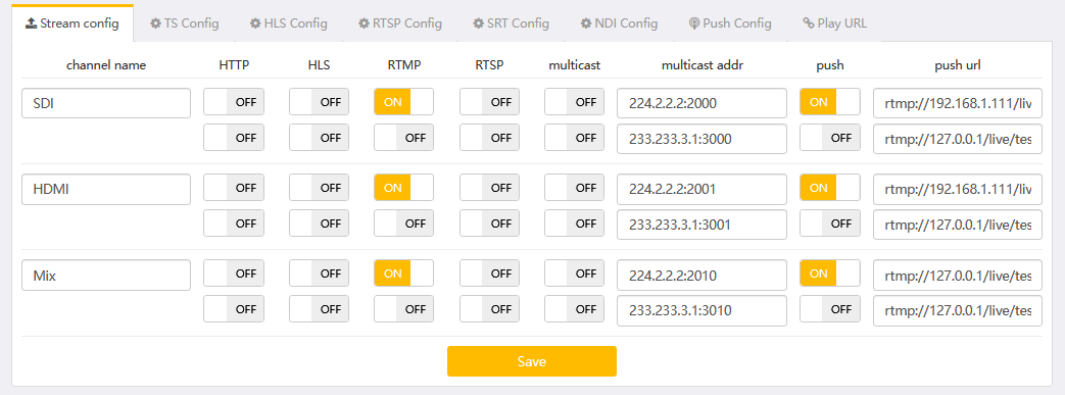
Overall configuration Here you can uniformly set common protocol switches for all channels, including HTTP(TS), HLS, RTMP (Server/pull stream), RTSP, Multicast (UDP Multicast/Unicast) , push stream (Client/rtmp, rtsp, etc.) .

Among them, the multicast address supports the automatic increment setting of IP or Port:

- For example, if "233.233.2.1:3000+" is set, the channel multicast addresses are: "233.233.2.1:3000", "233.233.2.1:3001", "233.233.2.1:3002"...
- For example, if "233.233.2.1+:3000" is set, the channel multicast addresses are: "233.233.2.1:3000", "233.233.2.2:3000", "233.233.2.3:3000"……

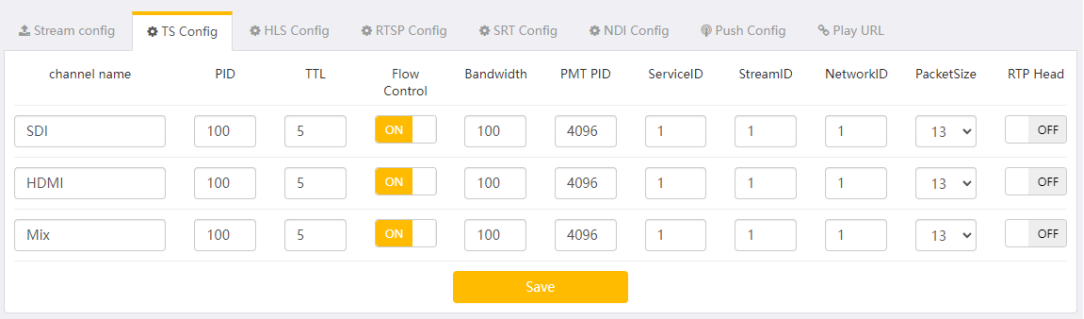
Note that multicast needs to be allowed by the network environment, and usually requires a switch with IGMP management function and correct configuration. If UDP unicast is required, just change the multicast address to the IP address of the target device.

6.2 Stream configuration



It is used to set the common output protocol switch and address of each communication, among which the streaming address supports streaming protocols such as rtmp rtsp etc.

6.3 TS configuration

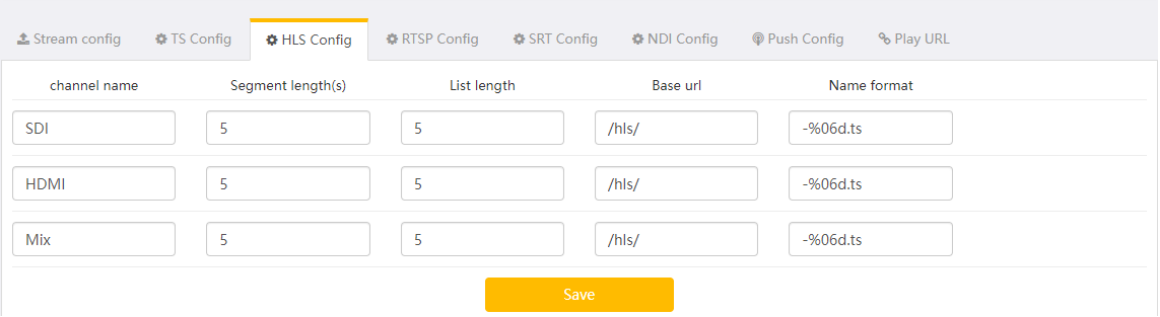


It is used to set the parameters of mpegts encapsulation in HTTP and multicast (UDP) protocols. For details, refer to the definition of mpegts format.

Flow control, bandwidth: These two parameters are used to limit the maximum rate of UDP sending to prevent packet loss caused by sending too fast.

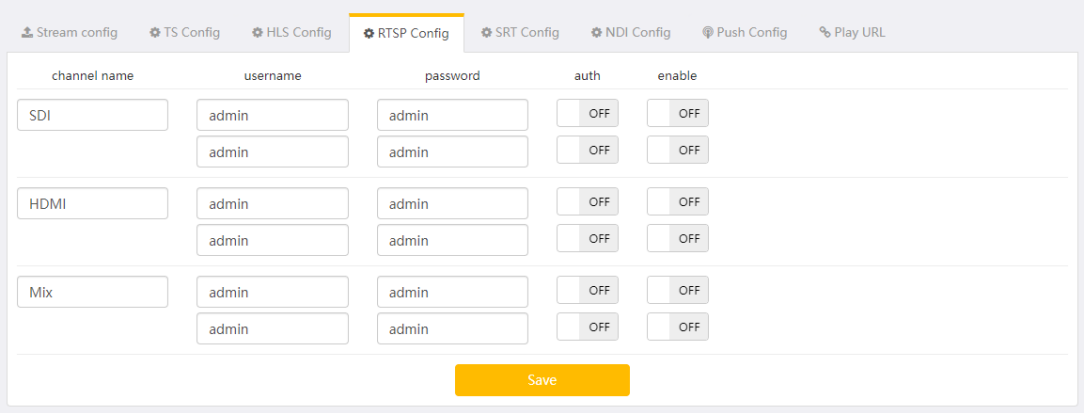
RTP Head: When this switch is turned on, the TS stream sent by UDP will additionally carry the RTP header.

6.4 HLS configuration



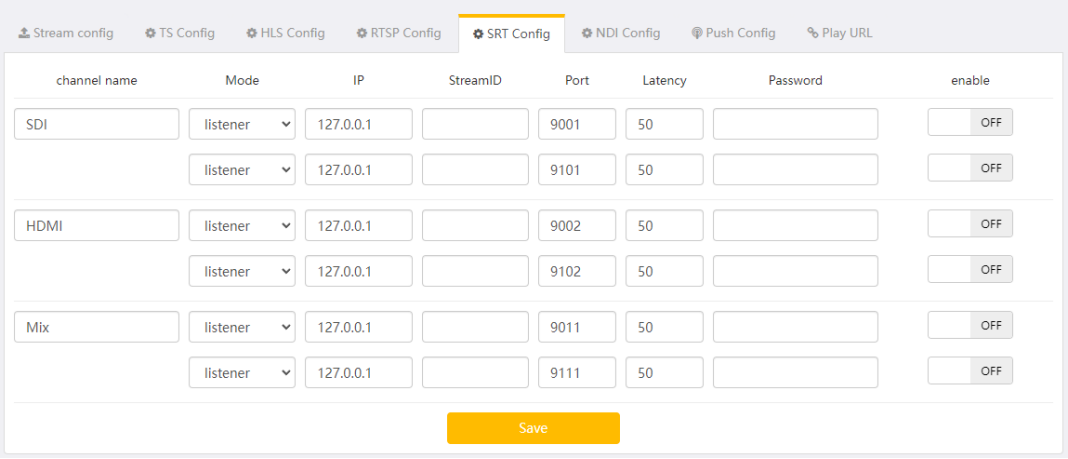
Note that in order to protect the lifespan of Flash, the HLS segment data is stored in memory, setting too large a segment length or the number of lists will lead to insufficient memory.

6.5 RTSP configuration



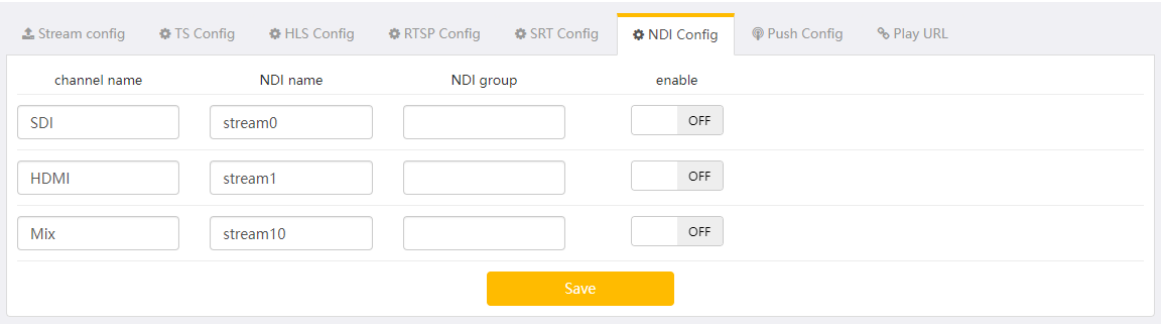
RTSP authentication, after enabling RTSP authentication, to access RTSP stream, you need to set the user name and password.

6.6 SRT configuration



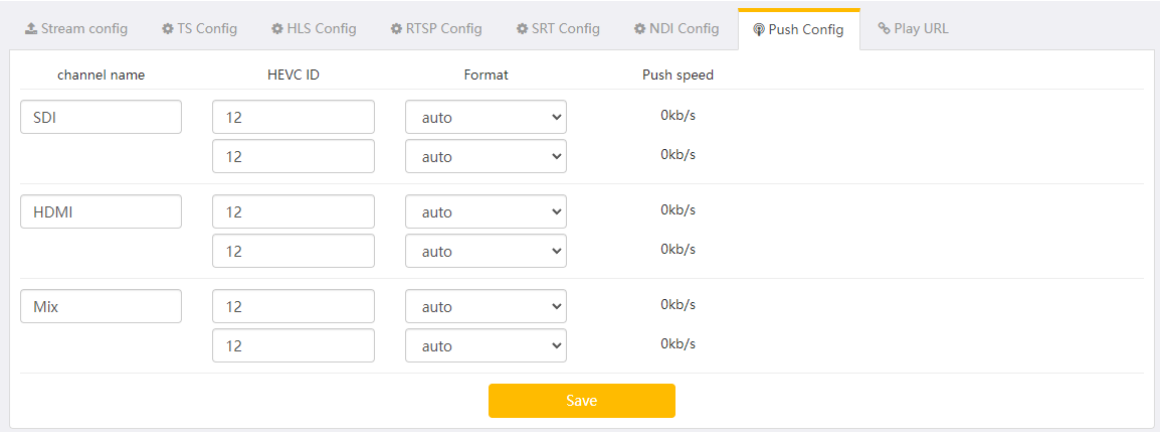
Note that the modification of SRT parameters needs to be restarted to take effect, and the password must not be less than 10 characters.

6.7 NDI configuration



NDI name : The channel name displayed when used for NDI auto-discovery
NDI group : It is recommended to leave blank
enable: NDI output switch of the channel
Note that if you purchase an encoder without NDI authorization, it can only be used for 30 minutes each time NDI is turned on.

6.8 Push configuration

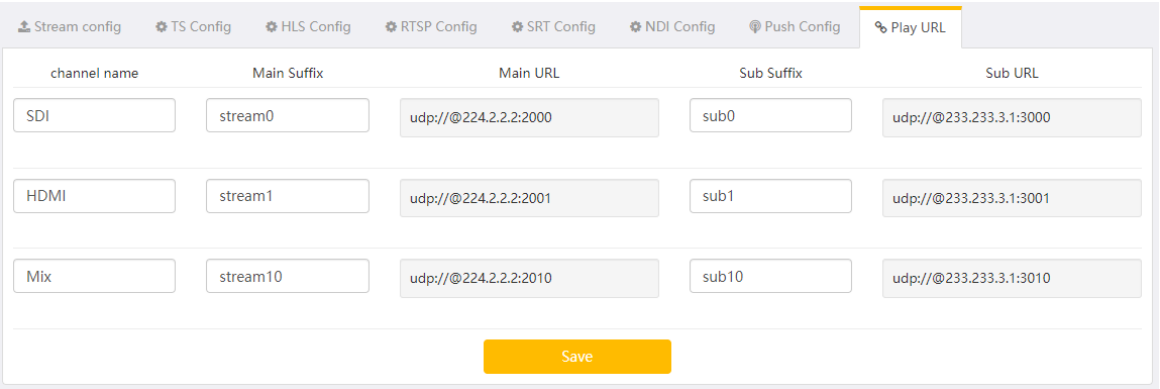


HEVC ID: Since the flv package used by standard rtmp does not support HEVC (H.265) for the time being, it is necessary to expand the package with a custom extension ID. The common ID for domestic platforms is 12.

Format: It is recommended to select auto.

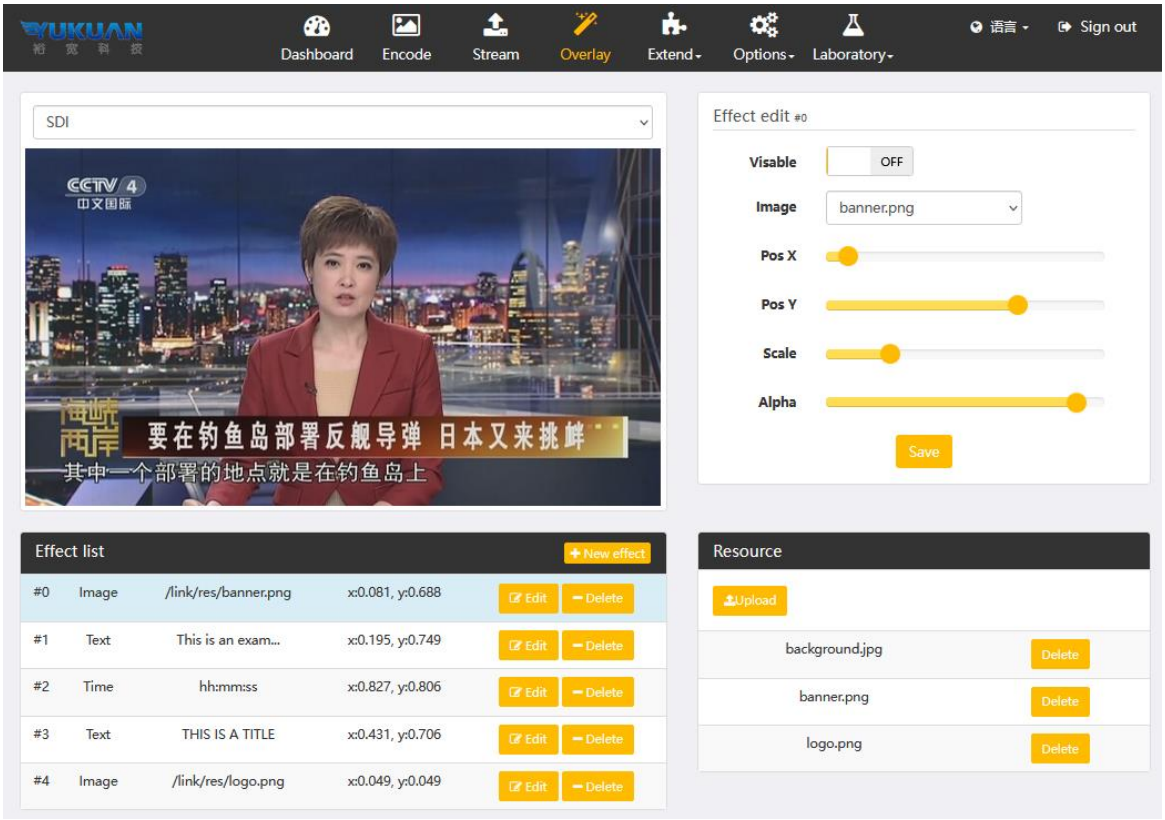
Push speed: When channel streaming is enabled, the real-time streaming upstream rate can be displayed here.

6.9 Play URL configuration



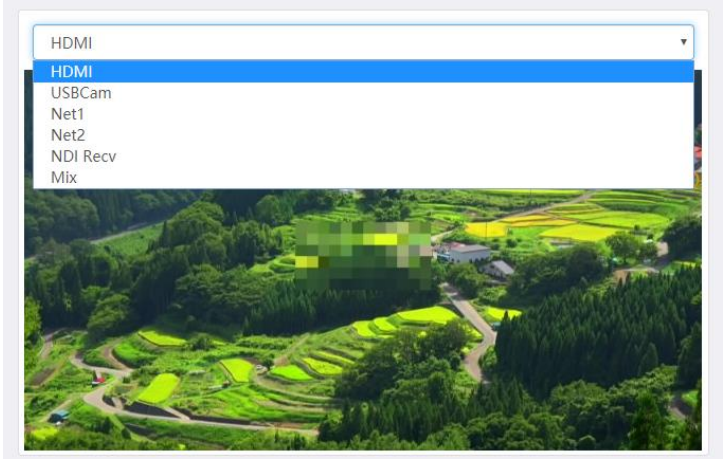
As shown in the figure above, all playable protocol addresses will be organized in this interface according to the output protocol you currently enable, so that it can be easily copied to other playback systems for use.
Change the code stream suffix, you can change the default output code stream URL.

7 Overlay configuration



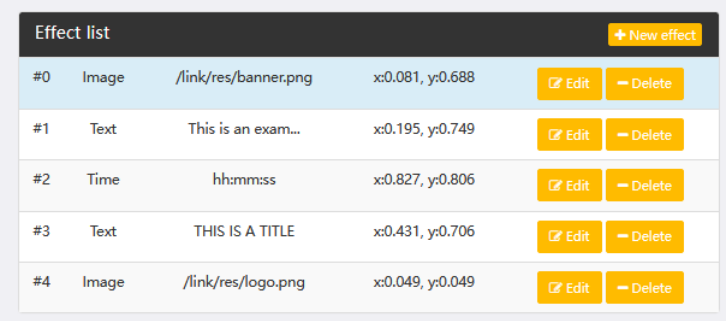
The overlay effect function supports several effects such as subtitles (scrollable), watermarks (pictures/logos, etc.), time stamps, and mosaics.
The page is divided into 4 areas, upper left, upper right, lower left, and lower right, which are "effect preview", "effect edit", "effect list" and "resource".

7.1 Effect preview



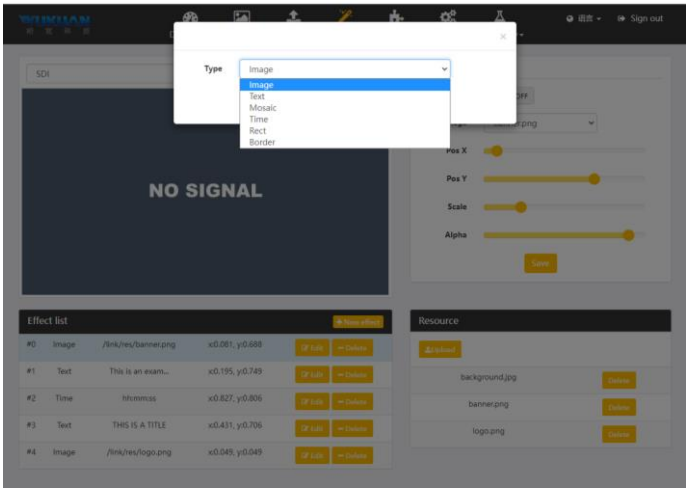
First of all, you need to select the channel you need to edit the effect. Only when the corresponding channel is enabled, you can select the corresponding channel here.

7.2 Effect list



All the effects of the corresponding channel are listed here, showing the effect type and superposition position.

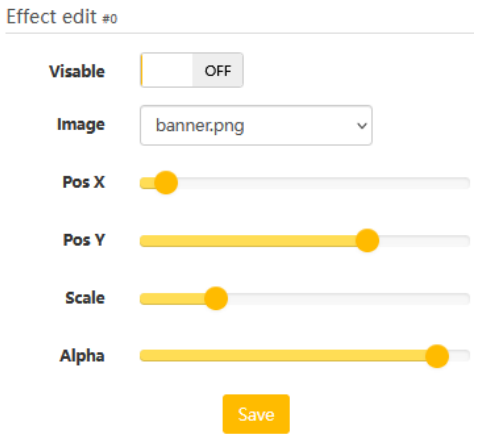
Click "New effect" button to create a new effect, as shown in the figure below:



Click "Delete" button to delete the effect of this layer.

Click "Edit" button, and the editing properties of the corresponding overlay will be displayed in the "Effect edit" area.

7.3 Effect edit



Different effect types will show different special effect attributes, most of the parameters are obvious, if you don't know anything, you can set it arbitrarily and save it,

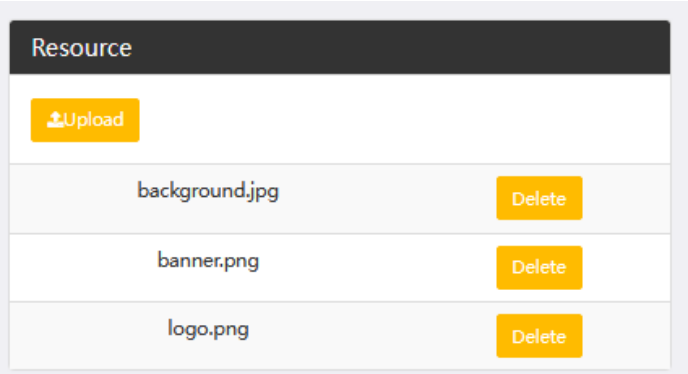
then observe the effect in the "special effect preview" area.

It should be noted that the "move" attribute of the subtitle layer indicates the direction of the scrolling subtitle. When it is set to 0, it is a static subtitle superimposition. When it is less than 0, it is a scrolling subtitle moving to the left. When it is greater than 0, it is a scrolling subtitle moving to the right.

Correspondingly, the "width" of the subtitle layer represents the moving range of the scrolling subtitle, not the font size. The font size is determined by the "scale" button.

The watermark layer currently only supports PNG32-bit images with a resolution not greater than 1920x1080.

7.4 Resource

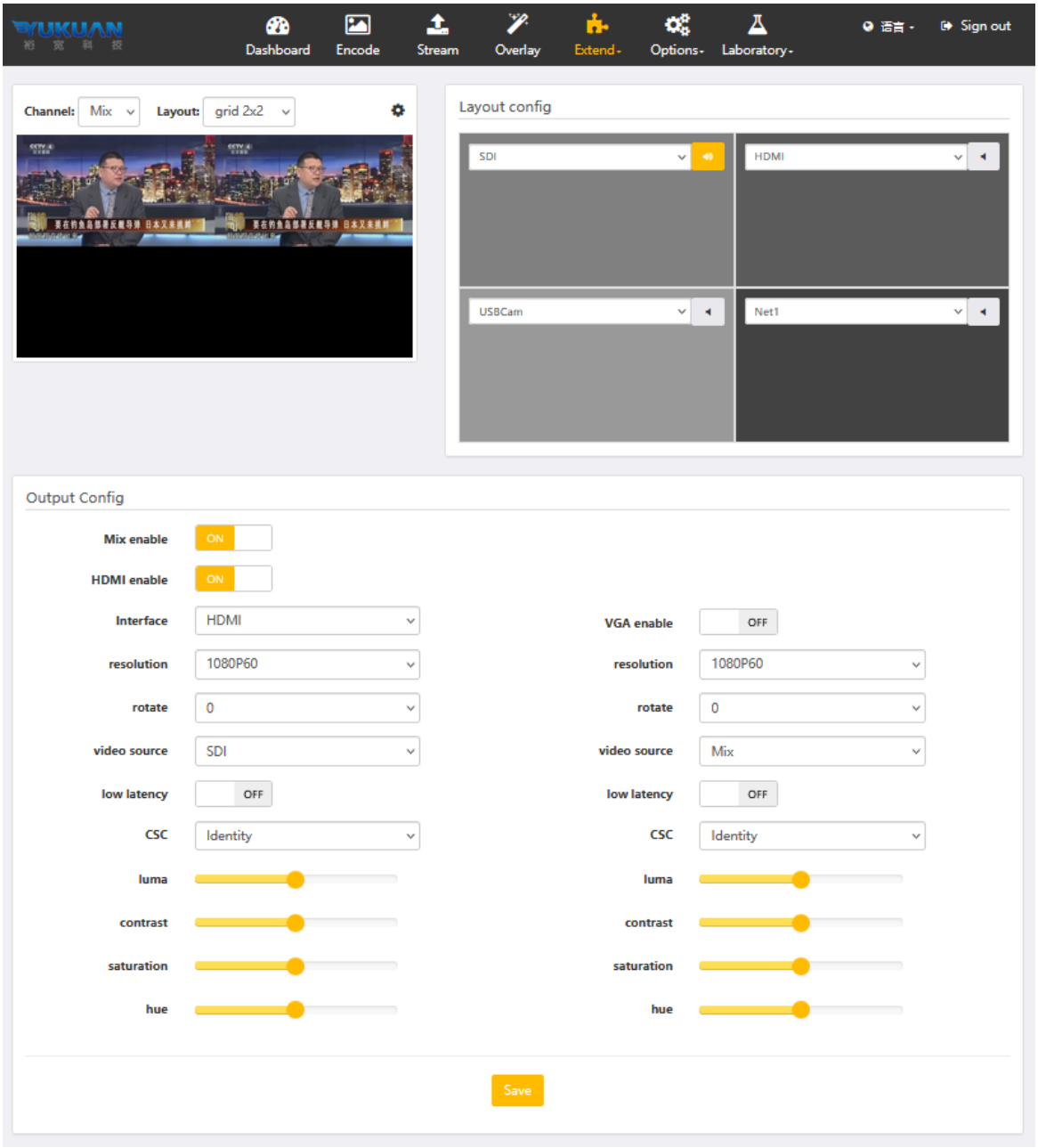


The pictures and font files used in effects can be uploaded through the “Upload ” button in this area.

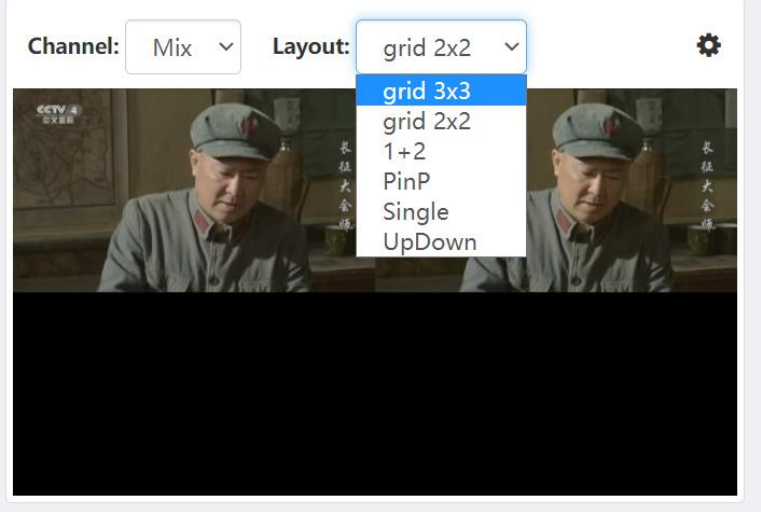
Be careful not to delete fonts and picture files that are in use.

8 Extend function

8.1 Video mix



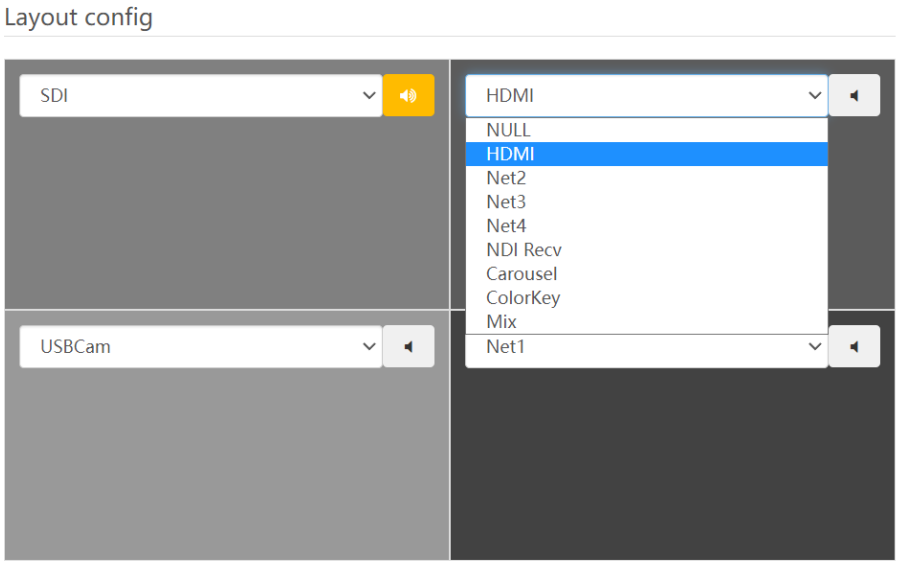
(1) Video mix and preview



This page can realize the function of multi-screen guide.

The upper left of the page is the preview area, where you can select the channel and layout, and the encoder usually only has one Mix channel.

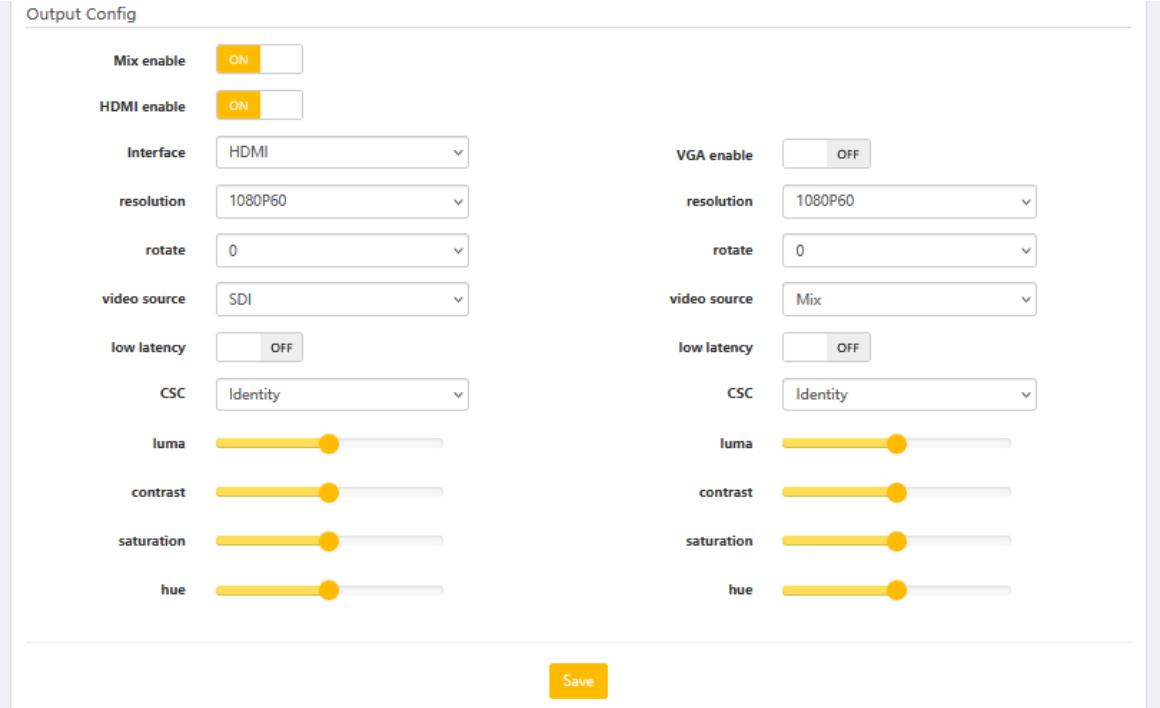
(2) Layout configuration



The grids in the layout configuration area will be arranged according to the selected layout, and the video source and audio switch (small speaker icon) for each position can be selected.

Note that some models need to light up at least one small speaker, otherwise the audio of the Mix channel will not be encoded, resulting in the inability to output streams.

(3) Output configuration



The output configuration control the configuration of display interfaces such as HDMI, VGA, and SDI, and you can choose different resolutions and video sources.

When you switch the video source, the audio source will also switch to the corresponding channel.

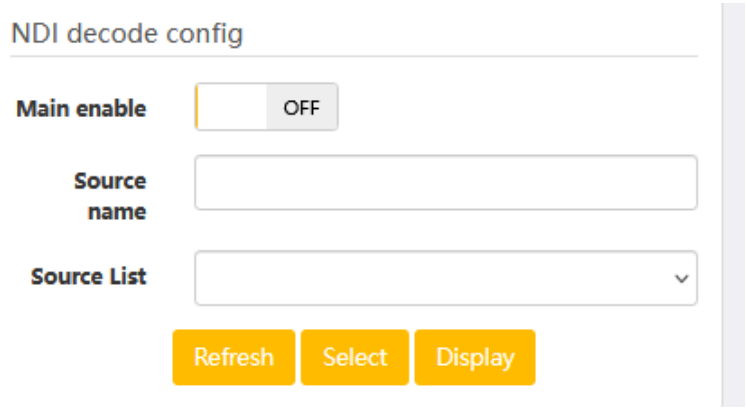
The VGA interface of most encoders is not exposed, and can be drawn out with an adapter cable when needed.

Mix enable: Control the overall switch of the Mix channel, which has the same effect as the Mix channel switch on the "Encoding configuration" page.

Low latency: When used for decoding output, turning on **low latency** will reduce a certain delay, but will lose the scaling ability, and the decoding resolution and output resolution must be consistent. Turning on or off the low latency requires a restart to take effect.

CSC, brightness, luma,contrast, saturation, hue: the display effect of signal output can be adjusted.

8.2 NDI decode



Main enable: switch of NDI decoding function.

Source name: The name of the NDI source device that is currently trying to connect, no need to manually enter, just select it from the list below.

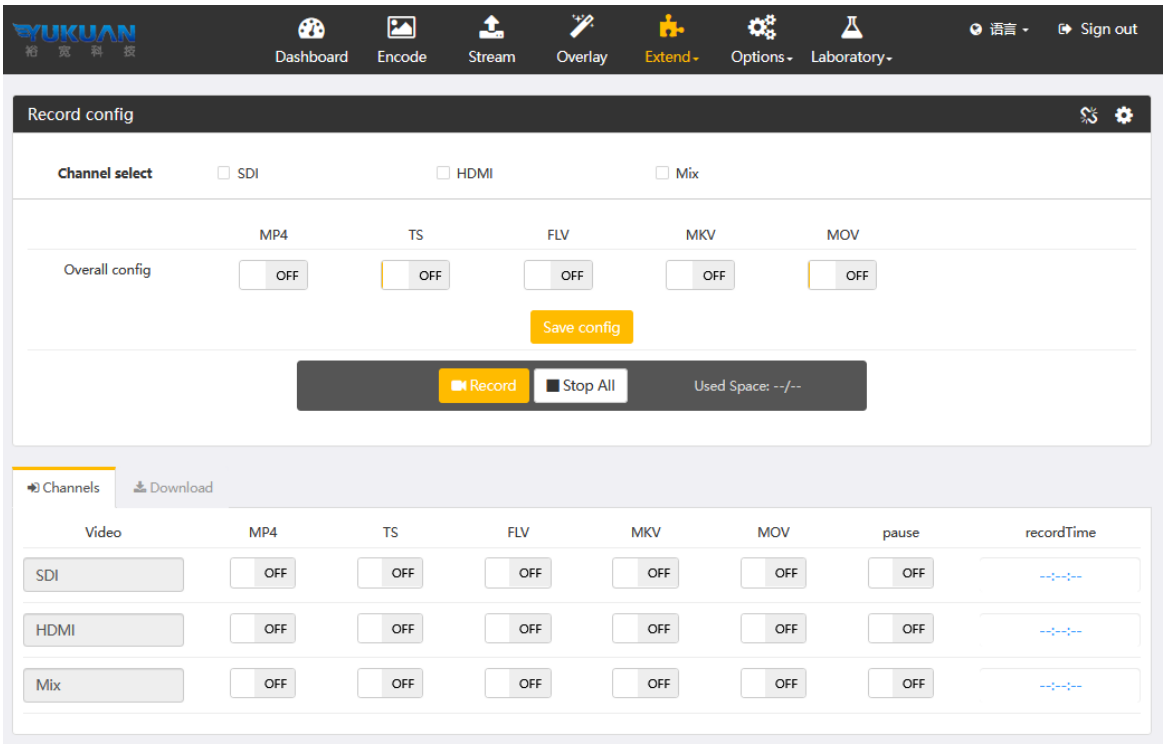
Source List: List all NDI devices in the current network.

Refresh: Re-search the source list.

Select: Connect to the currently selected device in the Source List.

Display: Output the decoded image to the HDMI interface.

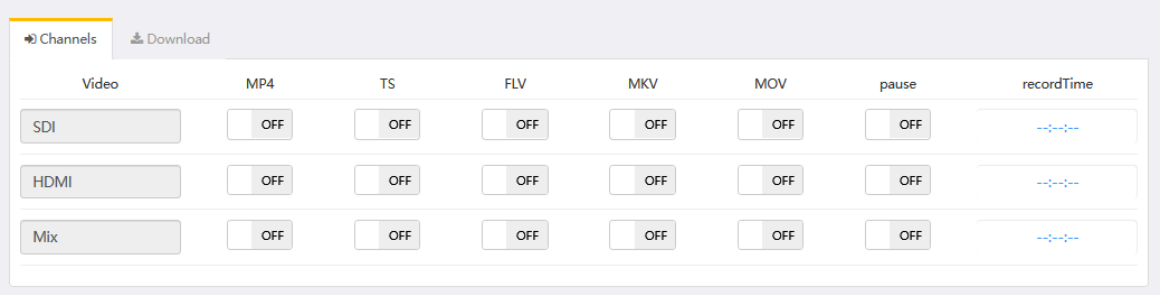
8.3 Record



Check the video channel to be recorded, and open the file format to be recorded. After clicking “Save config”. Each recording can be started according to this configuration.

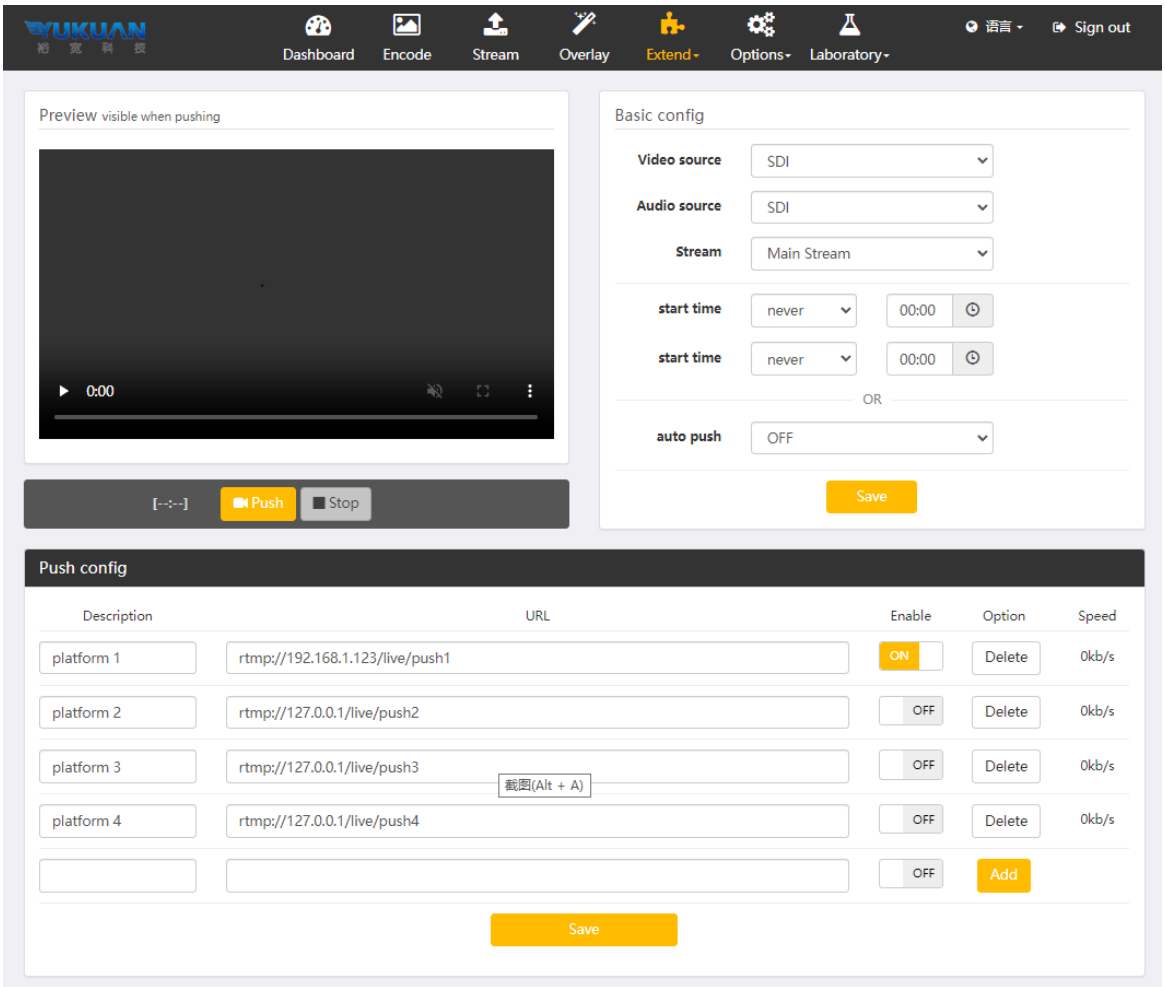
Click the “OFF” button to safely uninstall the mounted U disk device.

Click the setting button to enable the segment recording function, the default segment size is 1G for the time being.



The recording status of each video channel displayed here can dynamically turn on/off the recording of a certain format, and pause/continue recording.

8.4 Multiple push



This page is used to publish the same code stream to multiple live broadcast platforms in parallel, which is convenient for anchor users to do simultaneous live broadcast on multiple platforms.

(1) Preview
When the live streaming starts, you can preview the playback effect here.
Here flv.js is used for HTML playback, and interested developers can refer to it.

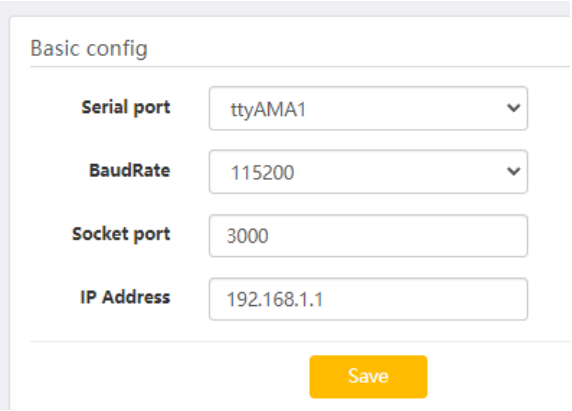
(2) PreviewBasic configuration
Video source: select the video channel of the live stream.
Audio source: select the audio channel of the live stream.
Auto push: After it is turned on, every time the encoder is powered on, it will automatically try to start streaming.
Save: Save the current settings.

(3) Operation bar

The left shows the elapsed broadcast time.
Push: start streaming.
Stop: stop streaming.

(4) Push configuration
Description: Enter any text to describe this streaming channel. It is recommended to fill in the platform name.
URL: Fill in the URL provided by the live broadcast platform (generally composed of address + streaming code).
Enable: Indicates whether to enable this channel when streaming starts.
Delete: Delete the current streaming channel.
Add: Add a new streaming channel.
Speed: The current streaming channel upload rate.

8.5 Serial, Button



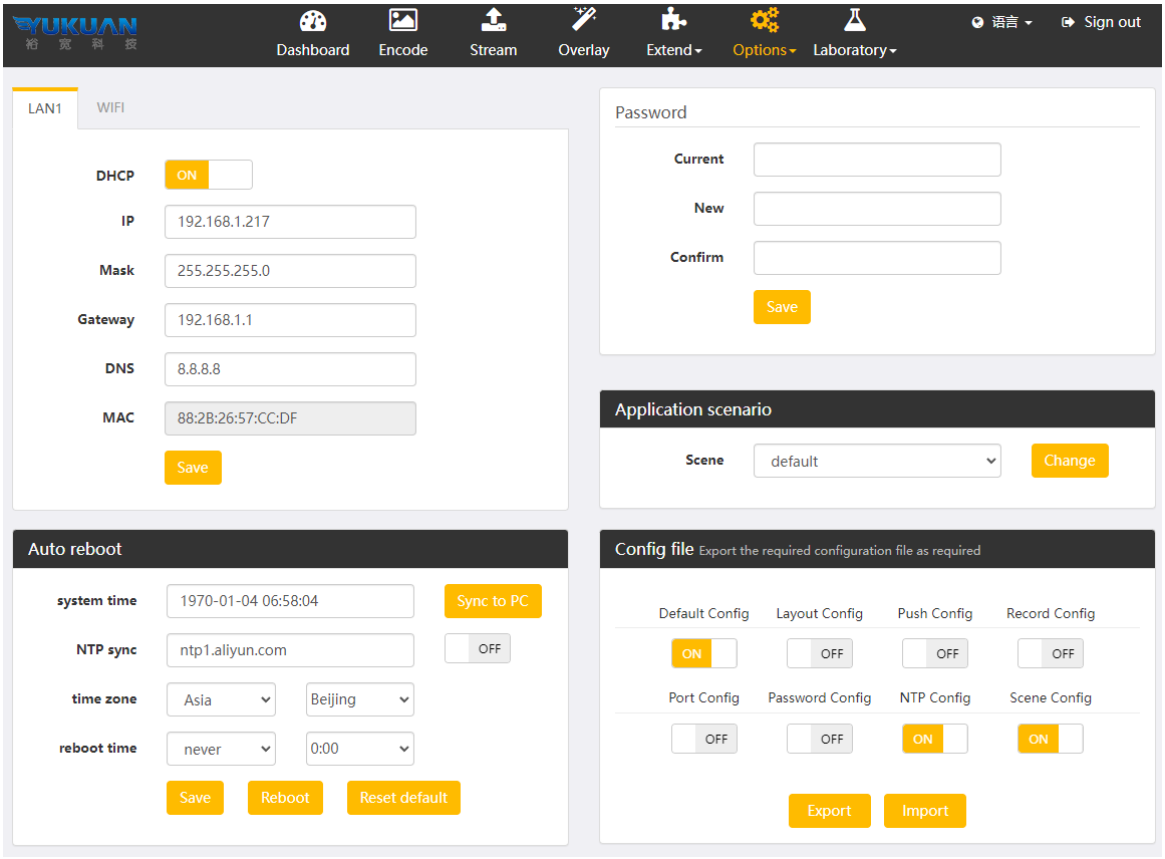
UDP-based port transparent transmission.
The serial port of most encoder models is not exposed, users who need to use it can connect it from the internal lead, or insert a USB serial device and select ttyUSB0.

8.6 H5 player

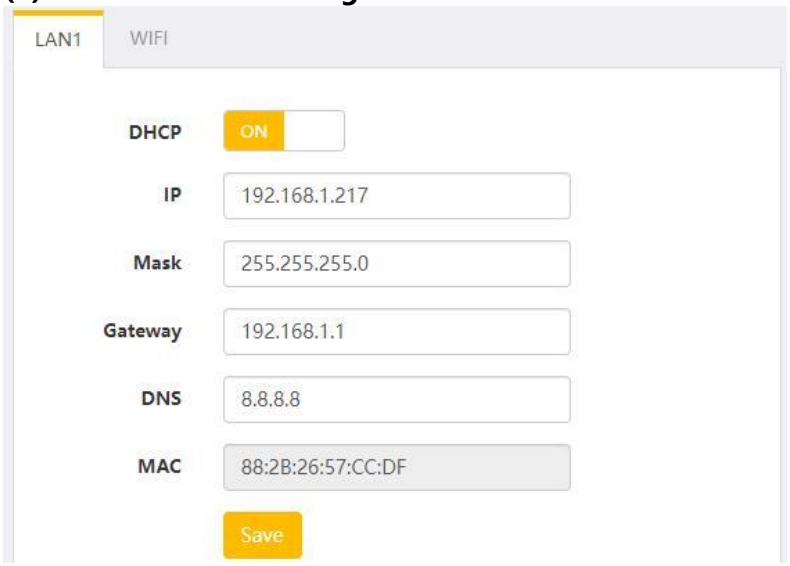
This page is implemented based on H5 technology, enabling browsers to watch rtmp streams, which can be used in small live broadcast scenarios, just share the page URL directly, and the page does not need to log in.

9 Options

9.1 System

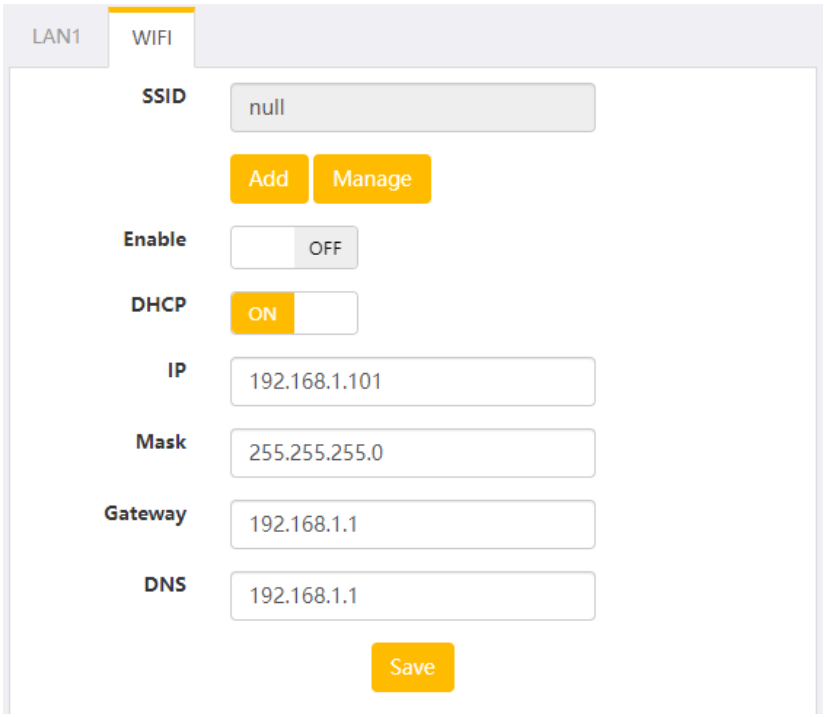


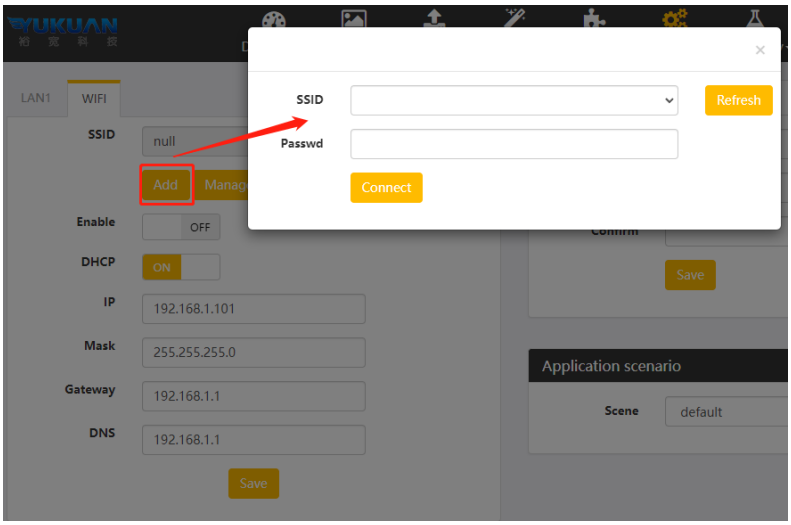
(1) Wired network configuration



After the fixed IP is saved, the login page will be opened automatically with the new IP. DHCP mode needs to check the latest IP from the OLED screen.

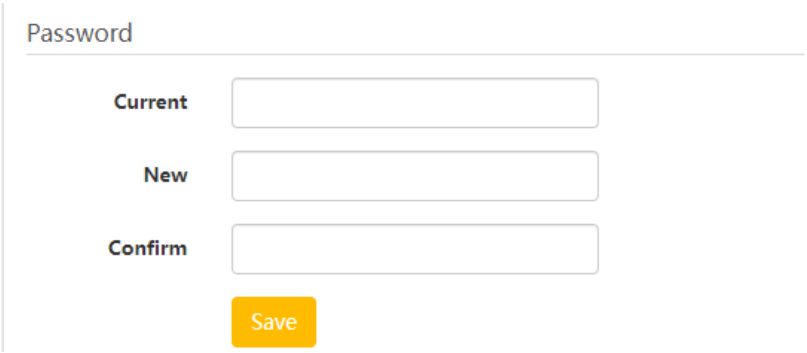
(2) Wireless network configuration





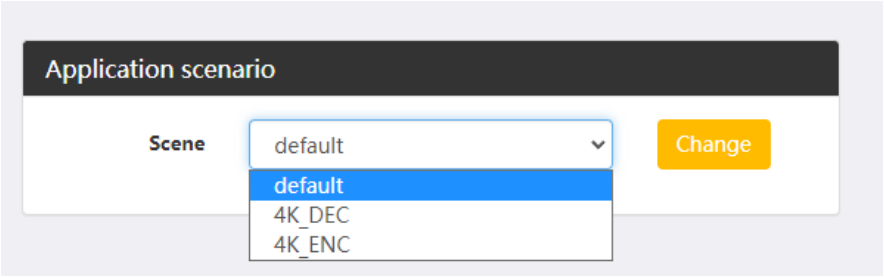
Note that some models of wifi are optional.

(3) Password configuration



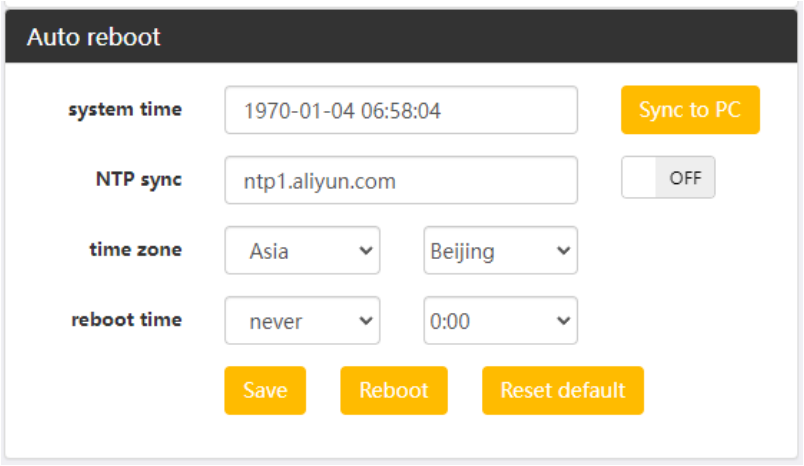
If you forget the password, it can only be solved by restoring the factory settings (press and hold the DEF button after startup).

(4) Application scenario



Due to the memory pre-allocation mechanism of the HiSilicon solution, the default memory allocation scheme may not be able to meet all scenarios, and can be switched according to the actual scenario. The default scenario can meet most requirements.

(5) Auto reboot

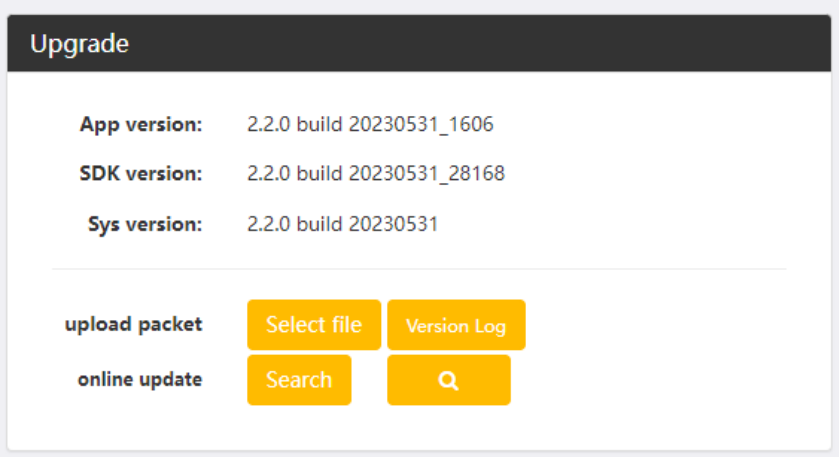


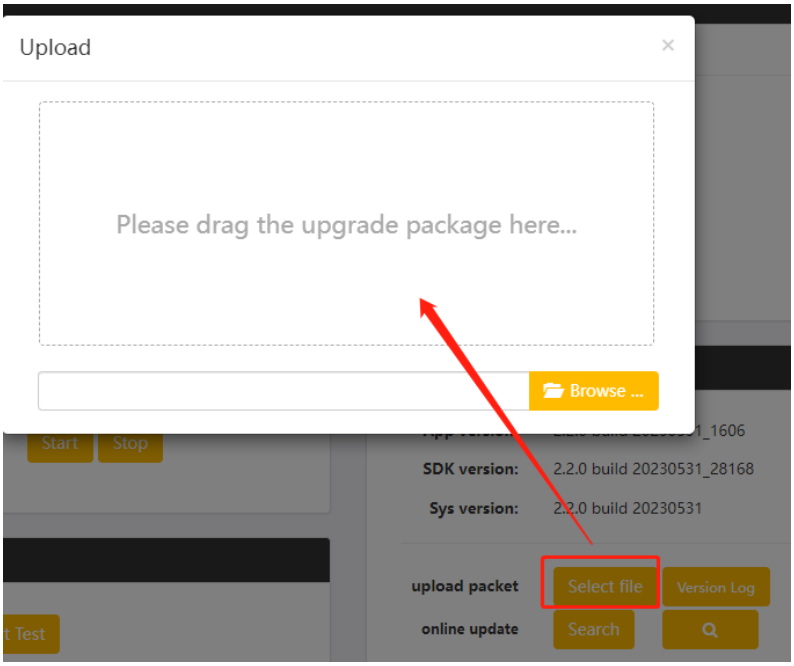
Sync to PC: Synchronize the encoder with the visitor's system time.

NTP sync: Synchronize with the NTP server every time you start up (need to be able to access the external network and configure the correct dns).

reboot time: The time for automatic restart, usually not needed, can run 7x24 hours, if more complex functions are used, scheduled restart can keep the system in the best working condition.

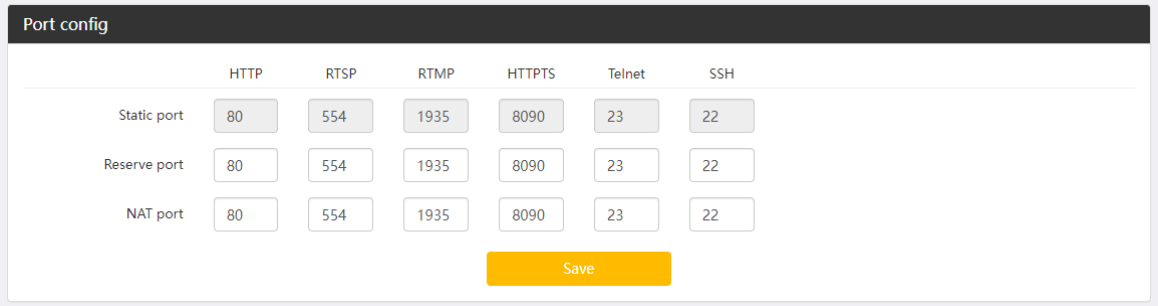
(6) Upgrade





Upload upgrade package for offline upgrade: Select file upload to upgrade, after uploading, the device will automatically restart to upgrade, after automatic startup, you need to restart manually again.

9.2 Port configuration

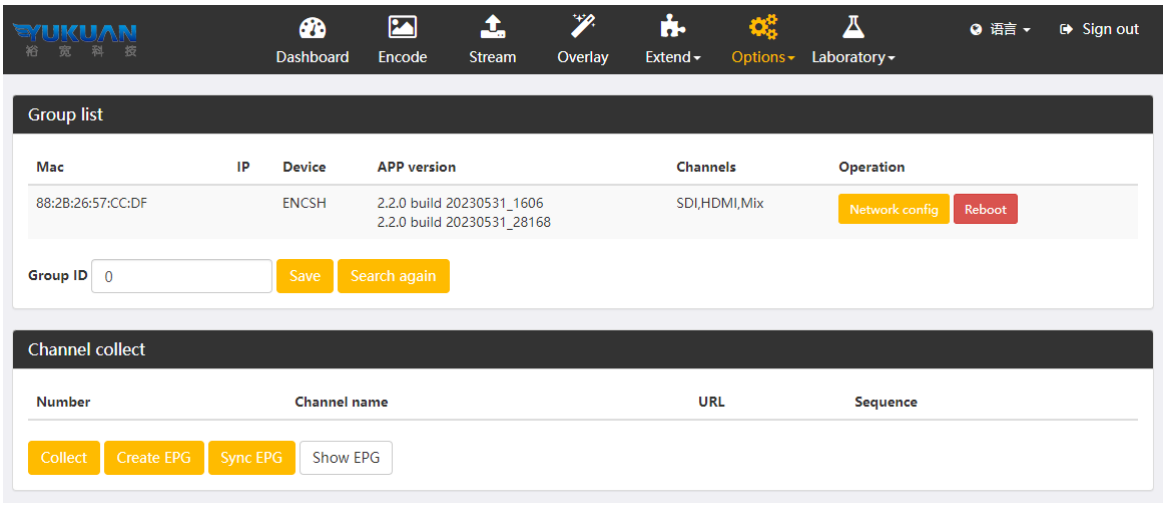


Static port: The fixed port of the system service, which cannot be modified。

Reserve port: You can add a spare port to access the corresponding service, which is meaningless in most cases and does not need to be set.

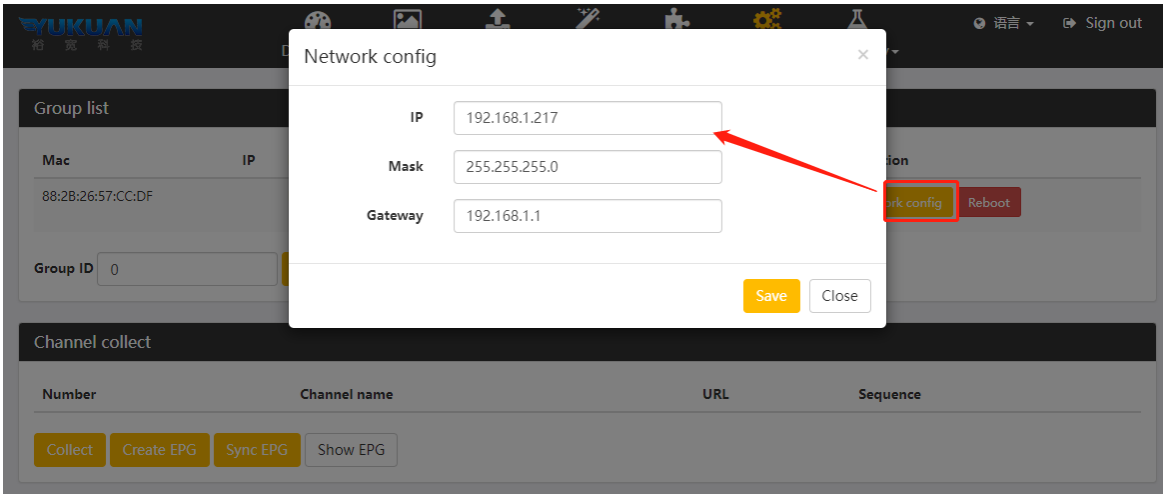
NAT (external network) port: It is mainly used for the correct display of the "playback address" on the "output settings" page when the encoder is accessed from the external network after the external network mapping.

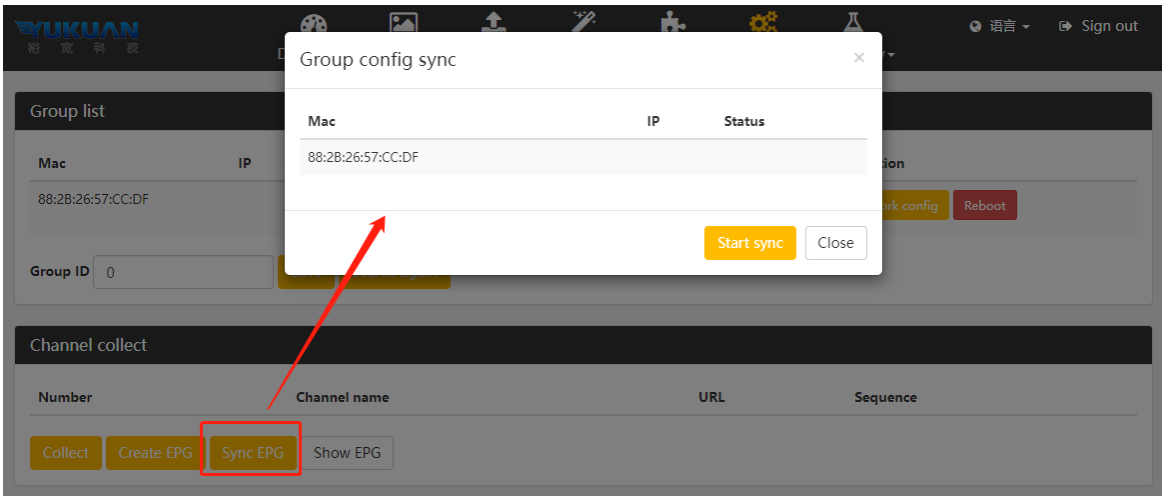
9.3 Group



When there are multiple encoders in the local area network, if you want some encoders to use the same parameters, you can set the group IDs of these encoders to be the same. The same group of encoding parameters and network protocol settings refer to encoding settings and output settings. Encoders in the same group will appear in the list of group settings. Users can select any encoder in the group to set network parameters, restart the operation, and summarize all channel lists with the same group ID, and then synchronize to the same in the group. Encoders with different IP segments can also be set as the same group. All operations of the group only require the encoders of the same group to be in the same LAN, not the same IP segment. Even if the IP conflicts, it cannot be operated (other manufacturers' When the encoder has an IP conflict, one of them must be turned off to set a new IP; but our encoder does not have this concern, using the group function to easily detect the IP conflict, and then change the conflicting IP).

Modify network configuration.





10 Statement

Because we have continuely adopted new technologies, will not notify if product parameters are changed.

The final interpretation of this instructions belongs to Yukuan Technology Ltd.