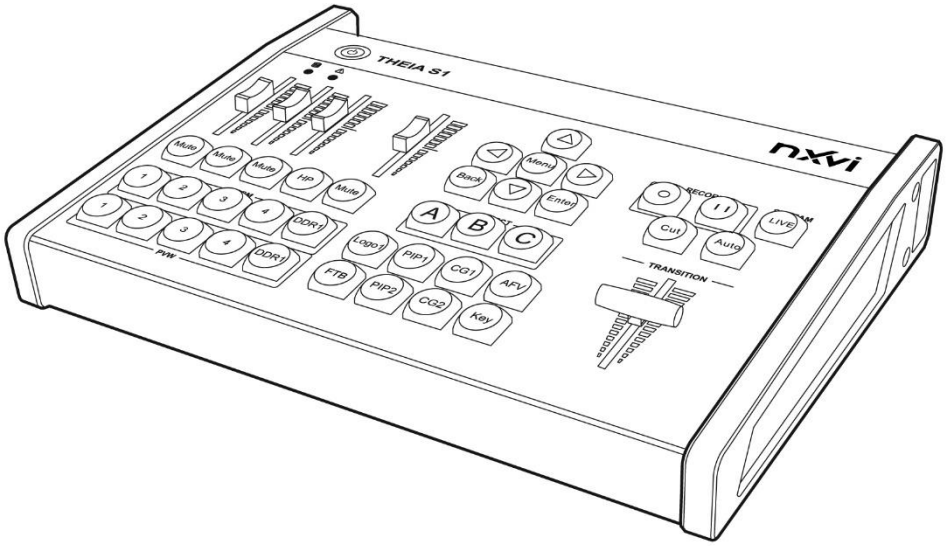
4K Live Switcher

User Manual

V1.2.5 2024.03



Theia S1

www.nxvitech.com

Cautions

1. Before use, please read this manual carefully and keep it safe.
2. Please strictly adhere to the warning signs and instructions indicated on the product.
3. Before cleaning the machine, unplug the power plug. Do not use liquid or corrosive cleaners; use a damp cloth for cleaning.
4. Ensure the product is used in an environment without the risk of water splashing or submersion.
5. Do not place the product in unstable locations, such as on a handcart or stand, to prevent it from falling and causing severe damage.
6. The product's case and venting holes are for heat dissipation. Do not cover or block these venting holes. Maintain a heat dissipation space of at least 4 centimeters during device operation to prevent overheating. Avoid placing the product on fabric surfaces to prevent blocking the venting holes.
7. Do not place the product near sources of heat, radiators, or hot air vents. Unless there is proper ventilation, do not place the product in a sealed space.
8. Use the power source specified on the power adapter.
9. Avoid pressing on the product's power cord and avoid placing the product on other power cords.
10. When using extension cords, confirm the total power/ampere does not exceed the load capacity of the extension cord.
11. The total current used in wall socket insertion should not exceed 15 amperes.
12. Do not insert anything into the venting holes of the device to avoid electric shock or short circuits. Do not splash any liquids on the product.
13. Do not attempt unauthorized disassembly or repairs. Opening the cover without authorization exposes you to voltage or other dangers. Consult service personnel for all service matters.
14. If any of the following situations occurs, unplug the product and consult an authorized dealer or service personnel:

    a. Power cord or plug is damaged or frayed.

    b. Liquid has entered the product.

    c. The product is exposed to rain or water splashes.

    d. If, following the instructions in this manual, the product still does not function properly, adjust only the areas mentioned in this manual, as improper adjustments elsewhere may damage the product and require qualified technicians more time for repairs.

    e. The product has been dropped or the body has been damaged.

    f. There are abnormal changes in the product's performance.

Product Warranty

Warranty Guidelines

- The product is covered by a one-year non man-made damage warranty from the date of purchase.
- For any repairs during the warranty period, the original purchase invoice or other relevant documents must be provided.
- The warranty period starts from the date of purchase. In case of loss of the purchase proof or if the purchase date is not specified, the warranty start date will be the product's factory date plus 30 days.
- Accidental events (natural disasters, changes in the environment, lightning, etc.), improper use (such as liquid, sand, dust infiltration, moisture, etc.), unauthorized disassembly, repairs, or modifications by unauthorized personnel are not covered by the warranty.
- Damage caused by computer system viruses and malicious software is not within the warranty coverage.
- Damage caused by the installation of third-party software on the computer without authorization is not covered by the warranty.
- All document delivery or shipping costs, including insurance, are the responsibility of the purchaser.
- Any other claims of a different nature are not within the warranty coverage.
- The warranty is only valid in the country or region where the product was purchased.
- This product warranty guideline does not affect the user's statutory rights.

Table of Contents

Chapter 1: Product Introduction

Theia S1 Live Switcher is a video switcher with multiple features. It supports up to 4 channels of 4K video input for multi-camera switching, including HDMI and network-based NDI sources. The mainstream video compression formats such as H.265 and H.264, and video streaming protocols such as UDP, SRT, RTP, RTMP, and HLS are supported for flexible video streaming, recording, and video playback, with the ability to push two different streaming addresses simultaneously.

In addition, Theia S1 Live Switcher includes built-in functions for video transition effects, graphic and text overlay, picture-in-picture, chroma keying, and audio mixing for multi-source video and audio processing. The all-in-one design and embedded function keys simplify the manipulation of Theia S1 Live Switcher and reduce cost, time, space, and staff required to operate.

Theia S1 Live Switcher is a powerful, versatile, and user-friendly video processing device suitable for high-quality and low-latency video broadcasting and production scenarios, such as live e-commerce, lectures, conferences, concerts, and remote production.

Product Overview

1.1 Product Features

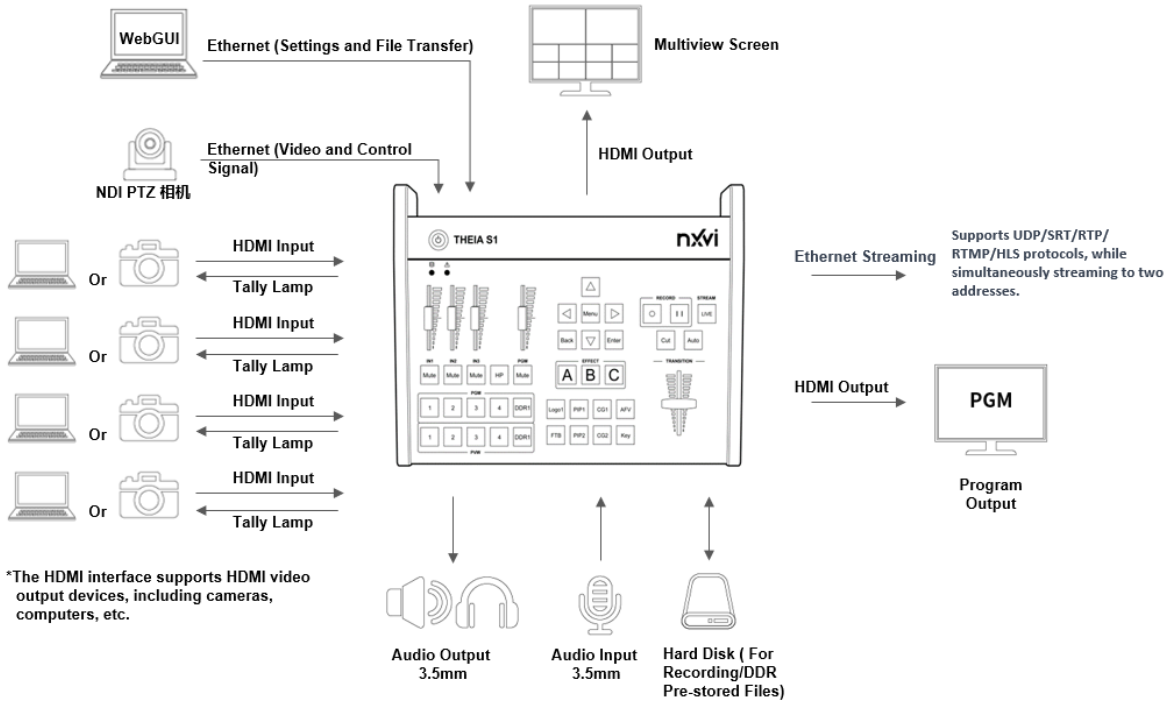
Theia S1 Live Switcher is a multifunctional video switching and streaming system with the following key features:

- Integrate video switching, graphic and text effects, multi-source audio mixing, hardware encoding, streaming, and video recording into one device.
- Support 4 channels of Full HD to 4K video input (including HDMI and NDI formats) and 1 channel of Digital Video/Audio Recorder (DDR) for multiview switching.
- Support external audio input and output.
- Support mixing of multiple video inputs with embedded audio sources (including HDMI and NDI formats), DDR audio, and external audio, along with quick function keys for audio follow video.
- Built-in 30+ video transition effects, with the ability to select 3 effects to physical function keys.
- Support user-controlled cut, auto, or T-Bar manipulated video transition speed.
- Include filter functions for implementing chroma keying (chroma key, luma Key, filter Key) graphic and text effects.
- Support Digital Video Effect (DVE) effects, with subtitle, logo and CG text overlay, as well as picture-in-picture effects.
- Support up to 5 sub-windows overlaying in picture-in-picture effect, with the option to assign 2 effects to physical keys.
- Support 1 macro function key for selecting and executing grouped functions with a single press.
- Support 2 HDMI video outputs including multiview monitoring and program (PGM) streaming preview.
- Support H.265/H.264 video compression formats.
- Support multiple streaming protocols including UDP/SRT/RTP/RTMP/HLS with the ability to assign 2 different addresses simultaneously.
- Support 2 USB ports for video recording or playback with external hard drives in NTFS format.

1.2 System Use-Case Diagram

Theia S1 Live Swticher system use-case scenario is depicted in the following figure with:

- 4 HDMI video inputs for camera or computer connection (with option for configuring one of the video inputs as networked-based NDI camera input).
- 4 Tally indicator lights connection.
- 2 HDMI video outputs for multiview screen and program output connection.
- WebGUI for system setting and file transfer configuration through Ethernet port.
- NDI camera command and control connection for compressed video input through Ethernet port.
- UDP/SRT/RTP/RTMP/HLS streaming protocols for video transport through Ethernet port.
- Audio input and output connection.
- USB port for external video recording or playback.

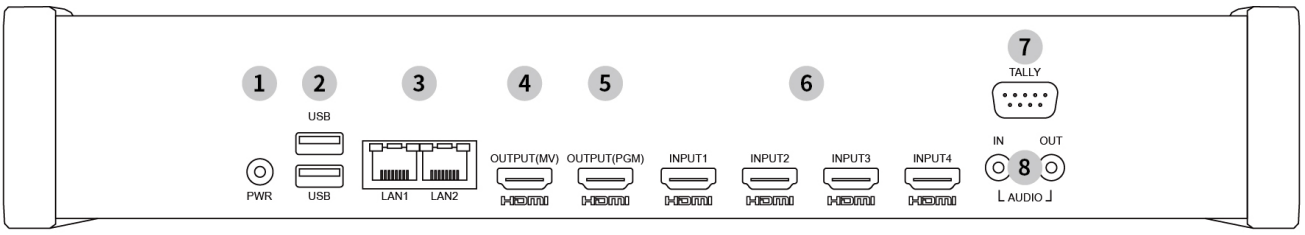


Theia S1 Live Switcher Use Case

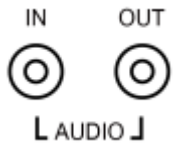
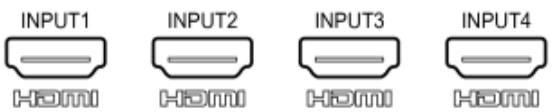
Chapter 2: Connection and Operation

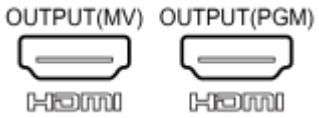
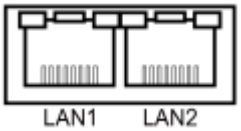
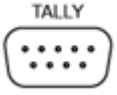
2.1 I/O Ports Layout and Description

Theia S1 Live Switcher contains I/O ports in system rear side for supporting WebGUI configuration, video and audio signal inputs and outputs, networking streaming, video and audio file recording and playback, tally control, and power input. The I/O ports layout and descriptions are shown in figure and table below.



1	Power Socket	5	HDMI Output (program)
2	USB x2 (external hard drive for DDR recording and playback)	6	HDMI Input x4
3	10M/100M/1000M Ethernet x2 (NDI input/streaming/WebGUI)	7	TALLY Interface (4 groups of red/green light control) ∗ Used only for light indication, no data transmission.
4	HDMI Output (multiview)	8	Audio Input & Output

	Audio Input & Output Ports (3.5mm Jack). • Audio IN for non-balanced dual-channel analog audio input. • Audio OUT for non-balanced dual-channel analog audio output.
	HDMI Video Input Ports (Type A) • INPUT1/INPUT2/INPUT3/INPUT4 for video sources displayed in multiview screen.

	HDMI Video Output Ports (Type A) • OUTPUT (MV) for multiview screen in 1080. • OUTPUT (PGM) for program video up to 4K.
	10M/100M/1000M Ethernet Ports (RJ45) • LAN1 for NDI video input, encoded video and audio streams, file upload (6GB in maximum) and download, and connection for Theia S1 WebGUI configuration (with fixed IP address: 192.168.1.10). • LAN2 for NDI video input, encoded video and audio streams, and file upload (6GB in maximum) and download.
	USB Ports (Type A) • USB for playback of pre-stored DDR audio and video files, as well as recording of audio and video files.
	DC Power Plug • PWR for DC12V power input (a AC-to-DC power adapter is included in product accessories).
	TALLY Interface (4 groups of red/green light control) • Tally lights for video production that indicate which camera is live or in preview during a live stream or video recording.

2.2 Peripheral Accessories

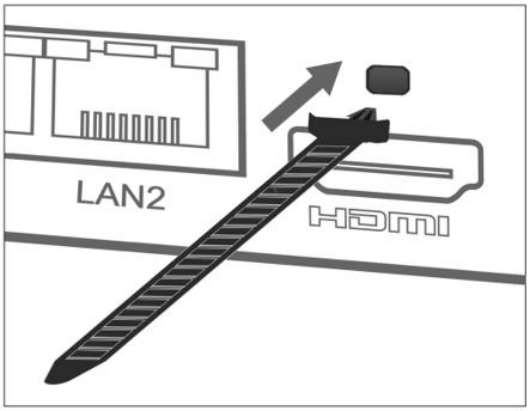
Theia S1 Live Switcher system peripheral accessories include:

- Quick Start Guide x1
- DC12V power adapter x1
- Cable tie x3
- Cable clip (strip and ring) x7

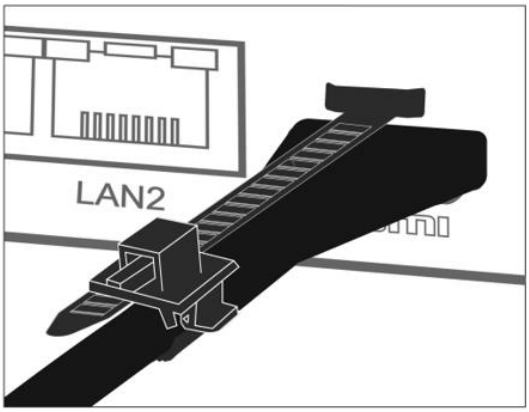
The cable clip straps and rings are provided to secure the HDMI cable connection, and prevent improper bending of cable head and accidental disconnection of cable. The installation and removal steps of cable clip strap and ring are provided below.

Installation of cable clip strap and ring

- Insert cable clip strap directly into the cable clip installation hole on the rear panel of Theia S1 Live Switcher, as figure shown below, and ensure a secure installation after insertion.

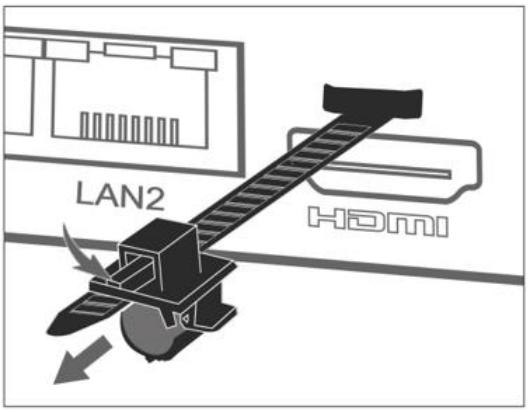


- Plug HDMI cable into HDMI interface on Theia S1 Live Switcher.
- Push HDMI cable into the hole on cable clip ring and move cable clip ring toward cable strap. Ensure cable strap pass through top hole on cable clip ring for fastening HDMI cable, as figure shown below.

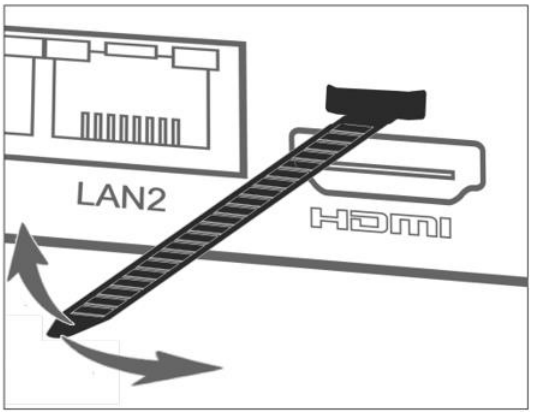


Removal of cable clip strap and ring

- Flip buckle upward on cable clip ring until cable clip ring can be moved away from cable clip strap.

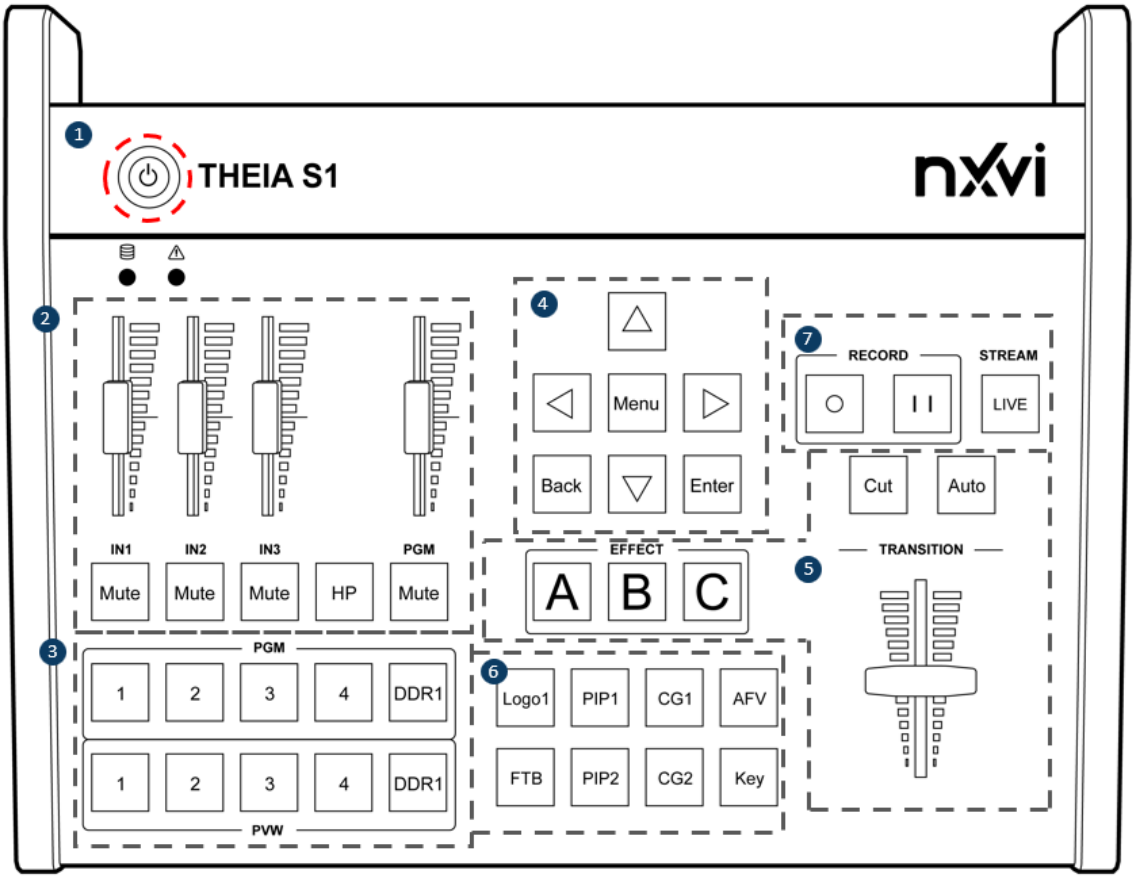


- Pull HDMI cable from the hole on cable strap ring and unplug it from HDMI interface on Theia S1 Live Switcher.
- Hold cable clip strap and gently shake it from side to side, and pull it outward for releasing, as figure shown below.



2.3 Control Panel

Theia S1 Live Switcher control panel includes function keys, audio volume sliders, and a T-Bar for video transition effect. The control panel is divided into 7 areas, as figure and description shown below.



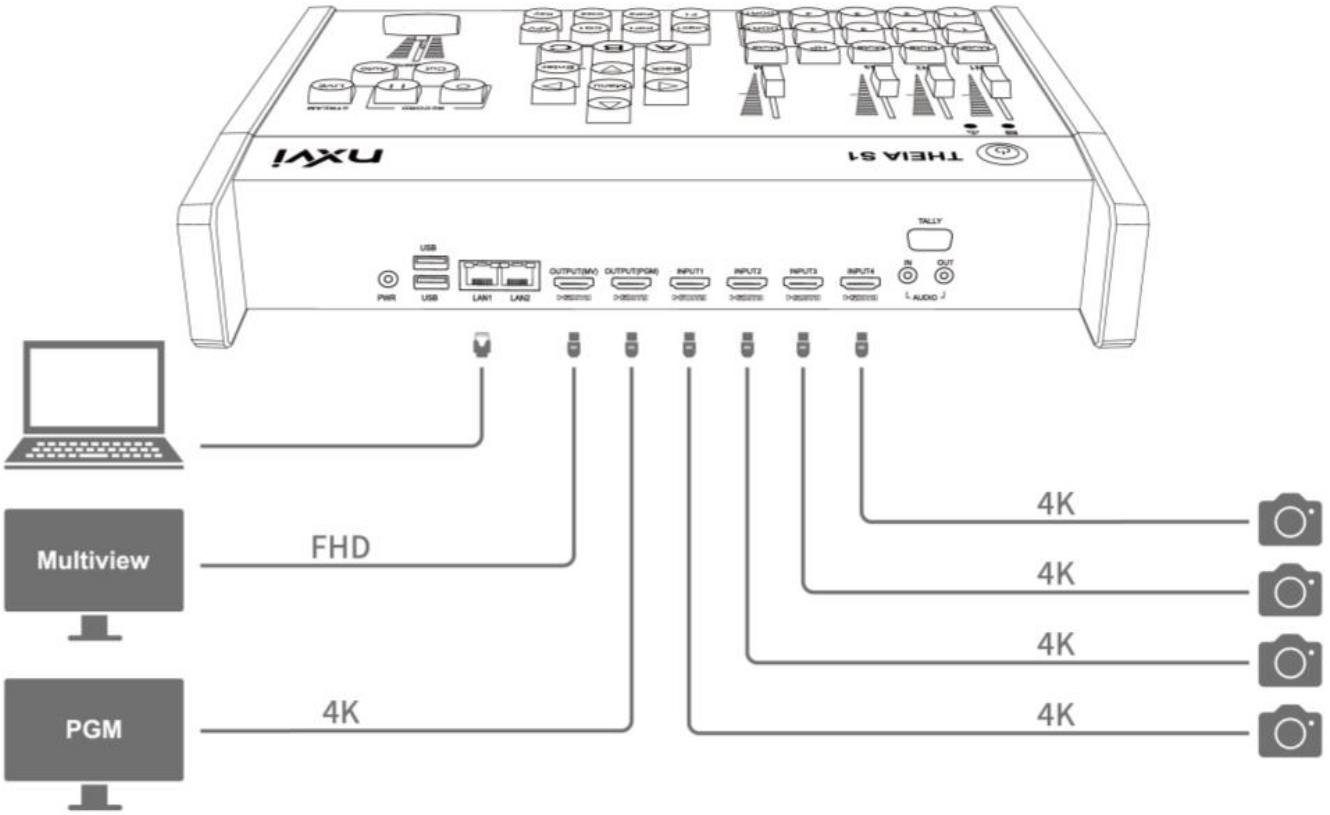
No.	Name	Description
1	**Power Switch**	Short press to power on. Long press for 5 seconds to power off.
2	**Audio Sliders and Control Keys**	**IN1/IN2/IN3:** Sliders for mixing audio volume control. The association of sliders and audio sources (4 channels of embedded audio from video input (HDMI or NDI), 1 channel of DDR video audio file, and 1 external audio signal) can be establised in menu. Each slider can be associated with more than one audio source when necessary. However, each video source can only be associated with one slider. The audio volume controlled by the slider will be displayed in menu as a volume bar with intensity. **PGM:** Slider for final mixed PGM audio volume control. **Mute:** Mute/Unmute keys of mixing audio channels controlled by sliders above keys. By pressing the mute key under IN1 slider will light up key in orange color, and muting the audio channel(s) associated to IN1. **HP:** Enable/disable key of audio output with 3.5mm jack in headphone monitoring. Users can configure audio output to Video-IN1, Video-IN2,

		Video-IN3, Video-IN4, DDR1, MIC, or PGM in menu (default configuration is PGM audio). Refer to 3.2 Audio Function for details.
3	**Program (PGM) and Preview (PVW)**	**PGM 1/2/3/4/DDR1:** Program keys for switching video signals from source 1/2/3/4 and DDR to “PGM” (Program) channel in multiview screen. By pressing the program key, the pressed numeric key will be lit up in red and the selected video signal will be immediately displayed in PGM (Program) channel. **PVW 1/2/3/4/DDR1:** Preview keys for switching video signals from source 1/2/3/4 and DDR to “PVW” (Preview) channel in mutilview screen. By pressing the preview key, the pressed numeric key will be lit up in green for indicating the next video signal being displayed in PGM (Program) channel, after video switching is applied (such as pressing “Cut” button). Note: DDR signal source is an internal audiovisual file that needs to be pre-stored on the hard disk.
4	**Menu and Control Keys**	**Menu:** Menu key for function selection. By pressing menu key, the OSD menu will be displayed in multiview screen. **Back:** Back key for exit current function selection or return to previous function selection in menu. **Enter:** Enter key for confirmation of function selection in menu. △▽◁▷**:** Up/Down/Left/Right movement keys for function selection in menu. Refer to 3 System Menu for details.
5	**Transition Effect**	**A/B/C:** Selection keys for transition effects. There are more than 30 built-in transition effects supported and users can associate 3 of them with these selection keys. **Cut:** Hard cut key for immediate transition without applying transition effects. **Auto:** Automatic key for transition effect. The transition time of effect can be set from 50 to 20000ms, after pressing automatic key. **T-Bar:** Manual control lever for transition time. Use Cut, Auto, or T-Bar to transit between PVW and PGM. Refer to 3.7 Effect Function for details.

6	**Digital Video Effect (DVE)**	**Logo1:** Enable/Disable key for logo overlay effect. Users can upload a logo image file (in BMP, JPG, JPEG, PNG, PBM, PGM, PPM, or XPM format) in menu and define position in X- and Y-axis for logo overlay. The logo is displayed in original image size and will not automatically scale. **PIP1/PIP2:** Enable/Disable keys for picture-in-picture effect on program channel. There are more than 10 predefined picture-in-picture effects in system and users can associate 2 of them with these keys in menu. Refer to 3.8 Picture-in-Picture Function. for details. **CG1/CG2:** Enable/Disable keys for computer graphic and text files overlay effect. Users can upload text and graphic files in menu and define position in X- and Y-axis for computer graphic and text overlay. Unlike logo overlay, which maintains the image original size, computer graphic and text overlay will stretch the image to full-screen in display. **AFV:** Audio Follows Video function Enable/Disable key for Audio-Follow-Video (AFV) function. By pressing audio-follow-video key, the pressed key will be lit up in orange, and the embedded audio of that selected PGM video source will be automatically mixed into the PGM output audio. When the selected video from the PGM is changed to another, the automatically mixed audio will also be immediately changed to the new embedded audio source. **FTB:** The fade to black button is an easy way to start and end live broadcasts. Fade to black performs a mix to black which happens across all video layers at the same time. When performing a fade to black, the master program audio will also fade out to silence. **Key:** Enable/Disable key for keyer function. Users can select video sources and set chroma, luma, and filter values in menu for performing keying function. By pressing keyer key, the associated keying functions will be activated. Refer to 3.11 Keyer Function for details.
7	**Streaming and Recording**	**LIVE:** Start/Stop key for live streaming. By pressing live key, the program channel will be streamed out. The second pressing of live key will stop the live streaming of program channel. Refer to 3.5 Stream Function for details. **O:** Start/Stop key for recording. By pressing record key, the program channel content will be recorded. The second pressing of record key will stop the recording of program channel. **II:** Pause/Resume key for recording. By pressing pause key, the program channel recording will be paused. The second pressing of pause key will resume program channel recording. Refer to 3.6 Record Function for details.

2.4 Connection of Devices and Settings

Before pressing power button on Theia S1 Live Switcher, please connect peripheral devices as figure shown below. A configuration of multiple 4K cameras with multiview and program monitors, as well as external computer for web-based graphic user interface (WebGUI) setting, is illustrated as a reference. Theia S1 Live Switcher supports both local embedded menu and remote external WebGUI for system configuration settings and operations. Some settings can only be configured through the WebGUI (such as encoding/streaming parameters, text subtitles, logo/CG image upload, DDR video download/upload/delete, recording filename input, etc.)



2.5 Multiview (MV) Interface Screen

Theia S1 Live Switcher contains a built-in multiview (MV) interface for managing multiple videos, audio, network, and storage input and output devices, as well as tally control. The multiview interface also provides setting options to associate panel function keys with required features and effects. This section explains the key features in multiview interface.

■ Power-On Screen

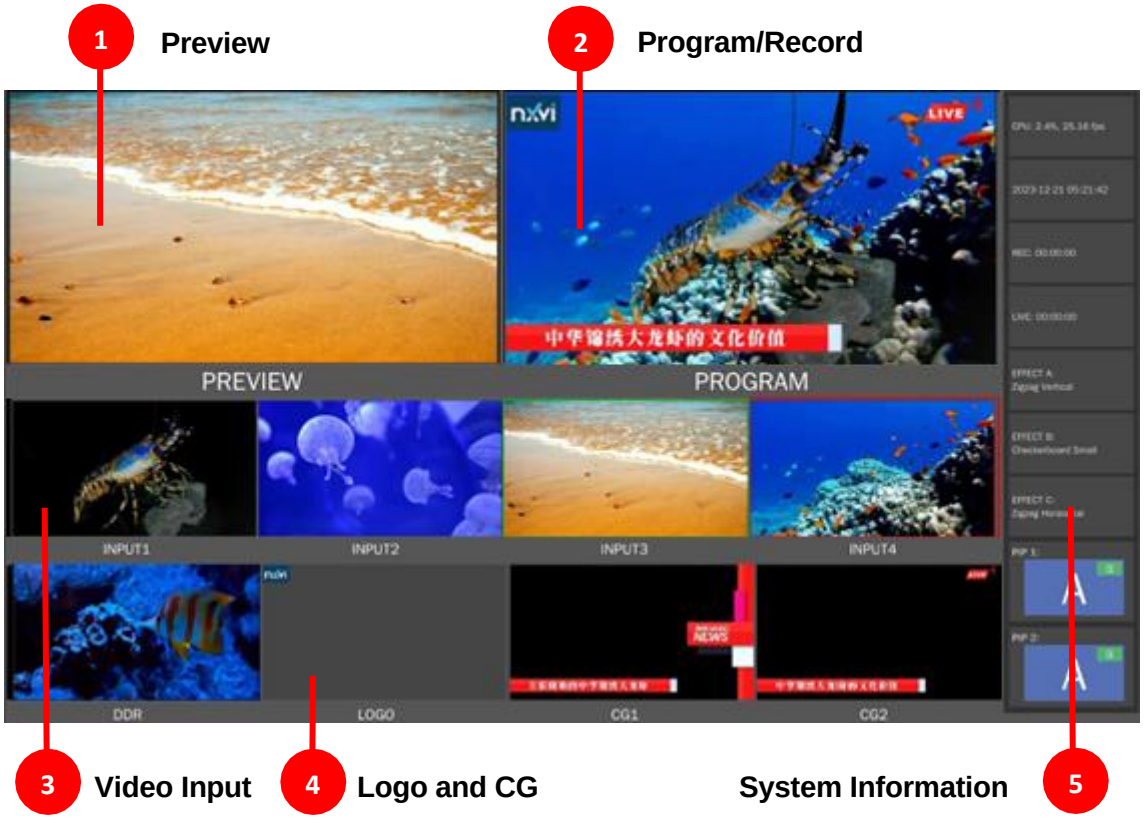
After peripheral devices are connected, press power button on top left corner of Theia S1 Live Switcher to power on the machine. Wait for 2~3 seconds, and the startup screen with the NxVi logo, as figure shown below, will appear on the monitor (preferred in 1080 resolution) connected to OUTPUT (MV) HDMI interface for indicating the successful power-on.

■ Operating Screen

Wait for another 30 seconds for system initiation (output screen will be in blank) and a blue screen will appear on **OUTPUT (MV) HDMI** monitor after the completion. The multiview operating screen, as figure shown below, will be displayed for indicating the readiness of operating. The multiview operating screen is divided into:

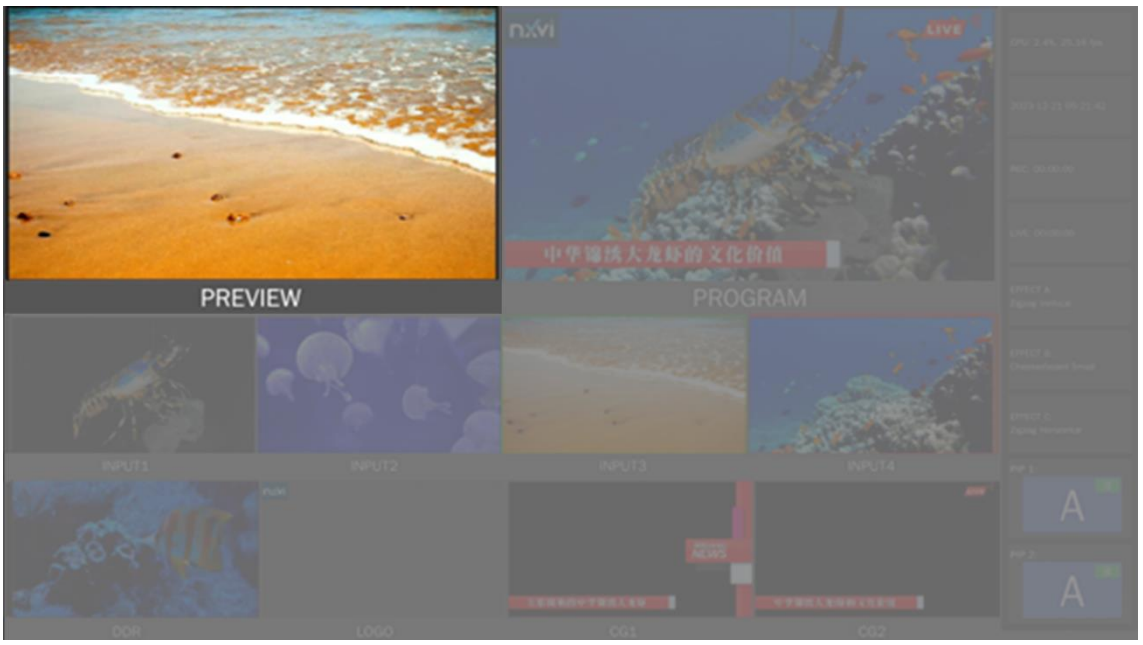
- **Preview** window
- **Program/Record** window
- **Video Input** windows
- **Logo and CG** windows
- **System Information** window

Each operating window is described below.



■ Preview Window

The **Preview** window displays the video content ready for being switched to **Program** window, when transition keys or T-bar is applied. Once the **Preview** window content is switched to **Program** window, the previous content in **Program** window will be displayed in **Preview** window instead.

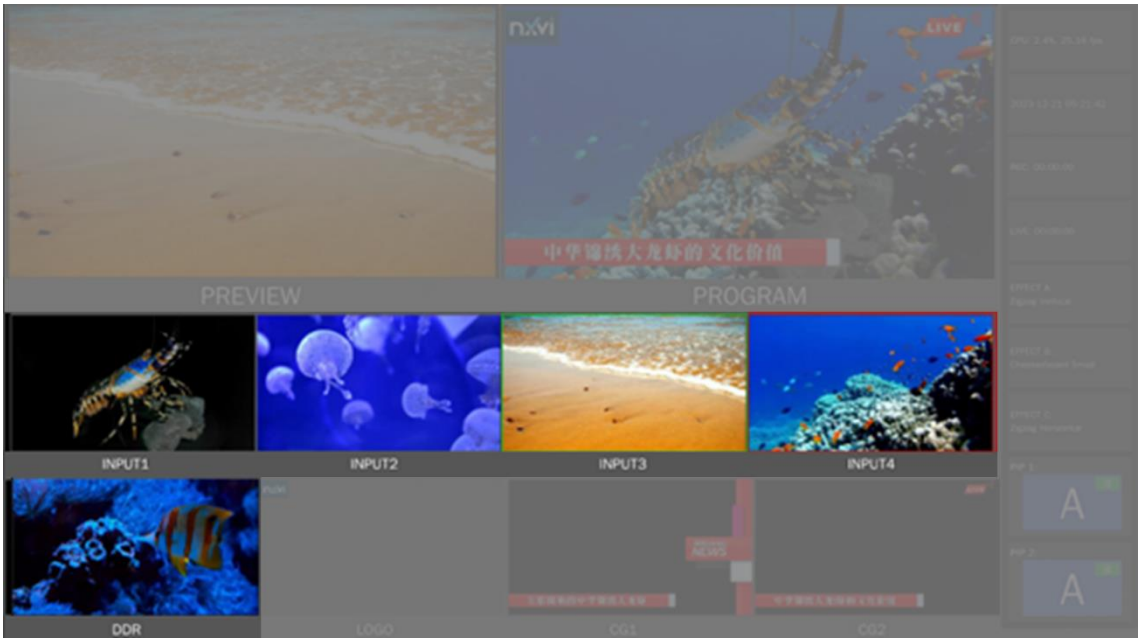


■ Program/Record Window

The **Program/Record** window displays the video content being streamed or recorded currently. The "next" program content can be the video sources from **Preview** window or **PGM 1/2/3/4/DDR1** function keys controllered.

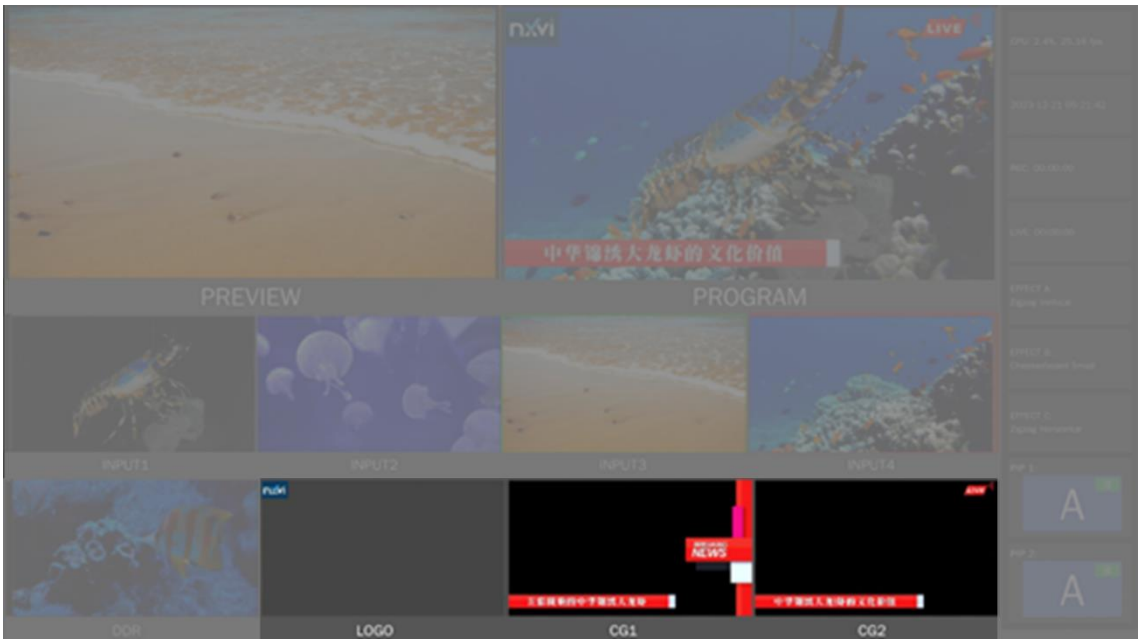
■ Video Input Windows

The **Video Input** windows display video sources from **INPUT1/INPUT2/INPUT3/INPUT4 HDMI** interfaces and **DDR** pre-recorded content. The video "output" resolution for these video sources can be configured in **Video Output** category of system **menu** with **Base Canvas Resolution** option. All the video input sources will be scaled accordingly based on the resolution selected in **Base Canvas Resolution** for further operations and output. One of the video input sources will be displayed in "red" rectangle for indicating the selection (by pressing function key in **PGM 1/2/3/4/DDR1** area) to **Program/Record** window (i.e. video source being streamed or recorded currently). One of the video input sources can also be displayed in "green" rectangle for indicating the selection (by pressing function key in **PVW 1/2/3/4/DDR1** area) to **Preview** window (i.e. video source in next for being streamed or recorded), assuming it is different from video source assigned to **Program/Record** window. These color indications on video input windows for **Program/Record** and **Preview** windows will also be displayed through **Tally** control interface to facilitate the coordinating of cooperation.



■ Logo and CG Windows

The **Logo** and **CG** (computer graphic) windows display images selected for logo (**LOGO** window) and subtitle (**CG1** and **CG2** windows) processing, with the support of text input in subtitle windows. For more information description, refer to 3.9 Logo Function and 3.10 CG Function for detailed description of settings and options.

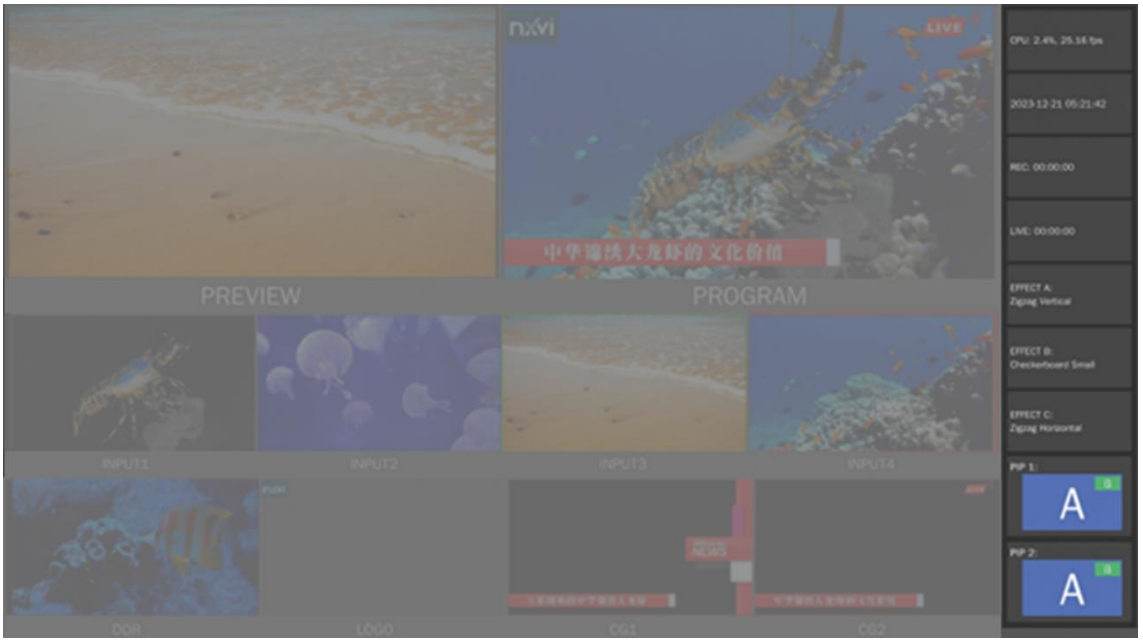


■ System Information Window

The **System Information** window displays following information:

- System CPU utilization status and video frame rate (in fps).
- System time (year-month-day hour:minute:second)
- Record time (hour:minute:second)
- Live streaming time (hour:minute:second)
- Transition Effect A key setting
- Transition Effect B key setting
- Transition Effect C key setting
- Picture-In-Picture (PIP) 1 key setting
- Picture-In-Picture (PIP) 2 key setting

as a quick summary of key system information and settings.



2.6 WebGUI Connection and Configuration

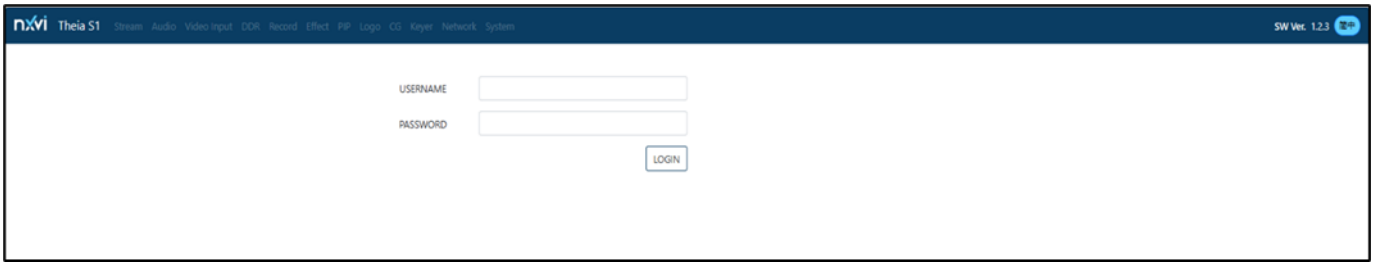
Theia S1 Live Switcher provides web-based graphic user interface (WebGUI) for complete system settings and configurations. The LAN1 port in system is the default Ethernet interface for connecting to external configuring device through WebGUI, and its default IP adress is configured as:

- LAN1 port IP address: 192.168.1.10

To establish connection between Theia S1 Live Switcher and external configuring device, set the external configuring device's IP address to the same subnet as Theia S1 LAN1 port (192.168.1.x).

Open a web browser in external configuring device and enter Theia S1 LAN1 port IP address in browser's address bar: http://192.168.1.10:3000/

The login screen will appear as figure shown below. Authenticate using the default username and password to access the WebGUI.



To authenticate external configuring device's access to Theia S1 Live Switcher, use following username and password to login WebGUI:

- Default username: admin
- Default password: NxVweb

For more information, refer to 4 Web-Based Graphical User Interface (WebGUI).

The LAN2 port in Theia S1 Live Switcher is dynamically configured by DHCP mechanism.

- LAN2 port IP Address: DHCP configured

2.7 Menu and WebGUI Setting Differences

Theia S1 Live Switcher supports both embedded menu (Menu key) and external web-based graphic user interface for system settings. Some of settings can only be configured through WebGUI, such as encoding and streaming parameters, text input for subtitles, Logo and CG image files upload, DDR video file download/upload/delete, and record filename; while video output, audio volume, and tally control mode switch settings can only be configured through embedded menu. The following table lists function settings supported by embedded menu and external WebGUI for comparison.

Function		Menu	WebGUI
Streaming	Encoding Parameter Setting		√
	Streaming Address Setting		√
	Single/Multi-Stream Switch	√	
Audio	Mixing Source Settings	√	√
	Audio Delay Settings	√	√
	Headphone Output Selection	√	√
	Audio Volume Level Setting	√	
	Slider Audio Channel Binding	√	√
DDR	DDR Video Selection	√	√
	DDR Video Upload/Download/Delete		√
	DDR Video Playback Control	√	√
Video Input	NDI/HDMI Input Source Switching	√	√
	Input Source Cropping and Rotation Setting	√	
	Input Source Chroma Keying Effect Setting	√	√
Video Output	Output Resolution Setting	√	
	Output Frame Rate Setting	√	
	Output Canvas Orientation Setting	√	
Record	Record Filename Setting		√
	Record Path Setting		√
Effect	FTB Duration Setting	√	√
	Transition Effects Auto Transition Speed Setting	√	√
	Transition Effects Binding Key Setting	√	√
PIP	Picture-in-Picture Binding Key Setting	√	√
	Picture-in-Picture Sub-Screen Style Setting	√	√
	Picture-in-Picture Style Preview	√	
Logo	Logo Image Upload		√
	Logo Image Selection	√	√
	Logo Position Setting	√	√
	Logo Image Chroma Keying Effect Setting	√	√
Text Subtitle	Text Subtitle Input		√
	Text Subtitle Size	√	√
	Text Subtitle Color	√	√
	Text Subtitle Font	√	√
	Text Subtitle Scroll Effect	√	√

Graphics Image	Graphics Image Upload		√
	Graphics Image Selection	√	√
	Graphics Image Chroma Keying Effect Setting	√	√
Keyer	Filter Key Image Upload		√
	Filter Key Image Selection	√	√
	Filter Key Parameter Setting	√	√
PTZ	NDI Source Select	√	
	Pan/Tilt Setting	√	
	Zoom/Focus and Parameters Setting	√	
	Preset Location Setting	√	
Network	Network Information Display	√	√
	Ethernet Configuration Setting		√
System Information	System Language Switching	√	√
	Time Zone and Time Setting		√
	Tally Control Mode Switching	√	
	Log Information		√

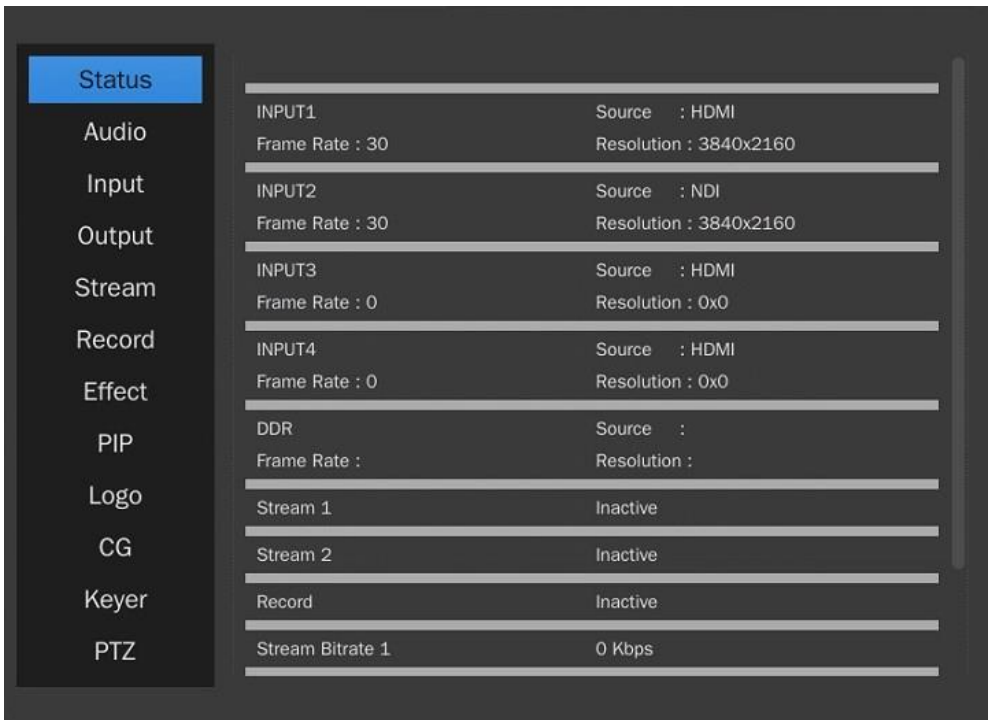
Chapter 3: System Menu

Theia S1 Live Switcher provides an embedded menu for system function settings and monitoring. By pressing the **Menu** key in multiview screen, a semi-transparent on-screen-display menu will appear and overlay with multiview operating windows. Most of system functions and settings can be configured through this embedded menu. The following sections describe these system functions and their corresponding settings one by one.

3.1 Status Function

The **Status Function** provides status information for video inputs, DDR file, streamings and bitrates, and recording and bitrate settings. The following table lists all the functions and their settings displayed in **Status Function**.

Function	Sub-Function	Value or State	Default
Video-In 1	Input Source	HDMI or NDI	HDMI
	Frame Rate	(According to source)	0
	Resolution	(According to source)	0x0
Video-In 2	Input Source	HDMI or NDI	HDMI
	Frame Rate	(According to source)	0
	Resolution	(According to source)	0x0
Video-In 3	Input Source	HDMI or NDI	HDMI
	Frame Rate	(According to source)	0
	Resolution	(According to source)	0x0
Video-In 4	Input Source	HDMI or NDI	HDMI
	Frame Rate	(According to source)	0
	Resolution	(According to source)	0x0
DDR	Input Source	File name	
	Frame Rate	(According to source)	0
	Resolution	(According to source)	0x0
Stream 1		Inactive, LIVE, or Reconnecting	Inactive
Stream 2			
Record		Inactive or Recording	Inactive
Stream Bitrate 1		Refer to 4.1 Streaming for details.	0 Kbps
Stream Bitrate 2			
Record Bitrate		Refer to 3.5 Stream & Record for details.	0 Kbps


Status
Audio
Input
Output
Stream
Record
Effect
PIP
Logo
CG
Keyer
PTZ
INPUT1
Source : HDMI
Frame Rate : 30
Resolution : 3840x2160
INPUT2
Source : NDI
Frame Rate : 30
Resolution : 3840x2160
INPUT3
Source : HDMI
Frame Rate : 0
Resolution : 0x0
INPUT4
Source : HDMI
Frame Rate : 0
Resolution : 0x0
DDR
Source :
Frame Rate :
Resolution :
Stream 1
Inactive
Stream 2
Inactive
Record
Inactive
Stream Bitrate 1
0 Kbps

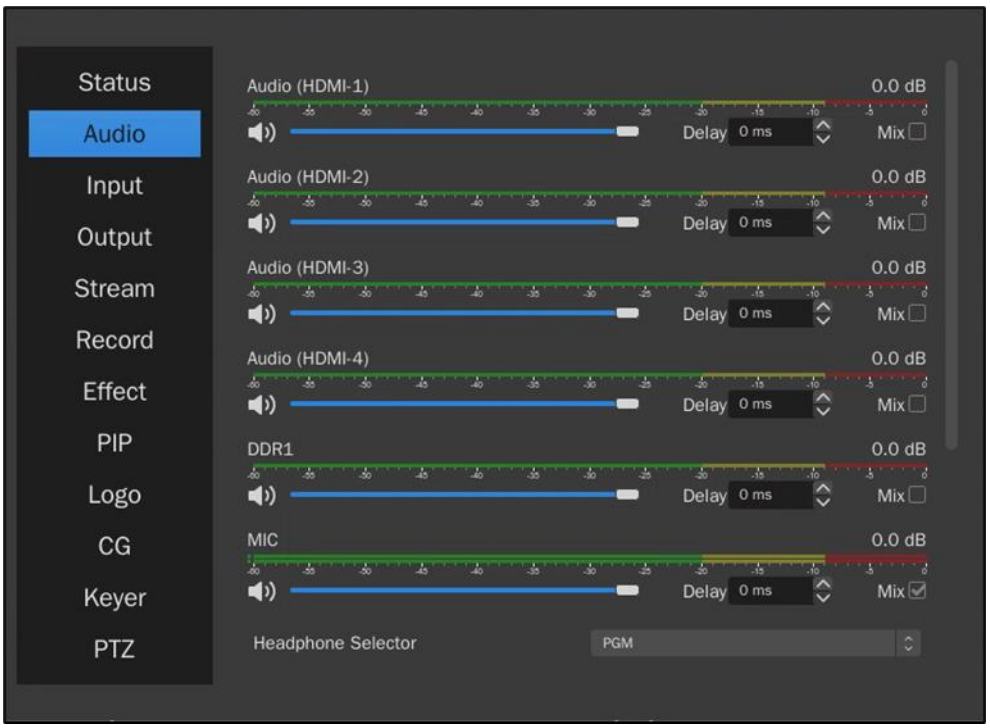
3.2 Audio Function

The **Audio Function** provides status information and settings for audio inputs (HDMI INPUT1/2/3/4 or NDI, DDR, and MIC), headphone output selection, and volume slider 1/2/3. All the selected audio inputs for mixing will be output to program (**PGM**) channel. The headphone selection selects one of the audio sources, including **PGM**, for monitoring. The association between volume sliders and the audio sources is also established in audio function through menu setting. The following table lists all the functions and their settings displayed in **Audio Function**.

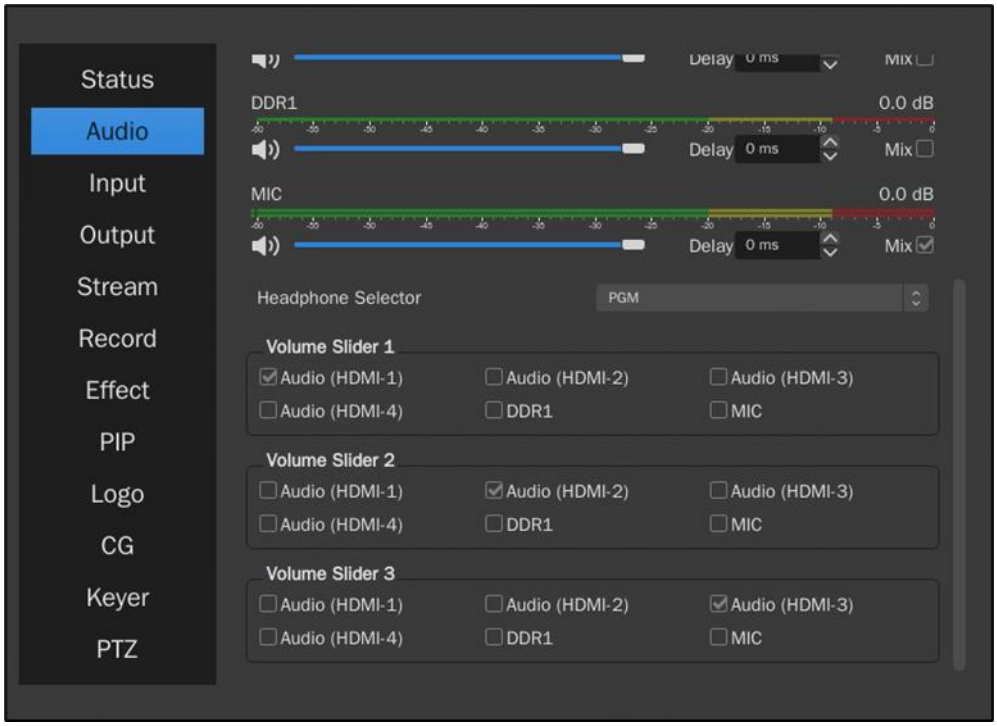
Function	Sub-Function	Value or State	Default
Audio-In 1	Input Source	HDMI-1 or NDI-1	HDMI-1
	Sound Level Meter	(According to source)	(None)
	Mute Control	Mute or Unmute	Unmute
	Volume Control	△▽◁▷key for adjustment	(None)
	Delay Control	0-10000ms delay time	0ms
	Mix Control	Mix or Unmix	Unmix
Audio-In 2	Input Source	HDMI-2 or NDI-2	HDMI-2
	Sound Level Meter	(According to source)	(None)
	Mute Control	Mute or Unmute	Unmute
	Volume Control	△▽◁▷key for adjustment	(None)
	Delay Control	0-10000ms delay time	0ms
	Mix Control	Mix or Unmix	Unmix
Audio-In 3	Input Source	HDMI-3 or NDI-3	HDMI-3
	Sound Level Meter	(According to source)	(None)
	Mute Control	Mute or Unmute	Unmute
	Volume Control	△▽◁▷key for adjustment	(None)
	Delay Control	0-10000ms delay time	0ms
	Mix Control	Mix or Unmix	Unmix
Audio-In 4	Input Source	HDMI-4 or NDI-4	HDMI-4
	Sound Level Meter	(According to source)	(None)
	Mute Control	Mute or Unmute	Unmute
	Volume Control	△▽◁▷key for adjustment	(None)
	Delay Control	0-10000ms delay time	0ms
	Mix Control	Mix or Unmix	Unmix
DDR (DDR1)	Sound Level Meter	(According to source)	(None)
	Mute Control	Mute or Unmute	Unmute
	Volume Control	△▽◁▷key for adjustment	(None)
	Delay Control	0-10000ms delay time	0ms
	Mix Control	Mix or Unmix	Unmix

Microphone (MIC)	Sound Level Meter	(According to source)	(None)
	Mute Control	Mute or Unmute	Unmute
	Volume Control	△▽◁▷key for adjustment	(None)
	Delay Control	0-10000ms delay time	0ms
	Mix Control	Mix or Unmix	Unmix
Headphone Selector		PGM, Audio-1/2/3/4, DDR1, or MIC	PGM
Volume Slider 1		Audio-1/2/3/4, DDR1, or MIC	(None)
Volume Slider 2		Audio-1/2/3/4, DDR1, or MIC	(None)
Volume Slider 3		Audio-1/2/3/4, DDR1, or MIC	(None)

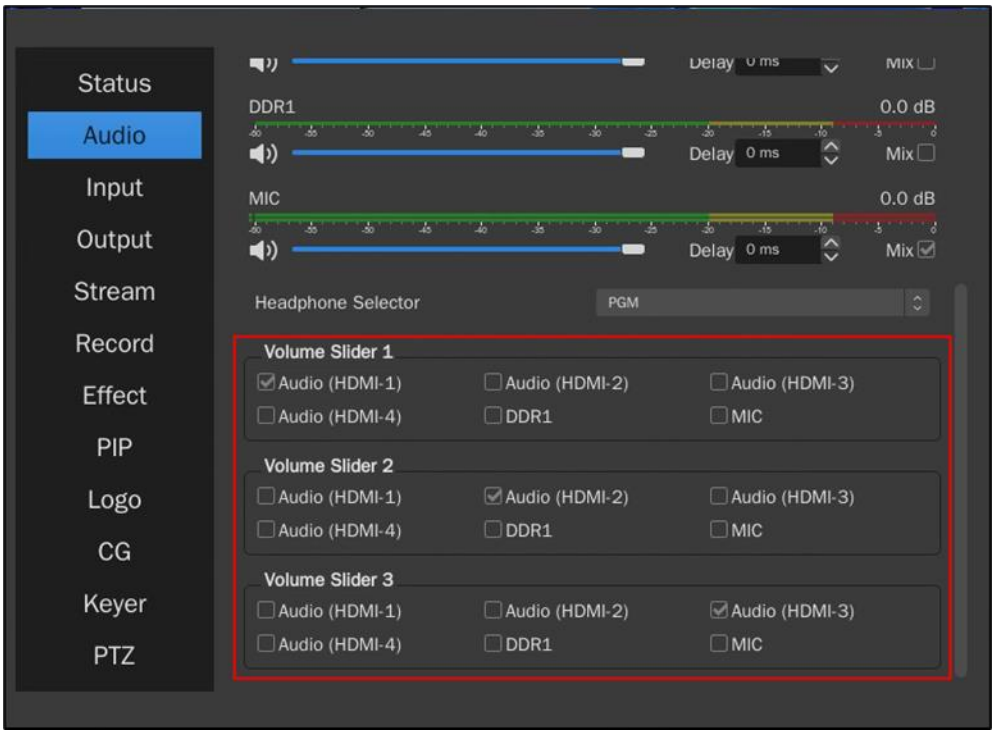
Use △▽◁▷ direction, **Enter**, and **Back** keys to move, select, and return for menu settings in audio function.



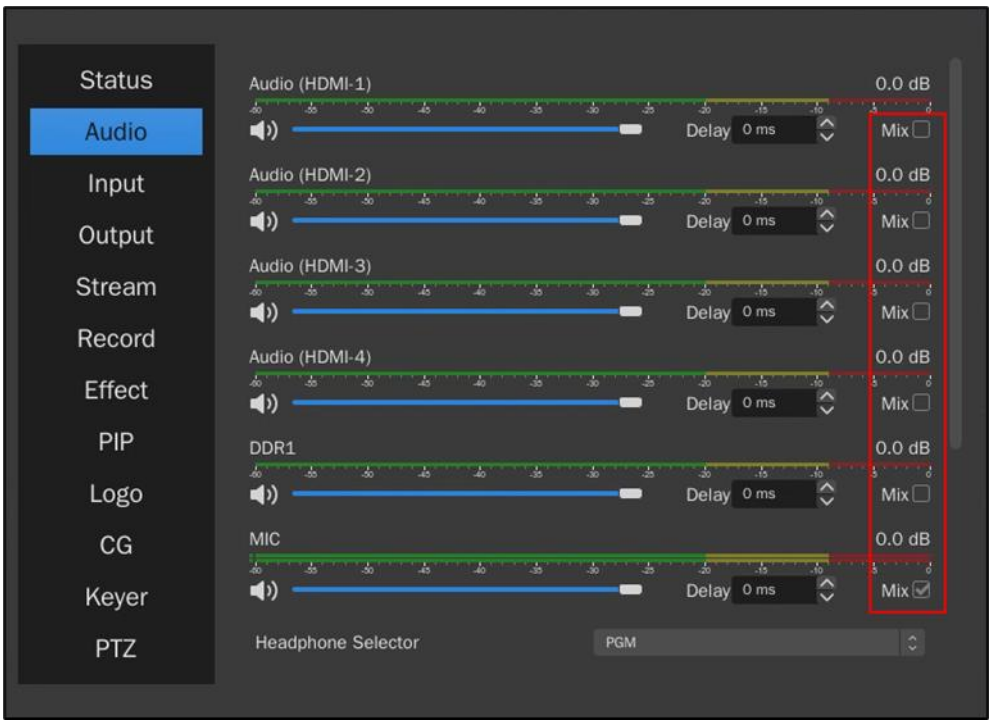
Audio Options(2-1)



Audio Options(2-2)



Audio Slider Settings

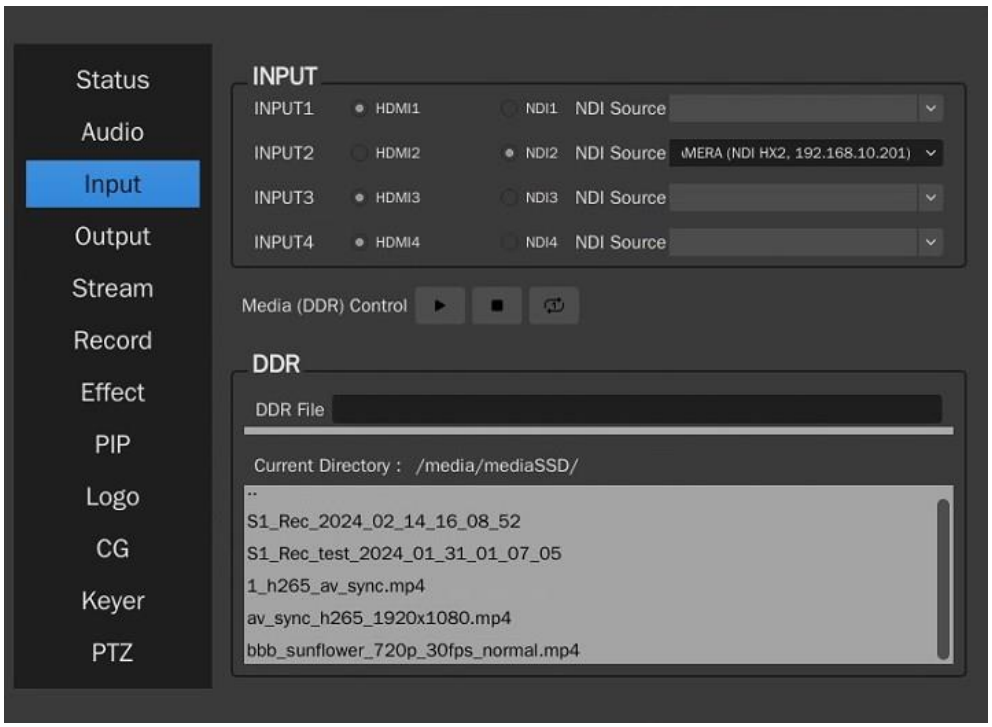

Status
Audio
Input
Output
Stream
Record
Effect
PIP
Logo
CG
Keyer
PTZ
Audio (HDMI-1)
0.0 dB
Delay 0 ms
Mix
Audio (HDMI-2)
0.0 dB
Delay 0 ms
Mix
Audio (HDMI-3)
0.0 dB
Delay 0 ms
Mix
Audio (HDMI-4)
0.0 dB
Delay 0 ms
Mix
DDR1
0.0 dB
Delay 0 ms
Mix
MIC
0.0 dB
Delay 0 ms
Mix
Headphone Selector
PGM


Headphone Selector
PGM

3.3 Input Function

The **Input Function** defines the video input sources (HDMI or NDI based, and which device in NDI network domain) and video file in DDR media for playback. After the association of video input channel and video input source is established in this function, the rest functions in menu will be able to use video input source in accordance with this association. The media player feature supports video file play, pause, loop, and stop operation in DDR device. The following table lists all the functions and their settings displayed in **Input Function**.

Function	Sub-Function	Value
INPUT1	HDMI1	Select either HDMI1 or NDI1 as input.
	NDI1	
	NDI Source	Select one connected NDI device as source when NDI1 is selected
INPUT2	HDMI2	Select either HDMI2 or NDI2 as input.
	NDI2	
	NDI Source	Select one connected NDI device as source when NDI2 is selected
INPUT3	HDMI3	Select either HDMI3 or NDI3 as input.
	NDI3	
	NDI Source	Select one connected NDI device as source when NDI3 is selected
INPUT4	HDMI4	Select either HDMI4 or NDI4 as input.
	NDI4	
	NDI Source	Select one connected NDI device as source when NDI4 is selected
Media (DDR) Control		Play/Pause, Stop, Loop (single file loop) (Use **Enter** key to activate/toggle selection)
DDR	File	Display video filename with full path
	Current Directory	Display current directory in DDR file browser
	DDR File Browser	Display sub-directories and video files with: • AVI/FLV/MKV/MOV/MP4 extension • H.265/H.264/VP8/VP9 codec • YUV420-8bit/YUV420-10bit sampling (Use △▽ direction, and **Enter** keys for selection)


Status
Audio
Input
Output
Stream
Record
Effect
PIP
Logo
CG
Keyer
PTZ
INPUT
INPUT1 HDMI1 NDI1 NDI Source
INPUT2 HDMI2 NDI2 NDI Source MERA (NDI HX2, 192.168.10.201)
INPUT3 HDMI3 NDI3 NDI Source
INPUT4 HDMI4 NDI4 NDI Source
Media (DDR) Control
DDR
DDR File
Current Directory : /media/mediaSSD/
..
S1_Rec_2024_02_14_16_08_52
S1_Rec_test_2024_01_31_01_07_05
1_h265_av_sync.mp4
av_sync_h265_1920x1080.mp4
bbb_sunflower_720p_30fps_normal.mp4

3.4 Output Function

The **Output Function** defines video resolution, frame rate, orientation, cropping, and rotation for the video input sources when applying the related processing functions over them, as well as the final video resolution in output.

The video input sources are processed first in **Base** canvas for any pre-processing before **Output** (in program (**PGM**) channel and network streaming port). The video input sources can be in resolutions different from **Base** canvas and the required scaling will be automatically applied to input sources in accordance with **Base** canvas resolution.

The video **Output (Scaled) Resolution** can be in different resolution from Base (Canvas) Resolution but it is preferred to set these two functions into same resolution for optimized system performance concern.

Both **Landscape** and **Portrai**t modes of canvas orientation are supported and can be selected in **Canvas Orientation** function. Refer to 5.6 Achieve Horizontal and Vertical Screen Switching for details.

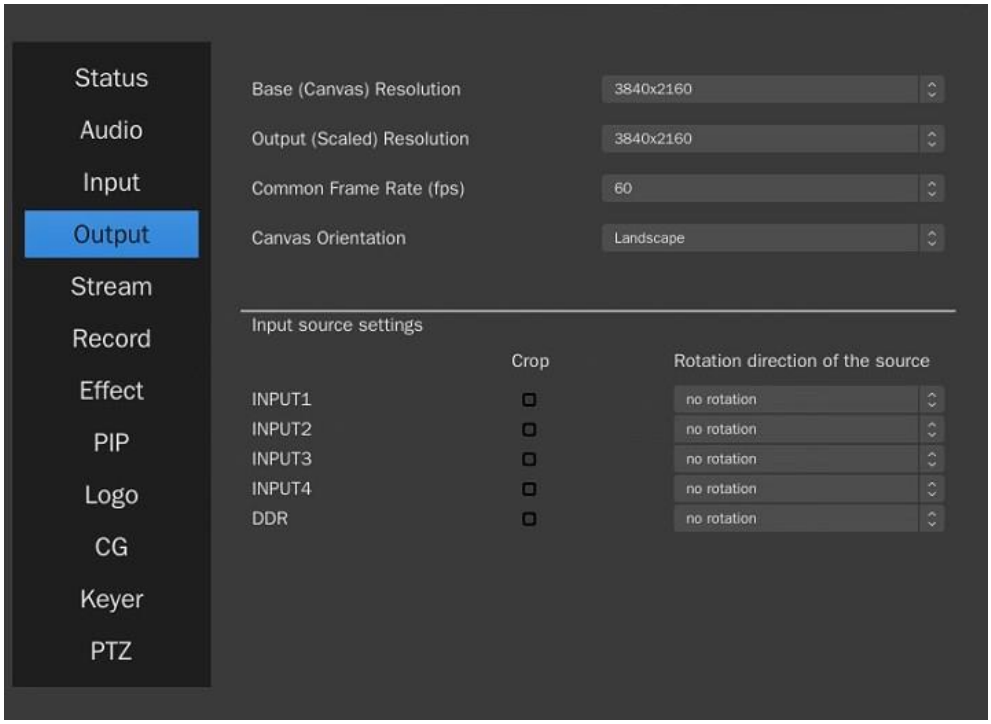
The cropping operation to video input sources can be applied when **Crop** option is selected. Depending on orientation and resolution defined in **Base** canvas, the cropping effects to video input sources may exhibit different results when **Base** canvas and input video sources are different in resolution and orientation.

The counterclockwise or clockwise rotation function is supported for video input sources in **Rotation Direction** selection, in addition to no rotation option.

Refer to 5.7 Settings to Rotate and Crop Signal Sources for details over cropping and rotation.

The following table lists all the functions and their settings displayed in **Output Function**.

Function	Sub-Function	Value
Base (Canvas) Resolution		3840x2160, 1920x1080, 1280x720 for landscape 2160x3840, 1080x1920, 720x1280 for portrait default is 1920x1080, or 1080x1920
Output (Scaled) Resolution		3840x2160, 1920x1080, 1280x720 for landscape 2160x3840, 1080x1920, 720x1280 for portrait default is 1920x1080, or 1080x1920
Common Frame Rate (fps)		25, 29.97, 30, 50, 59.94, 60
Canvas Orientation		Landscape or Portrait
INPUT1 (Input Source 1)	Crop	Video cropping is applied to input source
	Rotation Direction	Counterclockwise, clockwise, or no rotation (default is no rotation)
INPUT2 (Input Source 2)	Crop	Video cropping is applied to input source
	Rotation Direction	Counterclockwise, clockwise, or no rotation (default is no rotation)
INPUT3 (Input Source 3)	Crop	Video cropping is applied to input source
	Rotation Direction	Counterclockwise, clockwise, or no rotation (default is no rotation)
INPUT4 (Input Source 4)	Crop	Video cropping is applied to input source
	Rotation Direction	Counterclockwise, clockwise, or no rotation (default is no rotation)
DDR	Crop	Video cropping is applied to input source


Status
Audio
Input
Output
Stream
Record
Effect
PIP
Logo
CG
Keyer
PTZ
Base (Canvas) Resolution
3840x2160
Output (Scaled) Resolution
3840x2160
Common Frame Rate (fps)
60
Canvas Orientation
Landscape
Input source settings
Crop
Rotation direction of the source
INPUT1
INPUT2
INPUT3
INPUT4
DDR
no rotation
no rotation
no rotation
no rotation
no rotation

3.5 Stream Function

The **Stream Function** defines parameters for video codec and stream including:

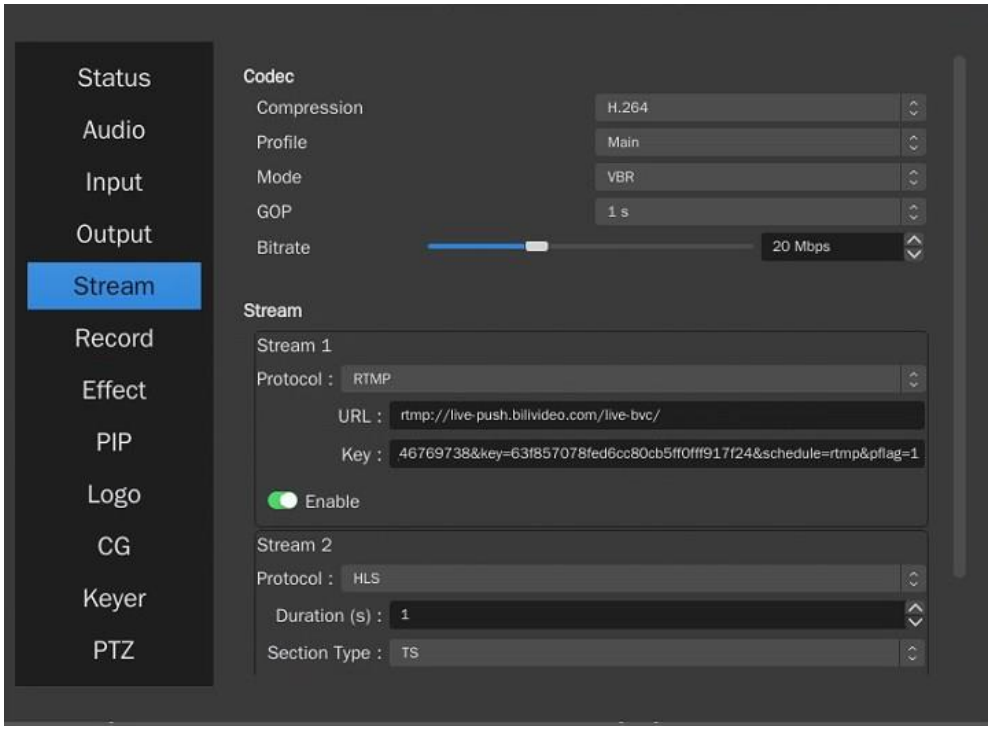
- Codec setting
  - Compression setting (HEVC, or H.264)
  - Profile setting
  - Mode setting (constant bit rate (CBR), or variable bit rate (VBR))
  - Group-of-Picture (GOP) setting (1, 2, 3, 4, or 5-sec)
  - Bit rate setting (up to 60Mbps)
- Stream setting
  - Protocol setting (RTMP, HLS, RTP, UDP, and SRT)
  - Protocol dependent setting
  - Enable setting

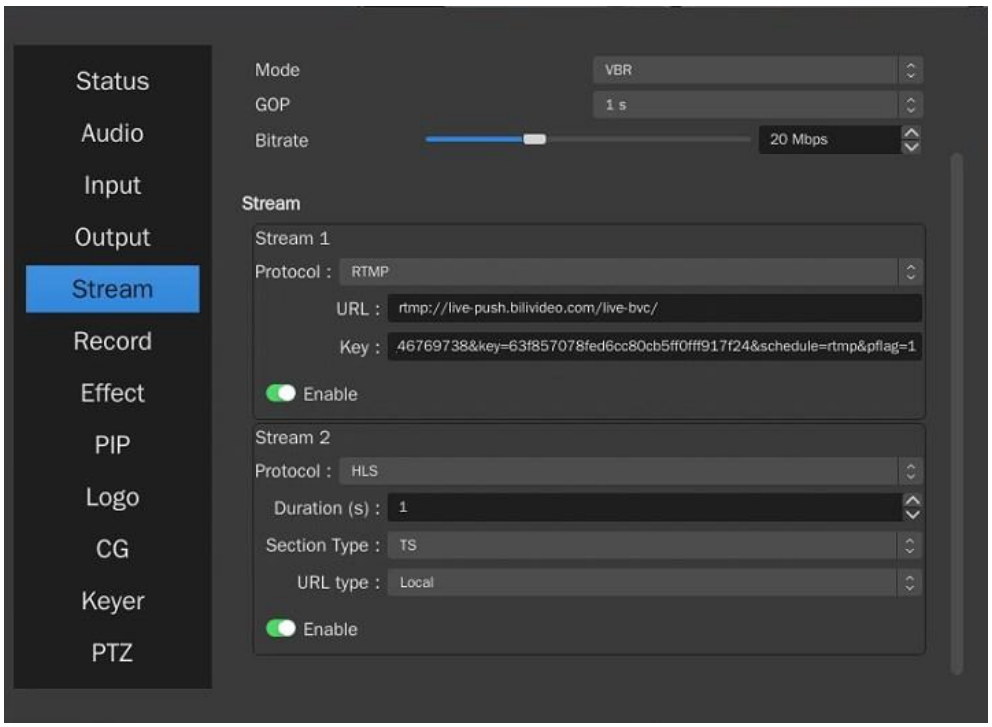
  Up to two streams can be enabled simultaneously.

The following table lists all the functions and their settings displayed in **Stream Function**.

Function	Sub-Function	Value or State	Default
Codec	Compression	HEVC/H.265	HEVC/H.265
		H.264	
	Profile	HEVC/H/265: Main	Main
		H.264: Baseline, Main, High	
	Mode	Variable bitrate (VBR)	VBR
		Constant bitrate (CBR)	
	Group-of-Picture (GOP)	1/2/3/4/5-second	1-second
	Bitrate	4K: 1~60Mbps 1080P: 1~32Mbps 720P: 1~20Mbps (Use △▽ key for adjustment)	8Mbps
Stream1	HLS	Duration	
		Section Type	
		URL Type: Local, Server	
		URL	
	RTMP	URL address	
		Key	
	RTP	IP address	
		Port	
		Video Packet ID (PID)	
		Audio Packet ID (PID)	
	SRT	URL address	

	UDP	IP address	
		Port	
		Video Packet ID (PID)	
		Audio Packet ID (PID)	
	Enable		
Stream2	HLS	Duration	
		Section Type	
		URL Type: Local, Server	
		URL	
	RTMP	URL address	
		Key	
	RTP	IP address	
		Port	
		Video Packet ID (PID)	
		Audio Packet ID (PID)	
	SRT	URL address	
	UDP	IP address	
		Port	
		Video Packet ID (PID)	
		Audio Packet ID (PID)	
	Enable		




Status
Audio
Input
Output
Stream
Record
Effect
PIP
Logo
CG
Keyer
PTZ
Mode
VBR
GOP
1 s
Bitrate
20 Mbps
Stream
Stream 1
Protocol :
RTMP
URL :
rtmp://live-push.bilivideo.com/live-bvc/
Key :
46769738&key=63f857078fed6cc80cb5ff0fff917f24&schedule=rtmp&pflag=1
Enable
Stream 2
Protocol :
HLS
Duration (s) :
1
Section Type :
TS
URL type :
Local
Enable

3.6 Record Function

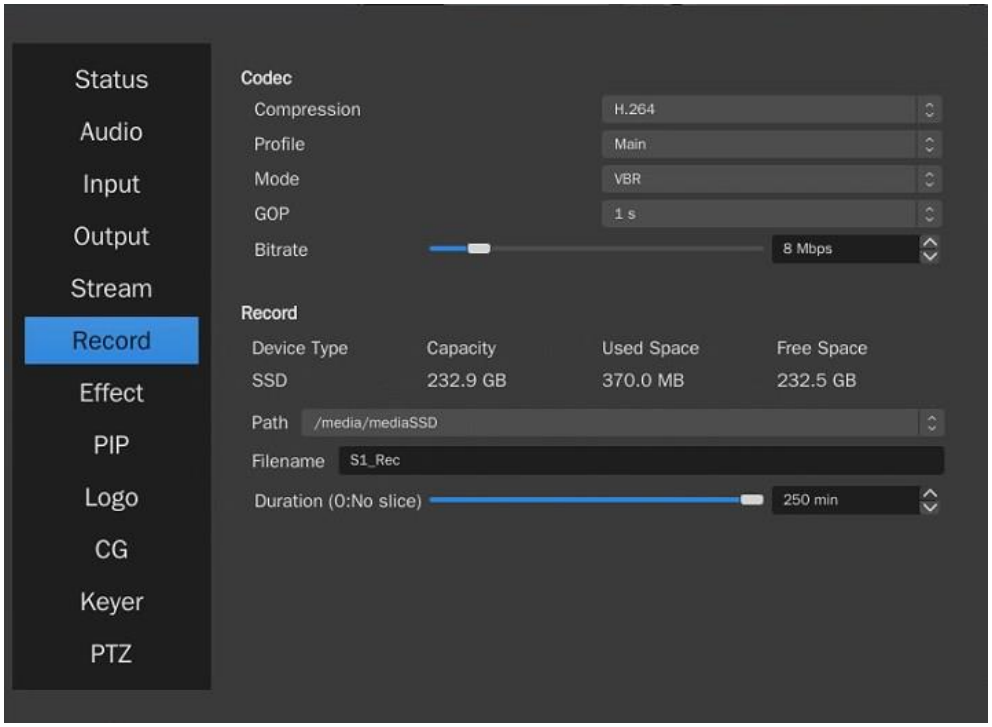
The **Record Function** defines and displays parameters for video codec and media information in recording including:

- Codec setting
  - Compression setting (HEVC, or H.264)
  - Profile setting
  - Mode setting (constant bit rate (CBR), or variable bit rate (VBR))
  - Group-of-Picture (GOP) setting (1, 2, 3, 4, or 5-sec)
  - Bitrate setting (up to 60Mbps)
- Record setting
  - Device Type, Capacity, Used Space, and Free Space for recording media
  - USB Path info for the selected directory (note that only 1 partition info will be display, therefore, it is preferred to format record media with 1 partition only)
  - Filename for record (the complete filename will be Filename_YYYY_DD_HH_MM_SS.mp4)
  - Duration time for recording file(s)

The following table lists all the functions and their settings displayed in **Record Function**.

Function	Sub-Function	Value	Default
Codec	Compression	HEVC/H.265	HEVC/H.265
		H.264	
	Profile	HEVC/H/265: Main	Main
		H.264: Baseline, Main, High	
	Mode	Variable bitrate (VBR)	VBR
		Constant bitrate (CBR)	
	Group-of-Picture (GOP)	1/2/3/4/5-second	1-second
	Bitrate	4K: 1~60Mbps 1080P: 1~32Mbps 720P: 1~20Mbps (Use △▽ key for adjustment)	8Mbps

Record	Record Type	USB (SSD option will be activated when available)
	Capacity	(According to record media)
	Used Space	(According to record media)
	Free Space	(According to record media)
	Path	(According to record media)
	Filename	Final saved filename in media will be: Filename_YYYY_DD_HH_MM_SS.mp4
	Duration	Record time in minute (“0” means continuous recording without split)



3.7 Effect Function

The **Effect Function** defines transition speed and the association of **EFFECT A/B/C** keys in panel with transition effects and provides preview window for the selected transition. The transition effects can be applied when switching the existing program channel (**PGM**) to the selected preview (**PVW)** channel, and the video contents in these two channels will be swapped.

The **Auto** key and transition lever are used to control the execution of transition effects. Do not leave transition level in the middle position when performing transition and it is fully pushed.

There are 36 visual transition effects supported including:

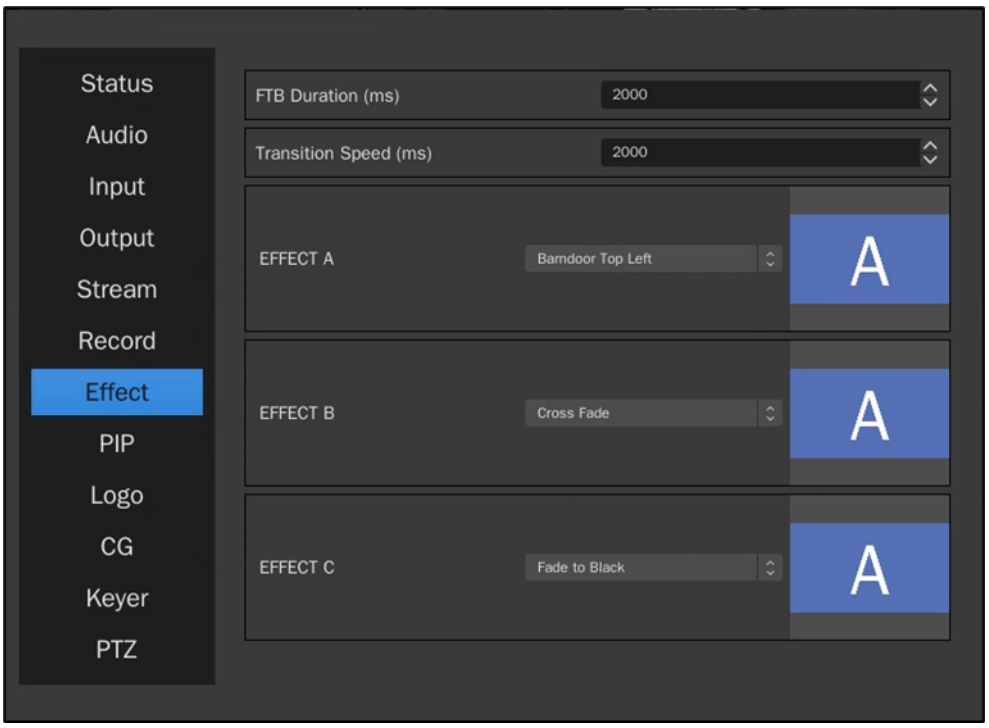
- Bamdoor Bottom Left
- Bamdoor Horizontal
- Bamdoor Top Left
- Bamdoor Vertical
- Blinds Horizontal
- Box Bottom Left
- Box Bottom Right
- Box Top Left
- Box Top Right
- Burst
- Checkerboard Small
- Circles
- Clock
- Cloud
- Curtain
- Cross Fade
- Fade to Black
- Fan
- Fractal
- Iris
- Linear Horizontal
- Linear Top Left
- Linear Top Right
- Linear Vertical
- Parallel Zigzag Horizontal
- Parallel Zigzag Vertical
- Sinus 9
- Spiral

- Square
- Squares
- Stripes
- Stripes Horizontal
- Stripes Vertical
- Watercolor
- Zigzag Horizontal
- Zigzag Vertical

The visual effects for the selected transitions will be displayed in preview windows with two frames (A and B) used to simulate transition process.

The following table lists all the functions and their settings displayed in **Effect Function**.

Function	Sub-Function	Value	Default
Effect	FTB Duration	50~10000ms	2000ms
	Transition Speed	50~20000ms	2000ms
	EFFECT A Key	(Select one effect)	Bamdoor Top Left
		Preview window	
	EFFECT B Key	(Select one effect)	Checkerboard Small
		Preview window	
	EFFECT C Key	(Select one effect)	Zigzag Horizontal
		Preview window	

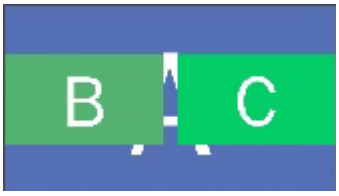


The **FTB** button will fade the whole program video output to black at the rate specified in the fade to black RATE window. Once the program output has been faded to black, the **FTB** button will flash croci until it is pressed again. Doing so will fade up from black at the same rate, or you can enter a new rate in the fade to black palette in the ‘switcher’ window. Fade to black is mostly used at the start and end of your production, or when cutting to commercial breaks.

3.8 PIP Function

The **PIP (Picture-in-Picture) Function** associates **PIP1** and **PIP2** keys in panel with selected video sources, picture-in-picture types, positions, and sizes for overlapping with program (**PGM**) channel.

There are 12 types of picture-in-picture supported with each type supports up to 5 scenes (A/B/C/D/E) for overlapping. Each scene contains a selected video source, positions (X and Y-axis), and size of the selected video source. The following table lists all the picture-in-picture types supported and the scene layout for each type.

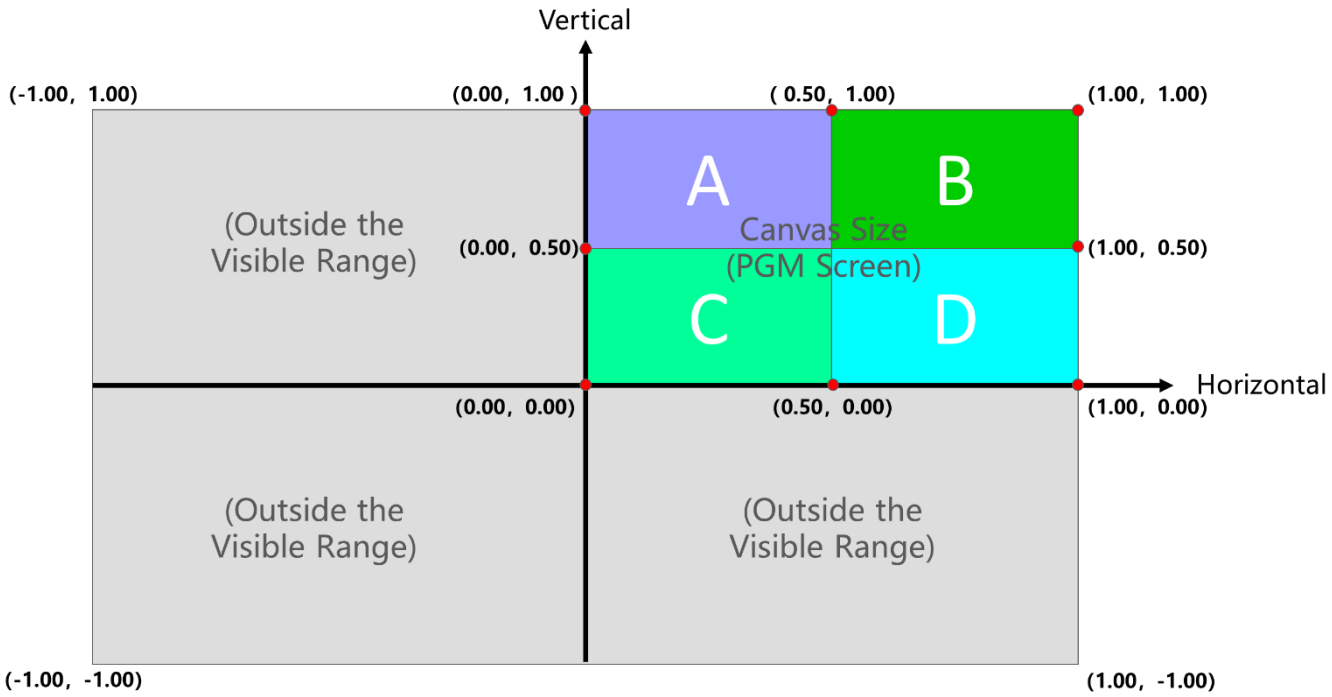
Type	Scene Layout	Input Source to Screen
1		Scene A: Video Input Selection1
		Scene B: Video Input Selection2
2		Scene A: Video Input Selection1
		Scene B: Video Input Selection2
3		Scene A: Video Input Selection1
		Scene B: Video Input Selection2
		Scene C: Video Input Selection3
4		Scene A: Video Input Selection1
		Scene B: Video Input Selection2
		Scene C: Video Input Selection3
5		Scene A: Video Input Selection1
		Scene B: Video Input Selection2
		Scene C: Video Input Selection3
6		Scene A: Video Input Selection1
		Scene B: Video Input Selection2
		Scene C: Video Input Selection3
		Scene D: Video Input Selection4
7		Scene A: Video Input Selection1
		Scene B: Video Input Selection2
		Scene C: Video Input Selection3
		Scene D: Video Input Selection4

8		Scene A: Video Input Selection1 Scene B: Video Input Selection2 Scene C: Video Input Selection3 Scene D: Video Input Selection4
9		Scene A: Video Input Selection1 Scene B: Video Input Selection2 Scene C: Video Input Selection3 Scene D: Video Input Selection4
10		Scene A: Video Input Selection1 Scene B: Video Input Selection2 Scene C: Video Input Selection3 Scene D: Video Input Selection4 Scene E: DDR Video/Audio5
11		Scene A: Video Input Selection1 Scene B: Video Input Selection2 Scene C: Video Input Selection3 Scene D: Video Input Selection4 Scene E: DDR Video/Audio5
12		Scene A: Video Input Selection1 Scene B: Video Input Selection2 Scene C: Video Input Selection3 Scene D: Video Input Selection4 Scene E: DDR Video/Audio5

The positions and size of each scene in picture-in-picture are defined by:

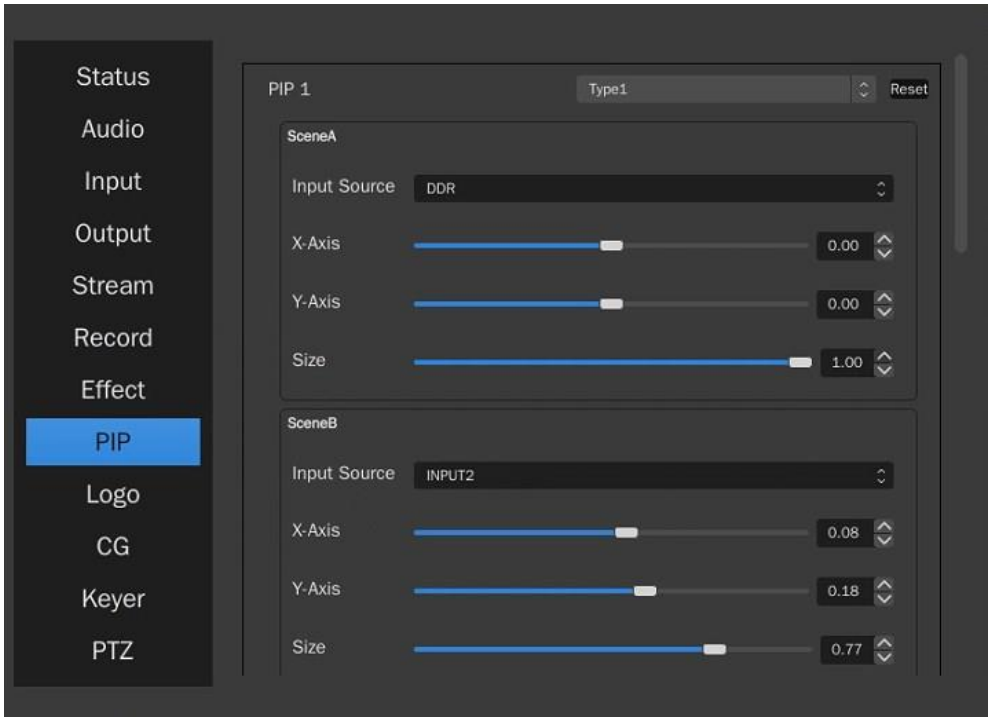
- X-axis value in range [-1.00, 1.00]
- Y-axis value in range [-1.00, 1.00]
- Size value in range [0.00, 1.00]

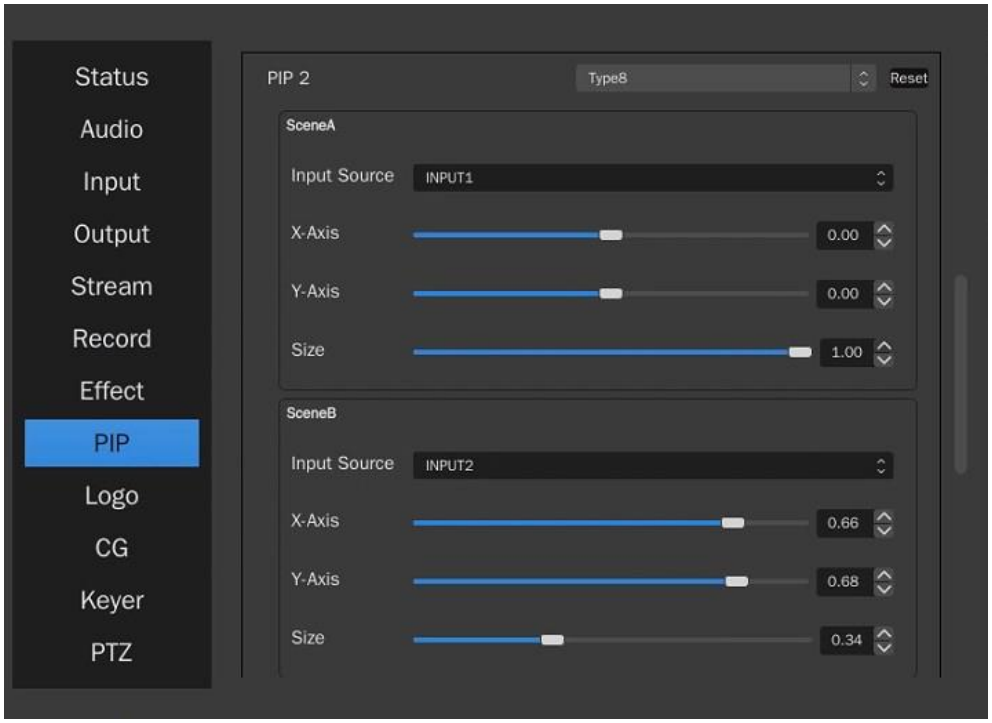
as figure shown below. Note that only scenes with [X, Y] position in between [0.00, 0.00] and [1.00, 1.00] are visible to progame (PGM) canvas.



The following table lists all the functions and their settings displayed in **PIP Function**.

Function	Sub-Function	Value	Default
PIP 1	Type	Type1 ~ Type12	Type7
	SceneA Input Source	INPUT1/2/3/4, DDR, Preview, Program	(None)
	SceneA X-Axis	[-1.00, 1.00]	(None)
	SceneA Y-Axis	[-1.00, 1.00]	(None)
	SceneA Size	[0.00, 1.00]	(None)
	(Expand to include SceneB, SceneC, SceneD, and SceneE according to Type selection)		
PIP 2	Type	Type1 ~ Type12	Type8
	SceneA Input Source	INPUT1/2/3/4, DDR, Preview, Program	(None)
	SceneA X-Axis	[-1.00, 1.00]	(None)
	SceneA Y-Axis	[-1.00, 1.00]	(None)
	SceneA Size	[0.00, 1.00]	(None)
	(Expand to include SceneB, SceneC, SceneD, and SceneE according to Type selection)		


Status
Audio
Input
Output
Stream
Record
Effect
PIP
Logo
CG
Keyer
PTZ
PIP 1
Type1
Reset
SceneA
Input Source
DDR
X-Axis
0.00
Y-Axis
0.00
Size
1.00
SceneB
Input Source
INPUT2
X-Axis
0.08
Y-Axis
0.18
Size
0.77


Status
Audio
Input
Output
Stream
Record
Effect
PIP
Logo
CG
Keyer
PTZ
PIP 2
Type8
Reset
SceneA
Input Source
INPUT1
X-Axis
0.00
Y-Axis
0.00
Size
1.00
SceneB
Input Source
INPUT2
X-Axis
0.66
Y-Axis
0.68
Size
0.34

3.9 Logo Function

The **Logo Function** selects image file uploaded by web-based graphic user interface (WebGUI) and defines position (X and Y-axis) in accordance with **Base (Canvas) Resolution**, with the support of applying **Keyer** function.

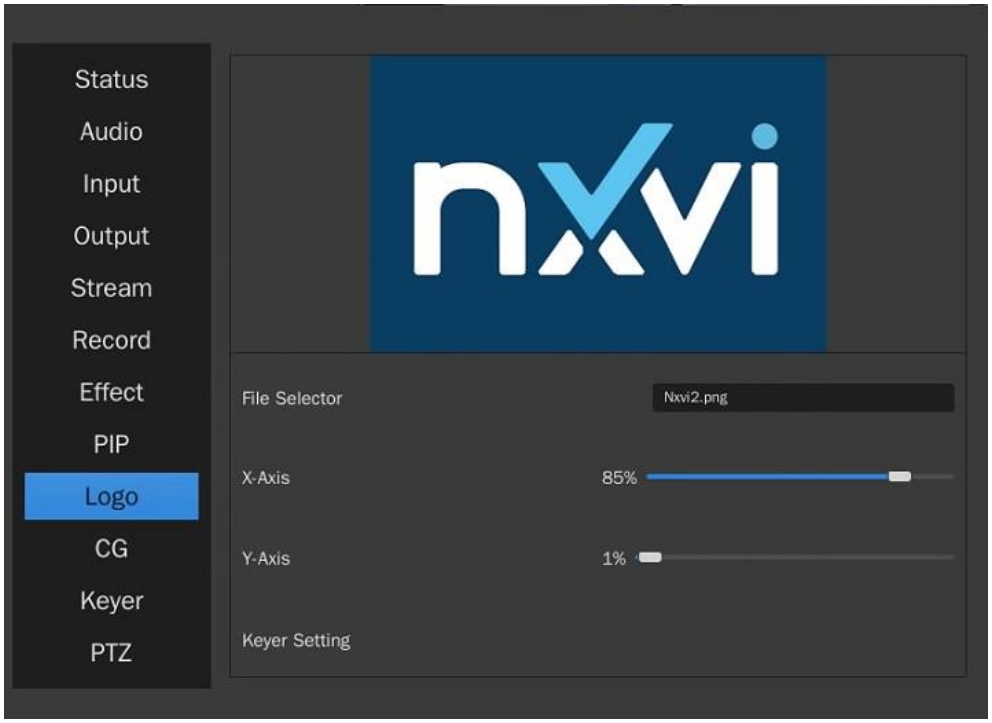
The WebGUI supports more than one image files uploaded into system and Logo function can browse them and select one for applying. Refer to 4.8 Logo for details in WebGUI setting.

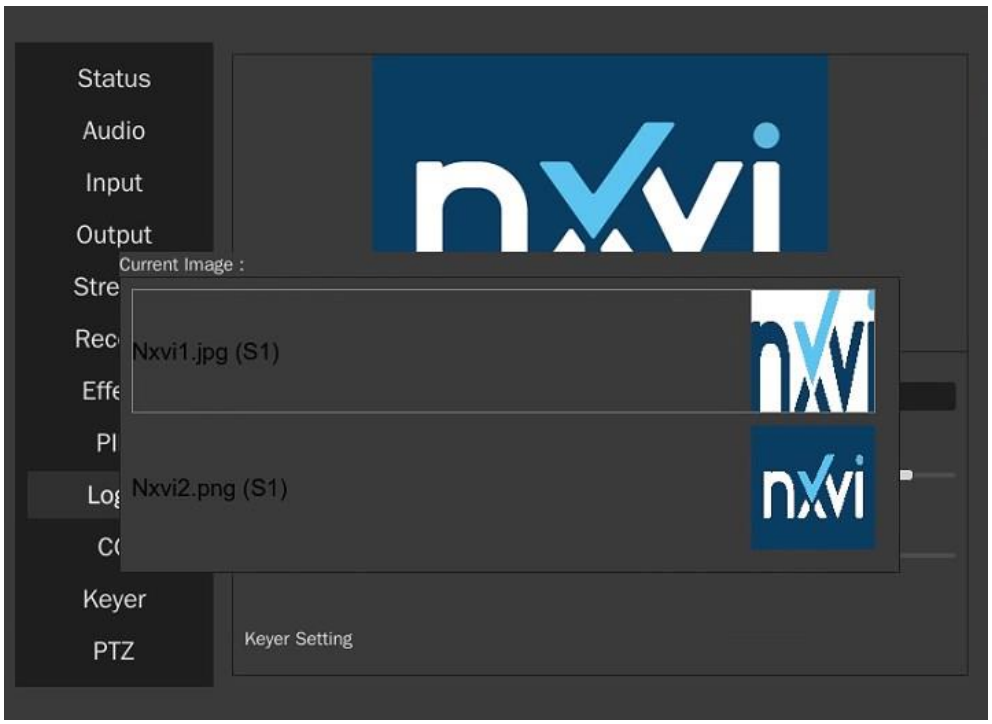
The position (X and Y-axis) of **Logo** image file is defined by setting coordinate origin [0, 0] at top left corner with the range in complying with **Base (Canvas) Resolution**. For instance, assuming **Base (Canvas) Resolution** is setting into 1080, then Y-axis will be in range [0, 1080] with single pixel granularity.

The **Keyer** function can be applied to **Logo** image file by pressing **Enter** key in menu selection and the **Keyer** function window will be displayed accordingly for setting. Refer to 3.11 Keyer Function for details.

The following table lists all the functions and their settings displayed in **Logo Function**.

Function	Sub-Function	Value	Default
Logo	File Selector	(None)	(None)
	X-Axis	Range in accordance with **Base Resolution**	(None)
	Y-Axis		(None)
	Keyer Setting	(Pressing **Enter** key for applying)	(None)




Status
Audio
Input
Output
Current Image :
Nxvi1.jpg (S1)
Nxvi2.png (S1)
Keyer
PTZ
Keyer Setting

3.10 CG Function

The **CG (Computer Graphic) Function** supports two types of format:

- Subtitle
- Graphic

for subtitle processing in program (**PGM**) channel. There are 2 **CG** windows (**CG1/CG2**) in multiview (**MV**) interface screen for preview, as figure shown below.

Text is input by web-based graphic user interface (WebGUI) and will be displayed at **CG** function window in menu when selected. Picture is selected at **CG** function window in menu from image file(s) uploaded in WebGUI with the support of applying **Keyer** function over the selected picture file.

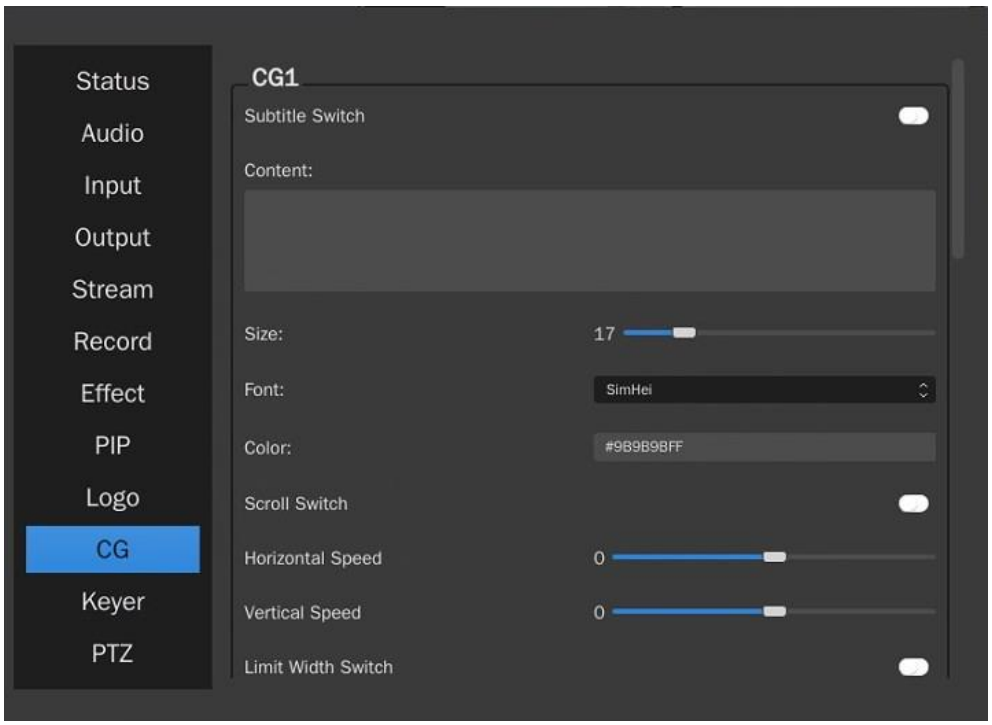
Text is controlled with settings of enabling, content preview, size, font, color, scrolling and speed in horizontal and vertical, scrolling boundary control and width, and starting position (X and Y-axis) in accordance with **Base (Canvas) Resolution**.

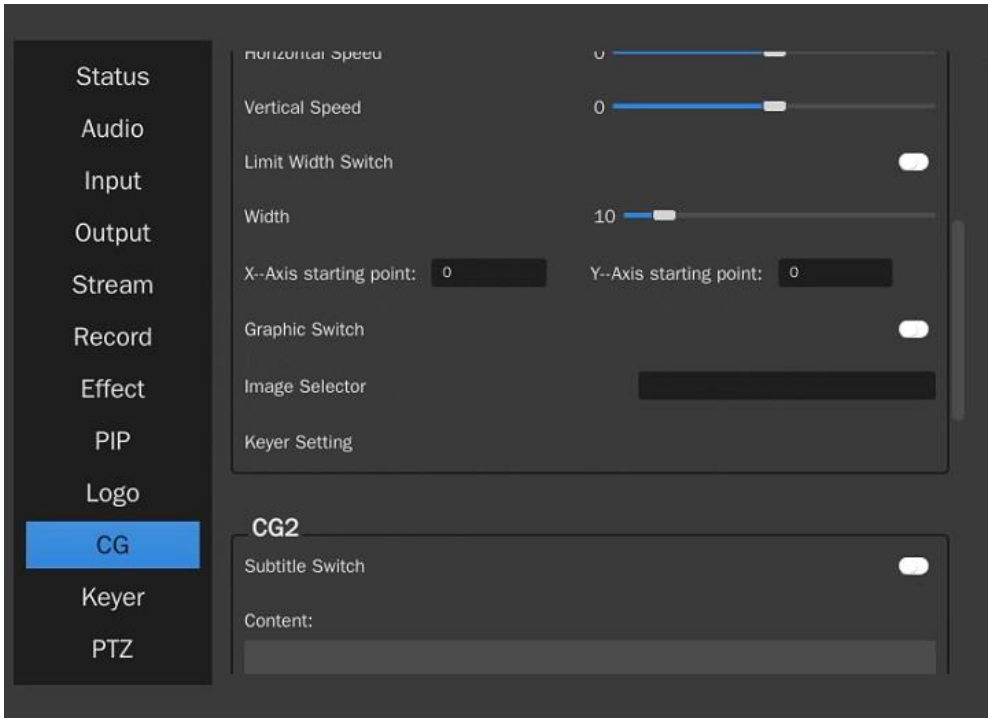
Picture is controlled with settings of enabling, and file selection.

The following table lists all the functions and their settings displayed in **CG Function**.

Function	Sub-Function	Value	Default
CG1	Subtitle Switch	Enable/Disable subtitle	Disable
	Content Preview	(Input by WebGUI)	(None)
	Size	1~100	16
	Font	Arial, Blackadder, Brushsci, Calibri, Vineritc, SimSun, SimHei, KaiTi, Caiyun, Hupo, XingKai	SimHei
	Color	RGBA in hexadecimal (Color palette available in WebGUI)	#9B9B9FFF (Grey)
	Scroll Switch	Enable/Disable scroll	Disable
	Horizontal Speed	-100 ~ 100 (Positive value for scrolling from right to left)	0
	Vertical Speed	-100 ~ 100 (Positive value for scrolling from bottom to top)	0
	Limit Width Switch	Enable/Disable scroll boundary limit width	Disable
	Width	0 ~ 100 (100 for entire screen)	10
	X-Axis Starting Point	Range in accordance with **Base Resolution** (Ex. [0, 0], [1920, 0], [1920, 1080], [0, 1080] for 4 corners in 1080 resolution)	[0, 0] (Top left corner)
	Y-Axis Starting Point		
	Graphic Switch	Enable/Disable picture file	Disable
	Image Selector	(None)	(None)
	Keyer Setting	(Pressing **Enter** key for applying)	(None)

Function	Sub-Function	Value	Default
CG2	Subtitle Switch	Enable/Disable text input	Disable
	Content Preview	(Input by WebGUI)	(None)
	Size	1~100	16
	Font	Arial, Blackadder, Brushsci, Calibri, Vineritc, SimSun, SimHei, KaiTi, Caiyun, Hupo, XingKai	SimHei
	Color	RGBA in hexadecimal (Color palette available in WebGUI)	#9B9B9FFF (Grey)
	Scroll Switch	Enable/Disable scroll	Disable
	Horizontal Speed	-100 ~ 100 (Positive value for scrolling from right to left)	0
	Vertical Speed	-100 ~ 100 (Positive value for scrolling from bottom to top)	0
	Limit Width Switch	Enable/Disable scroll boundary limit width	Disable
	Width	0 ~ 100 (100 for entire screen)	10
	X-Axis Starting Point	Range in accordance with **Base Resolution** (Ex. [0, 0], [1920, 0], [1920, 1080], [0, 1080] for 4 corners in 1080 resolution)	[0, 0] (Top left corner)
	Y-Axis Starting Point		
	Graphic Switch	Enable/Disable picture file	Disable
	Image Selector	(None)	(None)
	Keyer Setting	(Pressing **Enter** key for applying)	(None)


Status
Audio
Input
Output
Stream
Record
Effect
PIP
Logo
CG
Keyer
PTZ
CG1
Subtitle Switch
Content:
Size:
17
Font:
SimHei
Color:
#9B9B9BFF
Scroll Switch
Horizontal Speed
0
Vertical Speed
0
Limit Width Switch


Status
Audio
Input
Output
Stream
Record
Effect
PIP
Logo
CG
Keyer
PTZ
Vertical Speed
0
Limit Width Switch
Width
10
X--Axis starting point:
0
Y--Axis starting point:
0
Graphic Switch
Image Selector
Keyer Setting
CG2
Subtitle Switch
Content:

3.11 Keyer Function

The **Keyer Function** provides keying operations support based on:

- Chroma Key
- Mask Key
- Luma Key

options and their individual settings for video sources mixing and compositing and applying to program (**PGM**) channel in final.

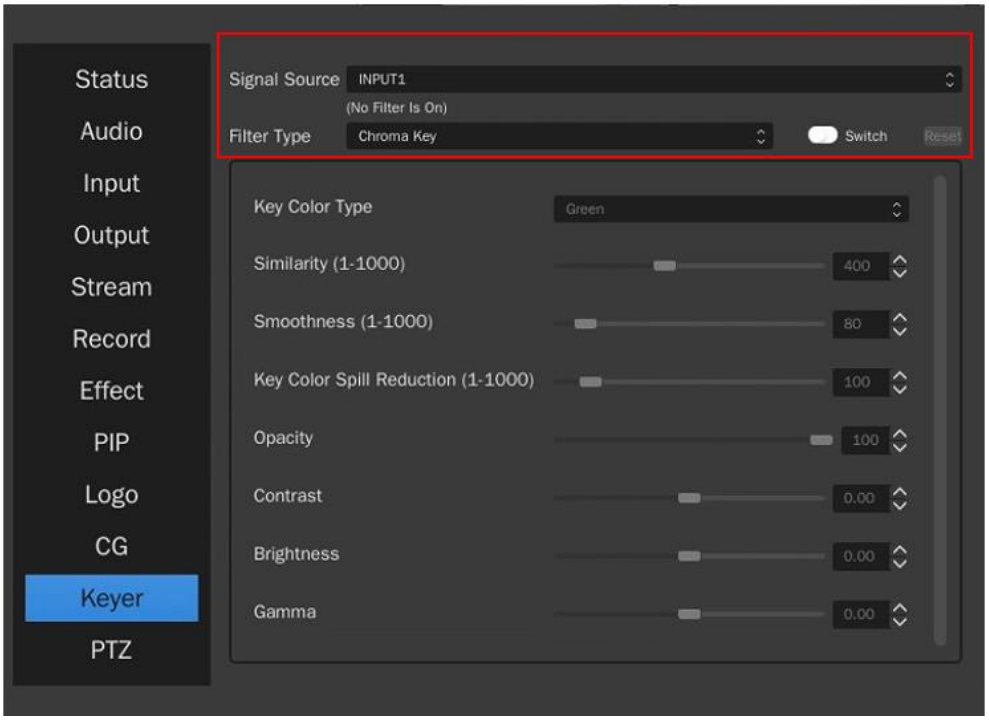
The following table lists all the functions and their settings displayed in **Keyer Function**.

Function	Sub-Function	Value	Default
Keyer	Signal Source	INPUT1/2/3/4，DDR1，Logo1，CG1，CG2	INPUT1
	Filter Type	Chroma Key, Mask Key, Luma Key	Chroma Key
	Switch	Enable/Disable	Disable
	Reset	(Pressing **Enter** key for applying)	(None)

For chroma key based filter, the following table lists all the functions and their settings in **Keyer** function.

- **Key Color Type** function sets the color to key out.
- **Similarity** function sets similarity threshold between defined color and signal source, with lower value removes fewer pixels.
- **Smoothness** function helps to smooth out edge, wrinkle, shadow, and spot in color removal, with lower value leaves hard edge around removed pixels.
- **Key Color Spill Reduction** function can be further applied to remove traces with key color spilled in signal source.
- **Opacity** function controls the opacity of signal source.
- **Contrast** function controls the contrast of signal source.
- **Brightness** function controls the brightness of signal source.
- **Gamma** function control the gamma of signal source.

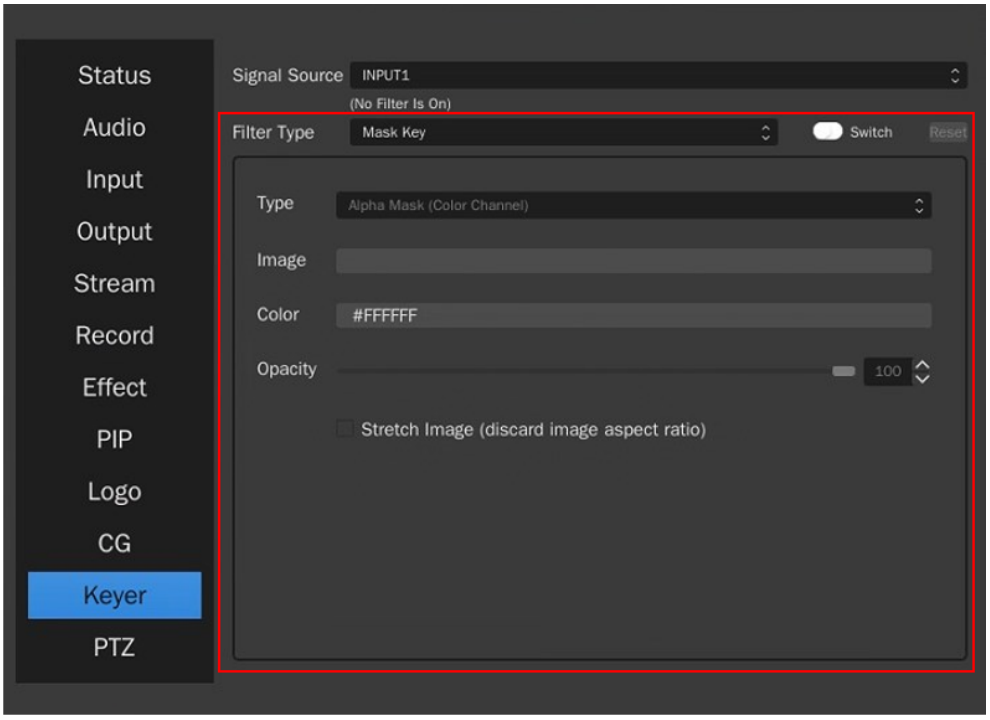
Function	Sub-Function	Value	Default
Chroma Key	Key Color Type	RGB in hexadecimal	#00FF00 (Green)
	Similarity	1~1000	400
	Smoothness	1~1000	80
	Key Color Spill Reduction	1~1000	100
	Opacity	0~100 (0 for transparent)	100
	Contrast	-1.00~ 1.00	0.00
	Brightness	-1.00~1.00	0.00
	Gamma	-1.00~1.00	0.00



For mask key based filter, the following table lists all the functions and their settings in **Keyer Function**.

- **Type** function sets the type of mask.
- **Image** function selects an image file to mask signal source.
- **Color** function sets the color used to mask signal source.
- **Opacity** function controls the opacity of signal source.
- **Stretch Image** function controls the enabling of image stretching, regardless of aspect ratio, to full size of signal source.

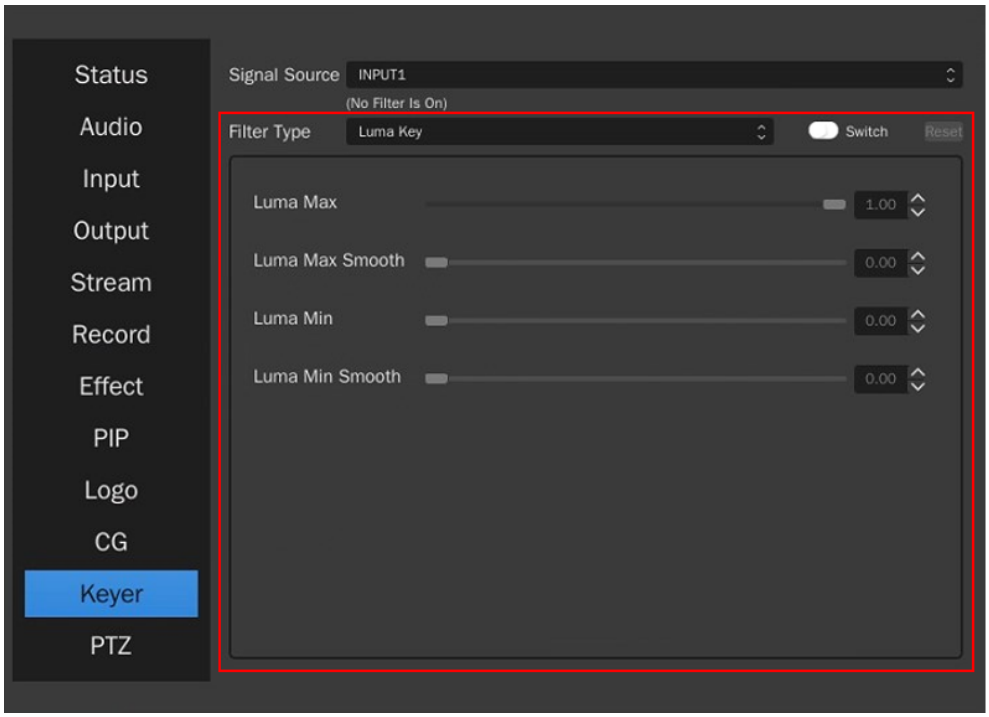
Function	Sub-Function	Value	Default
Mask Key	Type	Alpha Mask (Color Channel), Alpha Mask (Alpha Channel), Blend (Multiply), Blend (Addition), Blend (Subtraction)	Alpha Mask (Color Channel)
	Image	None	None
	Color	RGB in hexadecimal	#FFFFFF (Black)
	Opacity	0~100 (0 for transparent)	100
	Stretch Image	Enable/Disable	Disable



For luma key based filter, the following table lists all the functions and their settings in **Keyer Function**.

- **Luma Max** function sets the maximum luma value allowed in image with higher-value pixels being keyed out.
- **Luma Max Smooth** function sets smoothness of removal with lower value leaves hard edge around removed pixels.
- **Luma Min** function sets the minimum luma value allowed in image with lower-value pixels being keyed out.
- **Luma Min Smooth** function sets smoothness of removal with lower value leaves hard edge around removed pixels.

Function	Sub-Function	Value	Default
Luma Key	Luma Max	0.00~ 1.00	1.00
	Luma Max Smooth	0.00~ 1.00	0.00
	Luma Min	0.00~ 1.00	0.00
	Luma Min Smooth	0.00~ 1.00	0.00



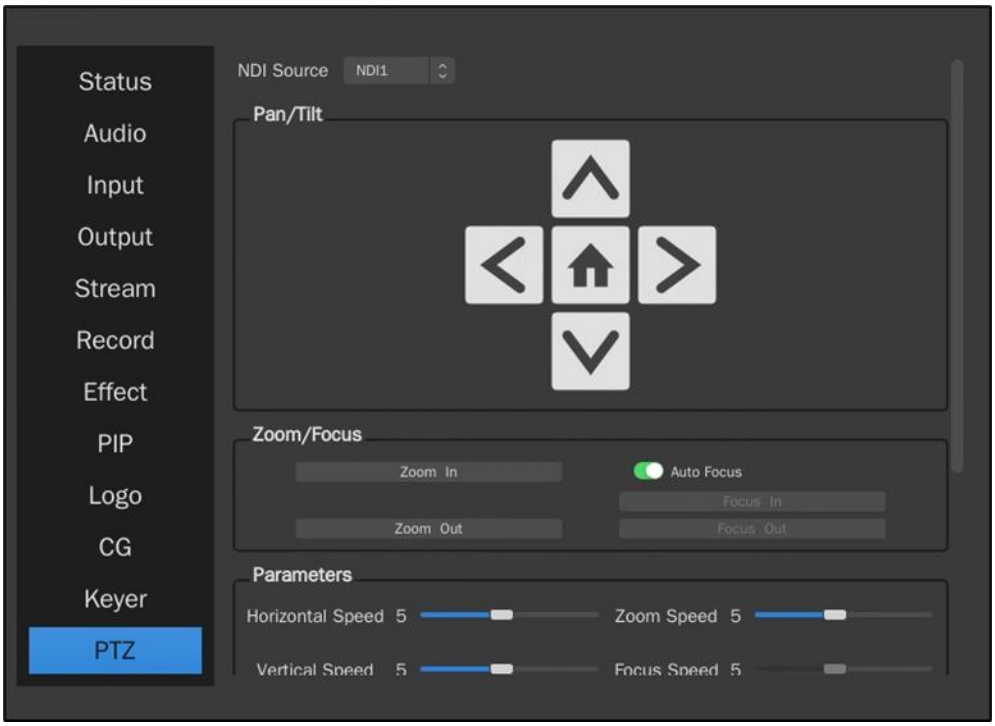
Refer to 5.8 Use Luma Key to PowerPoint File for Subtitle for an example.

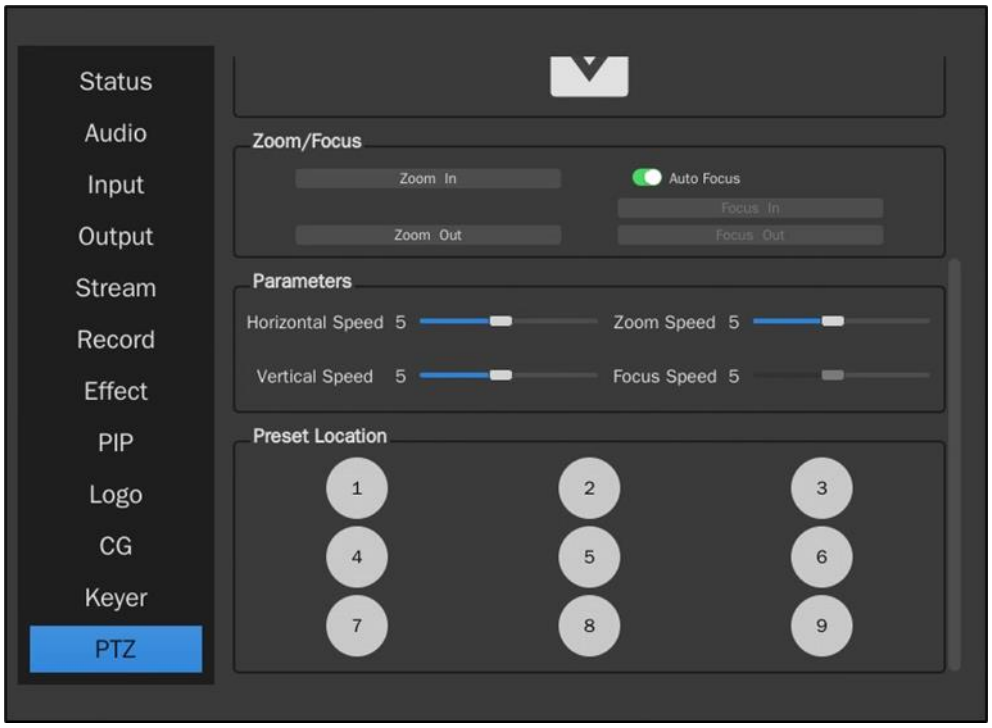
3.12 PTZ Function

The **PTZ Function** defines pan/tilt, zoom/focus, and preset location. Additionally, the zoom/focus feature allows for adjustment of focus length. The following table lists all the functions and the settings displayed in **PTZ Function**.

Note: Need to connect NDI device to enable the **PTZ Function**.

Function	Sub-Function	Value	Default
PTZ	Pan/Tilt	**Up/Down/Left/Right**: Control camera pan/tilt **Enter**: The camera returns to its original position **Back**: Exit camera pan/tilt control mode	(None)
	Zoom/Focus	Zoom In, Zoom Out, Focus In, Focus Out, Auto Focus	Auto Focus
	Parameters	Horizontal Speed: 1~10 Vertical Speed: 1~10 Zoom Speed: 1~10 Focus Speed: 1~10	Horizontal Speed: 5 Vertical Speed: 5 Zoom Speed: 5 Focus Speed: 5





Note: When the auto focus function is enabled, adjusting the focus speed is not permitted.

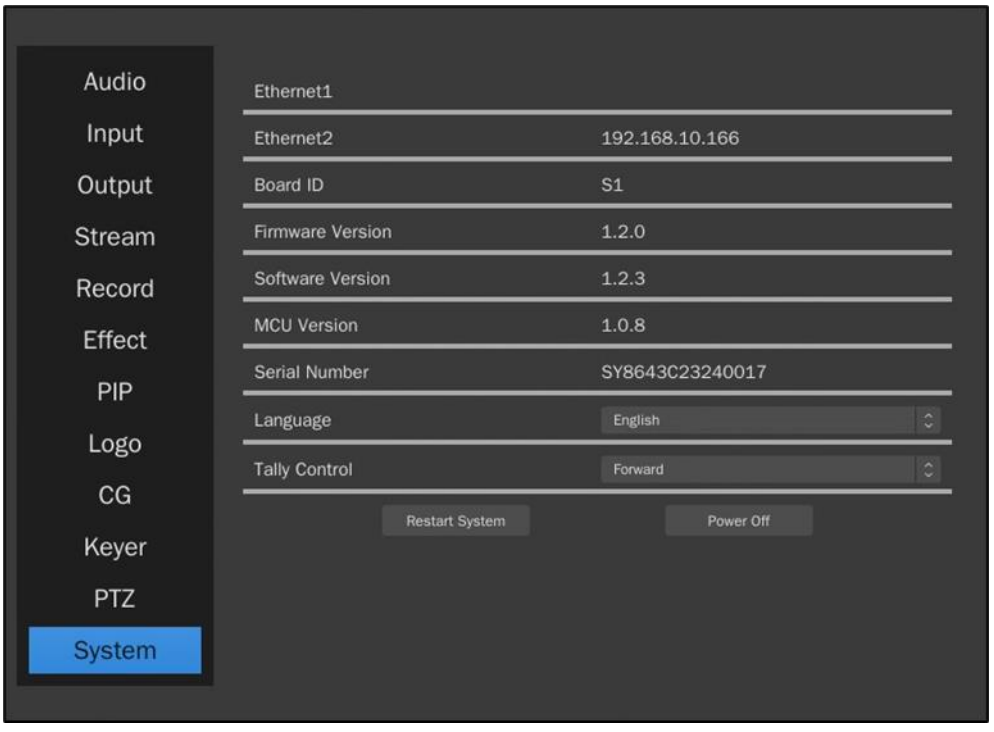
3.13 System Function

The **System Function** displays system information including:

- Ethernet1 IP address
- Ethernet2 IP address
- Board ID
- Firmware Version
- Software Version
- MCU Version
- Serial Number
- Language selection
- Tally control setting for voltage high (forward) or low (backward) in tally lights

The following table lists all the system information and selection displayed in **System Function**.

Function	Sub-Function	Value	Default
System	Ethernet1	IP address	192.168.1.10
	Ethernet2	IP address	(None)
	Board ID	Hardware board ID	(None)
	Firmware Version	Version number	(None)
	Software Version	Version number	(None)
	MCU Version	Version number	(None)
	Serial Number	System serial number	(None)
	Language	English/Simplified Chinese	English
	Tally Control	Forward/Backward	Forward

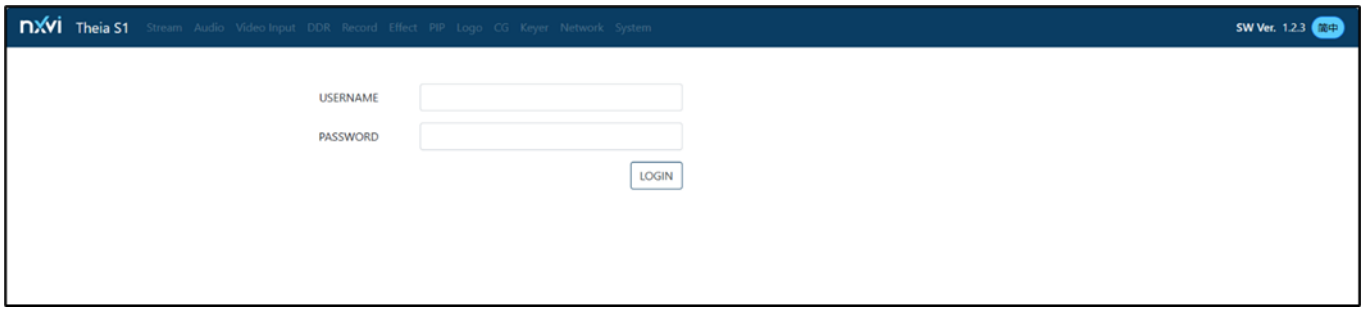


Chapter 4: Web-Based Graphical User Interface (WebGUI)

Theia S1 Live Switcher provides web-based graphic user interface (WebGUI) for external machine to perform complete system settings and monitoring. The following sections provide overview of setting defined in WebGUI.

Refer to 2.6 WebGUI Connection and Configuration for required networking configuration setting for connecting to Theia S1 Live Switcher through WebGUI.

The WebGUI login screen is shown below.

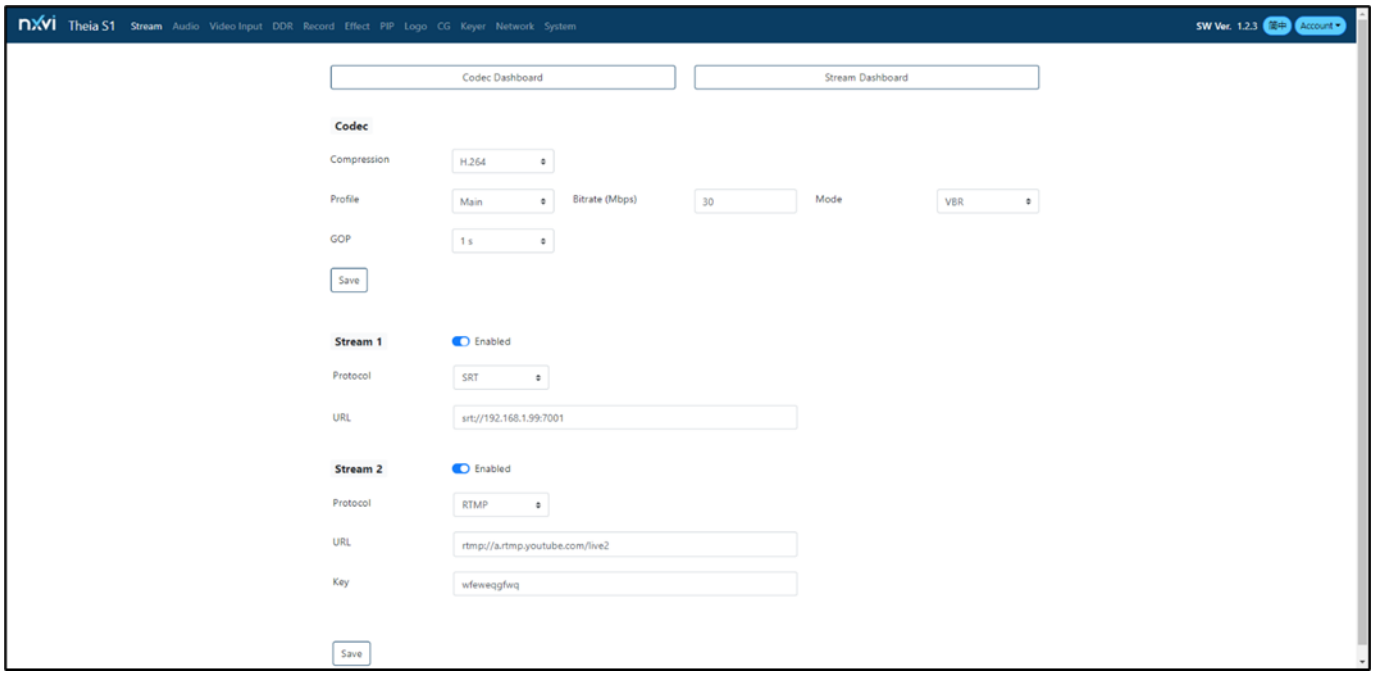


4.1 Streaming Setting

The **Stream Setting** defines parameters for:

- Codec
- Stream1/2
- Codec Dashboard
- Stream Dashboard

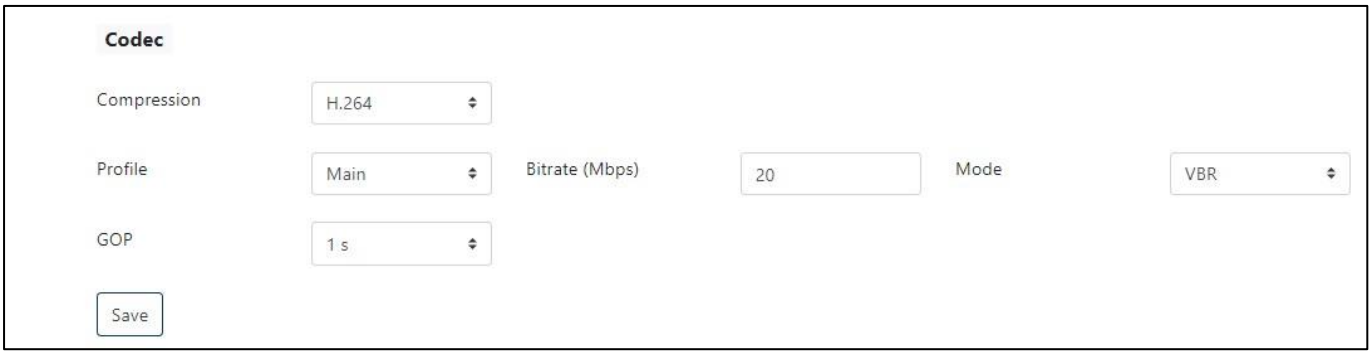
and the WebGUI setting screen is shown below.



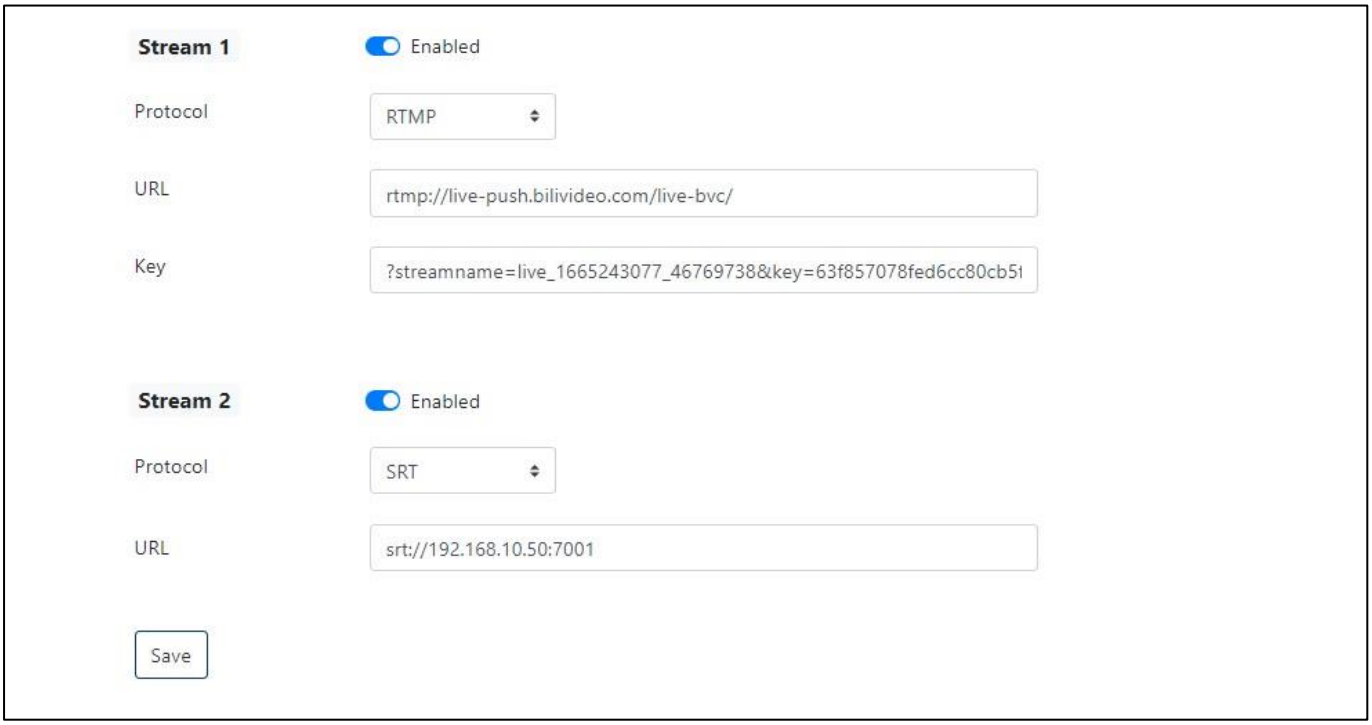
Refer to 3.5 Stream Function for detailed description regarding parameter settings in:

- Codec
- Stream1/2

The **Codec** setting WebGUI screen is shown below. After setting the parameters, click “**Save**” button for applying.



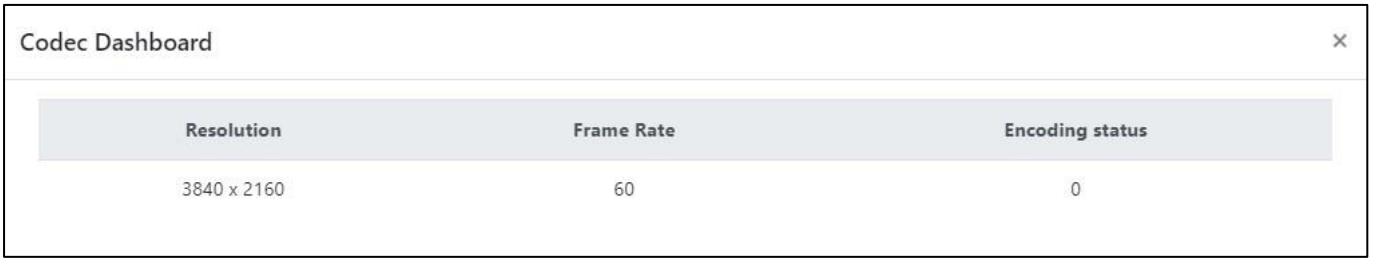
The **Stream** setting WebGUI screen is shown below. After setting the parameters, click “Save” button for applying.



The **Codec Dashboard** provides real-time information for current codec operating status including:

- Resolution
- Frame Rate
- Encoding Status

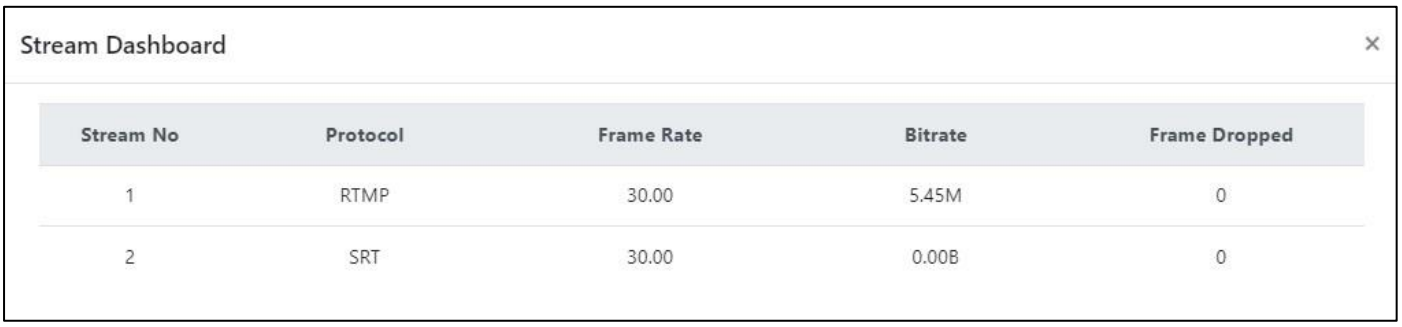
and its WebGUI screen is shown below.



The **Stream Dashboard** provides real-time information for current streaming operating status including:

- Protocol
- Frame Rate
- Bitrate

for up to 2 streams simultaneously and its WebGUI screen is shown below.



Note that system performance and network conditions may affect frame rate in streaming. Refer to Appendix 3 Streaming and Recording Guidelines for the supported frame rates and video channel configurations.

4.2 Audio Setting

The **Audio Setting** defines configurations for audio sources including:

- HDMI-1
- HDMI-2
- HDMI-3
- HDMI-4
- DDR (DDR1)
- Microphone (MIC)

in terms of:

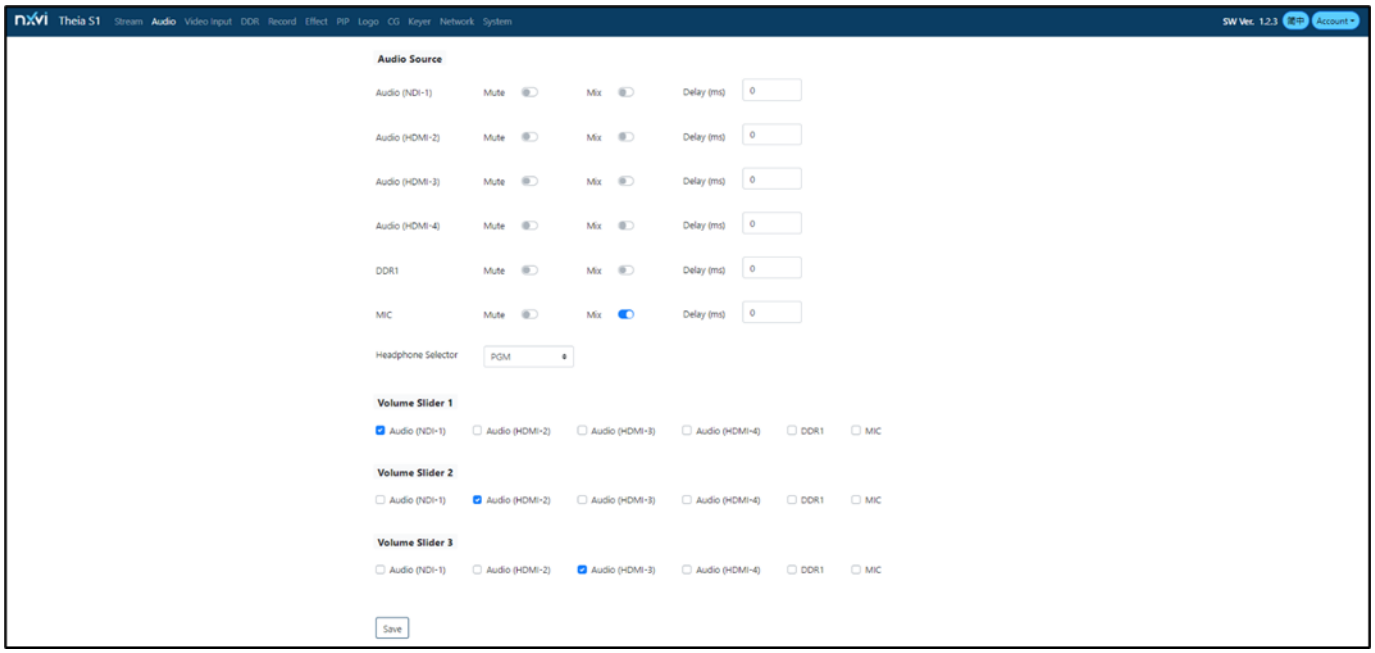
- Mute or unmute
- Mix or unmix
- Delay (0-10000ms)

to program (**PGM**) channel. The headphone selection selects one of the audio sources, including **PGM**, for monitoring. The association between volume sliders and the audio sources is also established in audio setting. The following table lists all the functions and their settings displayed in **Audio Setting**.

Function	Sub-Function	Value or State	Default
Audio (HDMI-1)	Mute Control	Mute or Unmute	Unmute
	Mix Control	Mix or Unmix	Unmix
	Delay Control	0-10000ms	0ms
Audio (HDMI-2)	Mute Control	Mute or Unmute	Unmute
	Mix Control	Mix or Unmix	Unmix
	Delay Control	0-10000ms	0ms
Audio (HDMI-3)	Mute Control	Mute or Unmute	Unmute
	Mix Control	Mix or Unmix	Unmix
	Delay Control	0-10000ms	0ms
Audio (HDMI-4)	Mute Control	Mute or Unmute	Unmute
	Mix Control	Mix or Unmix	Unmix
	Delay Control	0-10000ms	0ms
DDR1	Mute Control	Mute or Unmute	Unmute
	Mix Control	Mix or Unmix	Unmix
	Delay Control	0-10000ms	0ms
MIC	Mute Control	Mute or Unmute	Unmute
	Mix Control	Mix or Unmix	Unmix
	Delay Control	0-10000ms	0ms

Headphone Selector	PGM, HDMI-1/2/3/4, DDR1, or MIC	PGM
Volume Slider 1	HDMI-1/2/3/4, DDR1, or MIC	(None)
Volume Slider 2	HDMI-1/2/3/4, DDR1, or MIC	(None)
Volume Slider 3	HDMI-1/2/3/4, DDR1, or MIC	(None)

The WebGUI screen of **Audio Setting** is shown below. After setting the configurations, click "**Save**" button for applying.



4.3 Video Input Setting

The **Video Input Setting** defines configurations for video input sources including:

- Video Input1
- Video Input2
- Video Input3
- Video Input4

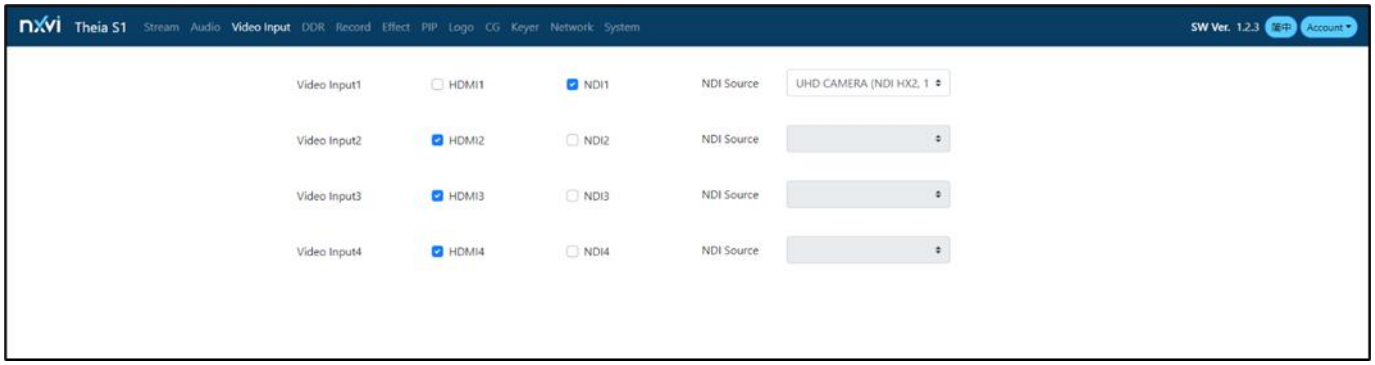
in terms of selecting one of two potential source types including:

- HDMI
- NDI

The following table lists all the functions and their settings displayed in **Video Input Setting**.

Function	Sub-Function	Value
Video Input1	HDMI1	Select either HDMI1 or NDI1 as input.
	NDI1	
	NDI Source	Select one connected NDI device as source when NDI1 is selected
Video Input2	HDMI2	Select either HDMI2 or NDI2 as input.
	NDI2	
	NDI Source	Select one connected NDI device as source when NDI2 is selected
Video Input3	HDMI3	Select either HDMI3 or NDI3 as input.
	NDI3	
	NDI Source	Select one connected NDI device as source when NDI3 is selected
Video Input4	HDMI4	Select either HDMI4 or NDI4 as input.
	NDI4	
	NDI Source	Select one connected NDI device as source when NDI4 is selected

The WebGUI screen of **Video Input Setting**, with one NDI device is selected, is shown below. After setting the configurations, click “**Save**” button for applying.



4.4 DDR Setting

The **DDR (Digital Video/Audio Recorder) Setting** provides the video file playback control over DDR recorded content. The information of DDR device for the selected video file including:

- Device Path
- Device Type
- Device Capacity
- Used Space
- Free Space

will be displayed in addition to:

- Device Selection
- File Selection

Note that it is planned to include embedded SSD storage as an option to Theia S1 Live Switcher product line in the future as well.

The video files with supported format:

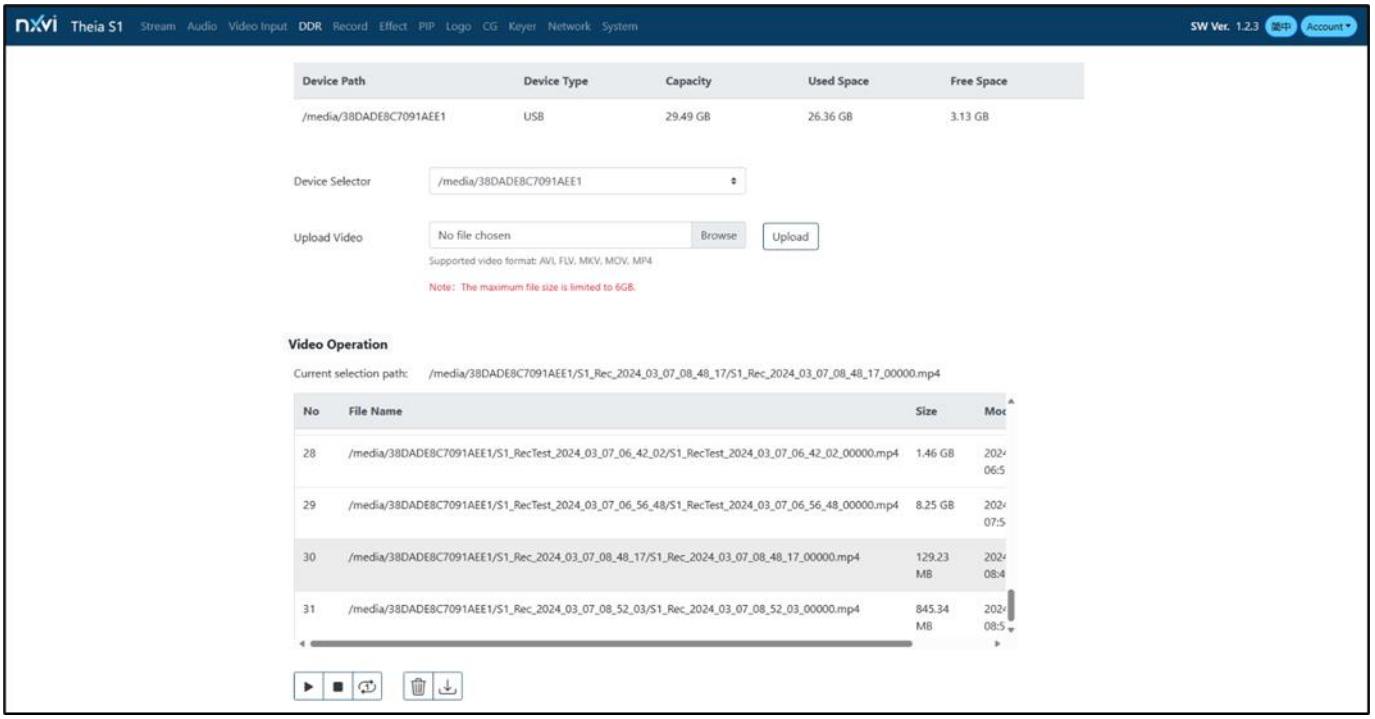
- AVI
- FLV
- MKV
- MOV
- MP4

will be displayed in the browser window for selection to upload with file size of 6GB in maximum. Once the selection is done, click “**Upload**” button for applying.

The video file playback is controlled by player with:

- Play/Pause
- Stop
- Loop
- Delete
- Download

The WebGUI screen of **DDR Setting** is shown below.



4.5 Record Setting

The **Record Setting** provides the configurations of recorded file for:

- Codec
- Path selection
- Filename creation with MP4 format (the complete filename will be Filename_YYYY_DD_HH_MM_SS.mp4)
- Duration time for recording file

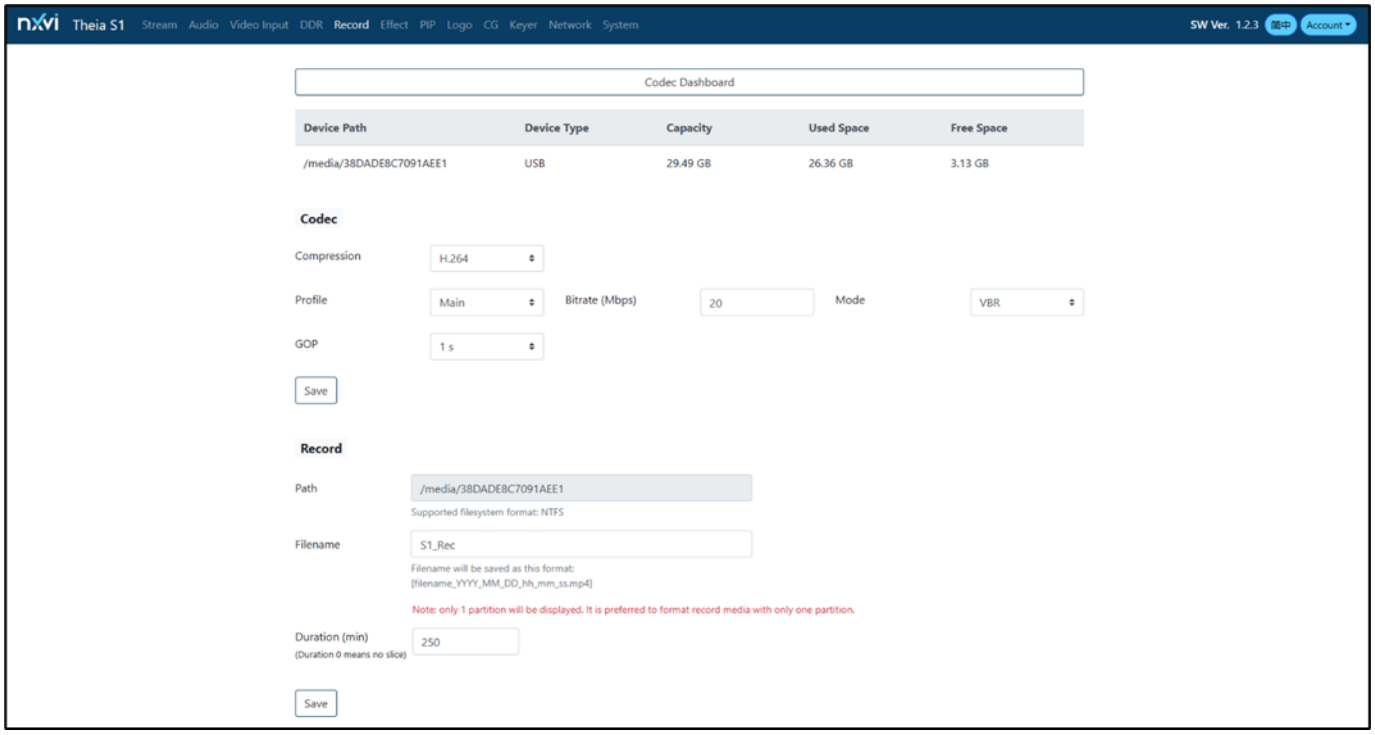
in the selected device. The information of the recorded device including:

- Device Path
- Device Type
- Device Capacity
- Used Space
- Free Space

will also be displayed.

Note that only 1 partition info will be displayed, therefore, it is preferred to format record media with 1 partition only.

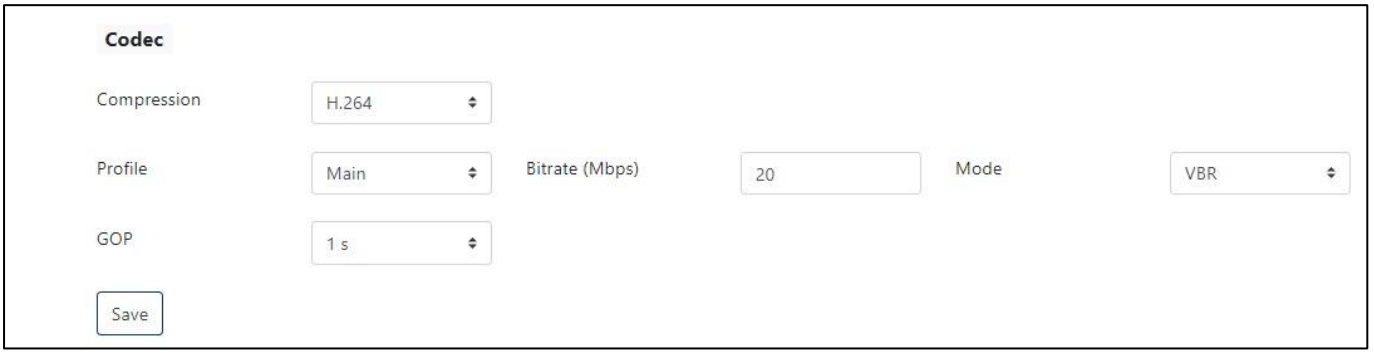
The WebGUI screen of **Record Setting** is shown below. After setting the configurations, click "**Save**" button for applying.



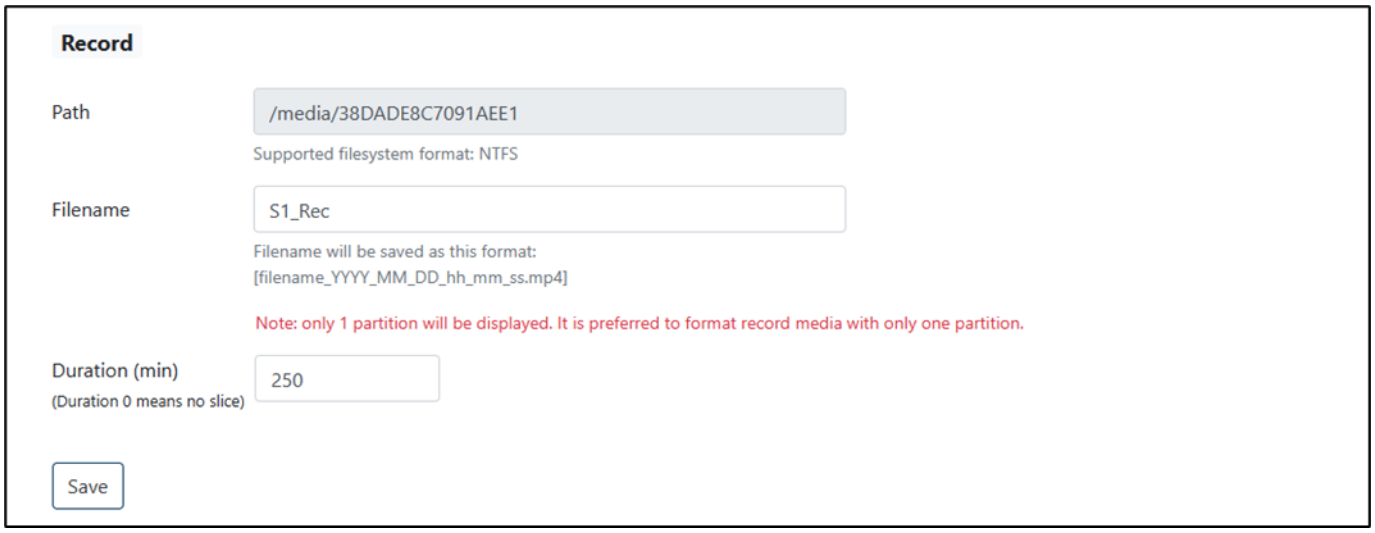
Refer to 3.6 Record Function for detailed description regarding parameter settings in:

- Codec
- Duration time for recording file

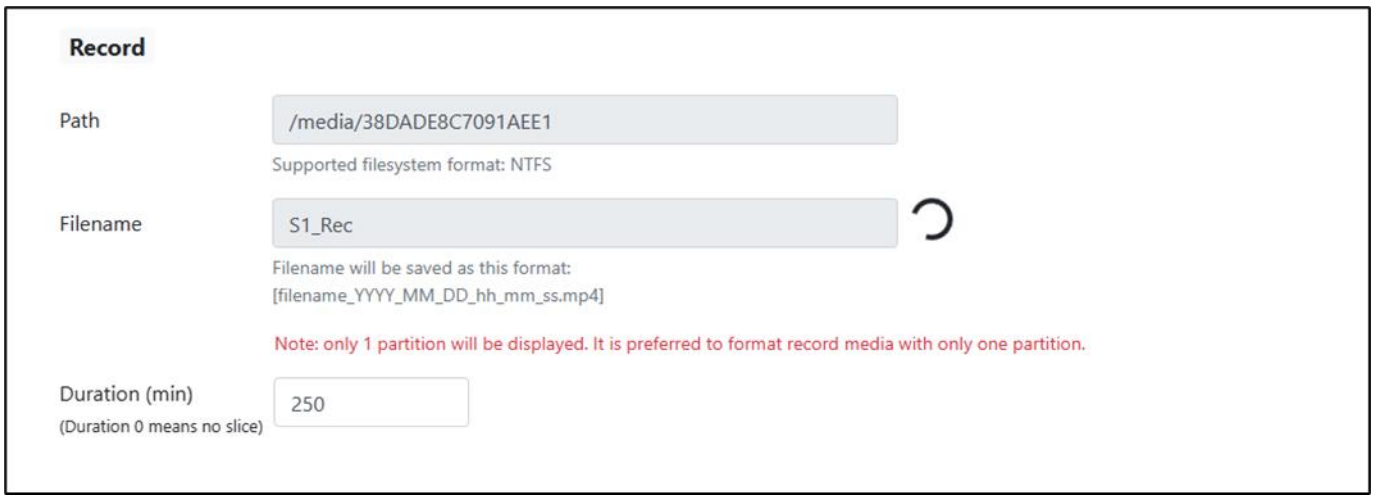
The **Codec** setting WebGUI screen is shown below. After setting the parameters, click "**Save**" button for applying.



The WebGUI screen of **Record Setting** is shown below. After setting the configurations, click "**Save**" button for applying.



When recording is applied, a recording status symbol (a spinning icon) in WebGUI will be observed to indicate the progress, as figure shown below.

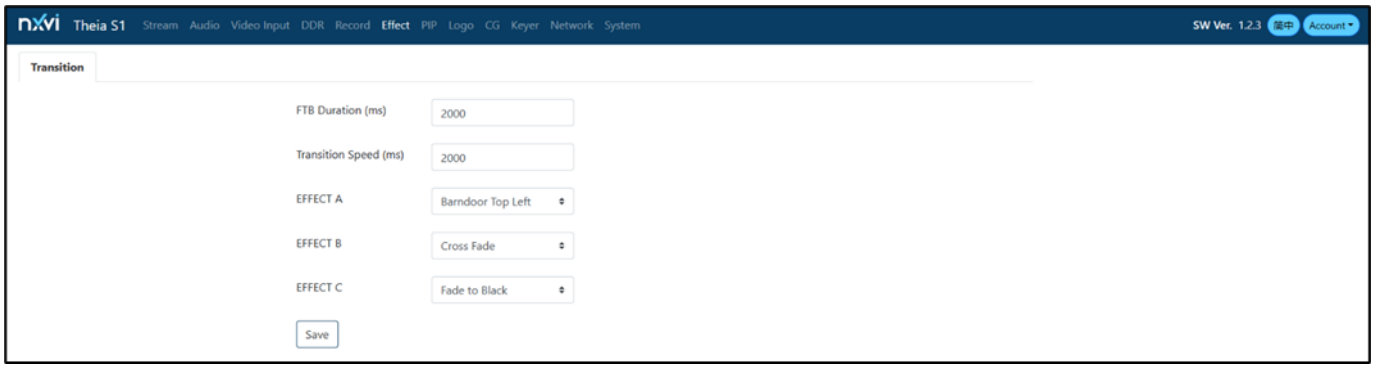


4.6 Effect Setting

The **Effect Setting** defines configurations of transition speed and the association of **EFFECT A/B/C** keys in panel with transition effects. The transition effects can be applied when switching the existing program channel (**PGM**) to the selected preview (**PVW)** channel, and the video contents in these two channels will be swapped.

Refer to 3.7 Effect Function for detailed description regarding parameter settings and the supported transition effects.

The WebGUI screen of **Effect Setting** is shown below. After setting the configurations, click "**Save**" button for applying.

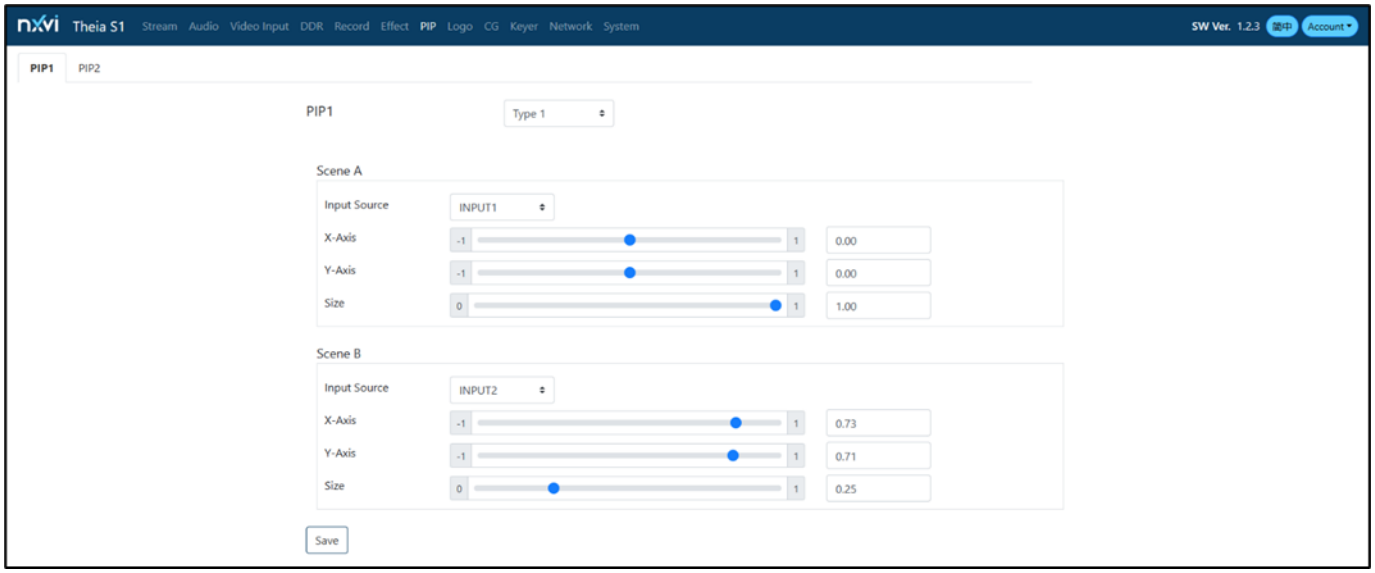


4.7 PIP Setting

The **PIP (Picture-in-Picture) Setting** associates **PIP1** and **PIP2** keys in panel with selected video sources, PIP types, positions, and sizes for overlapping with program (**PGM**) channel.

Refer to 3.8 PIP Function for detailed description regarding parameter settings and the supported PIP types.

The WebGUI screen of **PIP Setting** is shown below. There are two tabs for **PIP1** and **PIP2** settings. After setting the configurations, click "**Save**" button for applying.



4.8 Logo Setting

The **Logo Setting** defines configurations of selecting and uploading image file to the specified position (X and Y-axis) in accordance with **Base (Canvas) Resolution**, with the support of applying **Keyer** function.

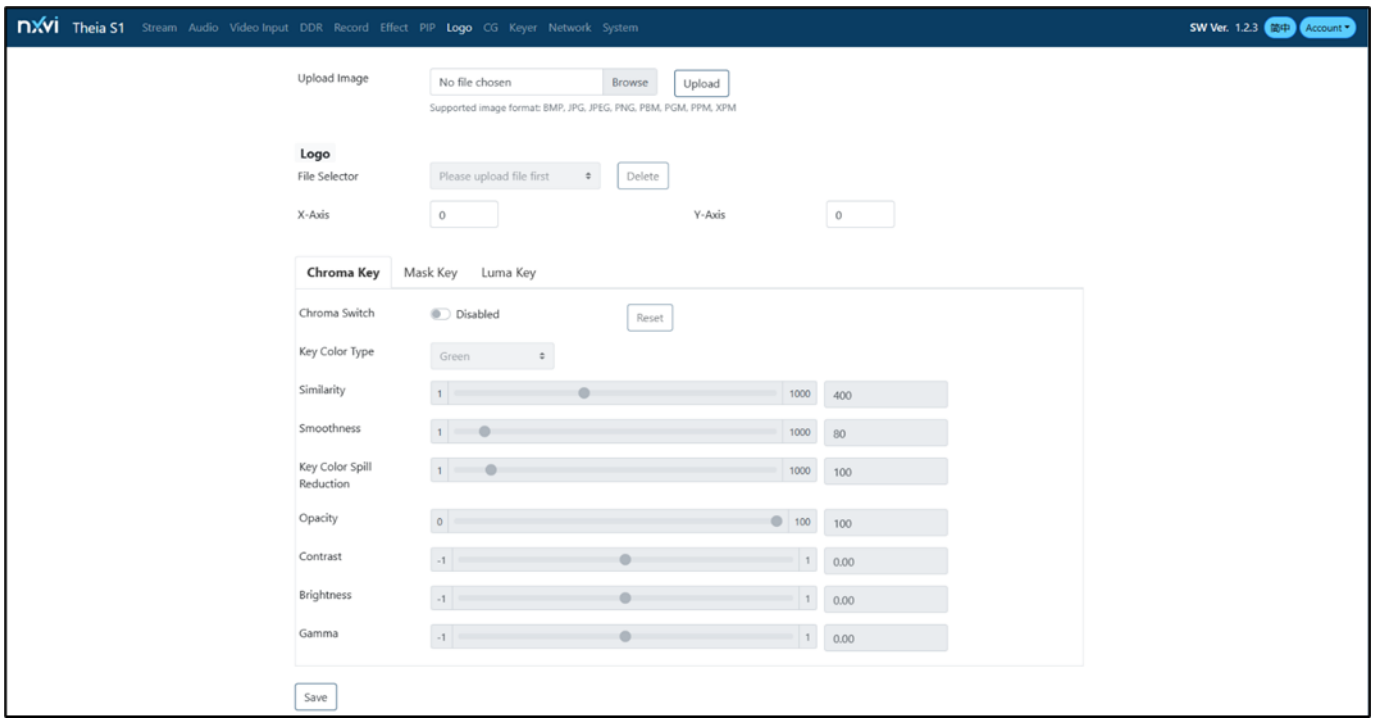
The image file with format:

- BMP
- JPG
- JPEG
- PNG
- PBM
- PGM
- PPM
- XPM

will be supported and up to 30 image files can be uploaded, with the option of deleting unrequired one(s).

Refer to 3.9 Logo Function for detailed description regarding parameter settings and 3.11 Keyer Function for keyer support.

The WebGUI screen of **Logo Setting** is shown below. After setting the configurations, click "**Save**" button for applying.



4.9 CG Setting

The **CG (Computer Graphic) Setting** defines configurations of subtitle processing in program (**PGM**) channel with two types of format:

- Text
- Picture

supported and the selecting switches:

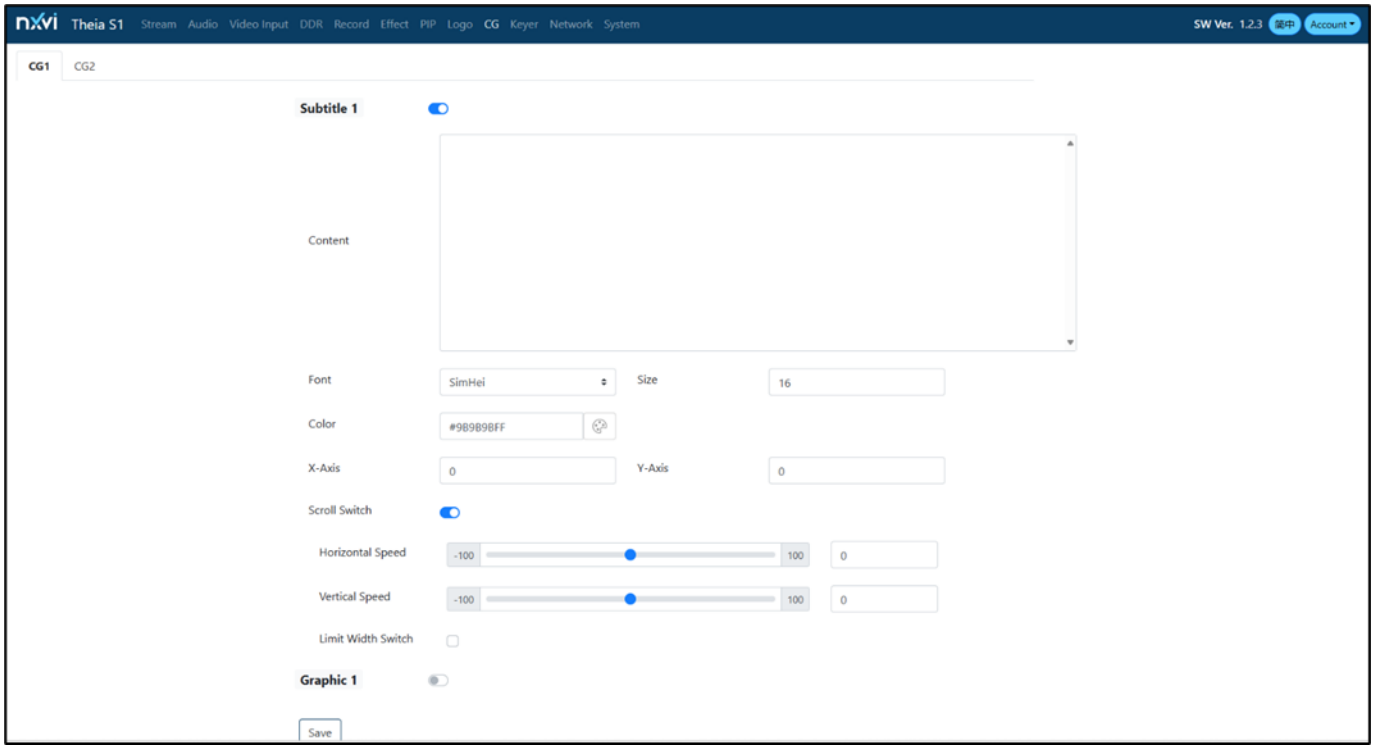
- Text Selection
- Picture Selection

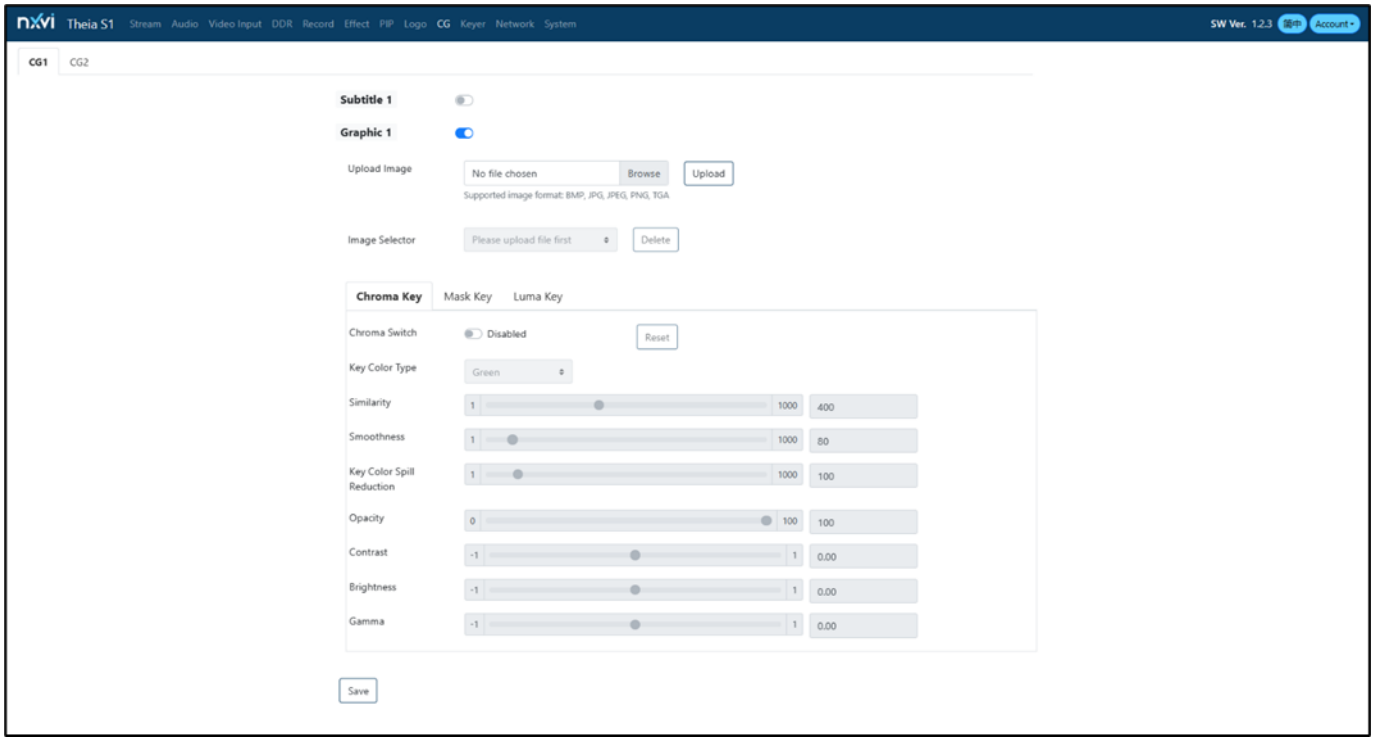
control respectively which type will be enabled in WebGUI.

For CG format in text, the input text will be displayed in **Content** preview window in WebGUI.

Refer to 3.10 CG Function for detailed description regarding parameter settings of CG in text and picture formats.

The WebGUI screens of **CG Setting** in text and picture formats are shown below. There are two tabs for **CG1** and **CG2** settings. After setting the configurations, click “**Save**” button for applying.



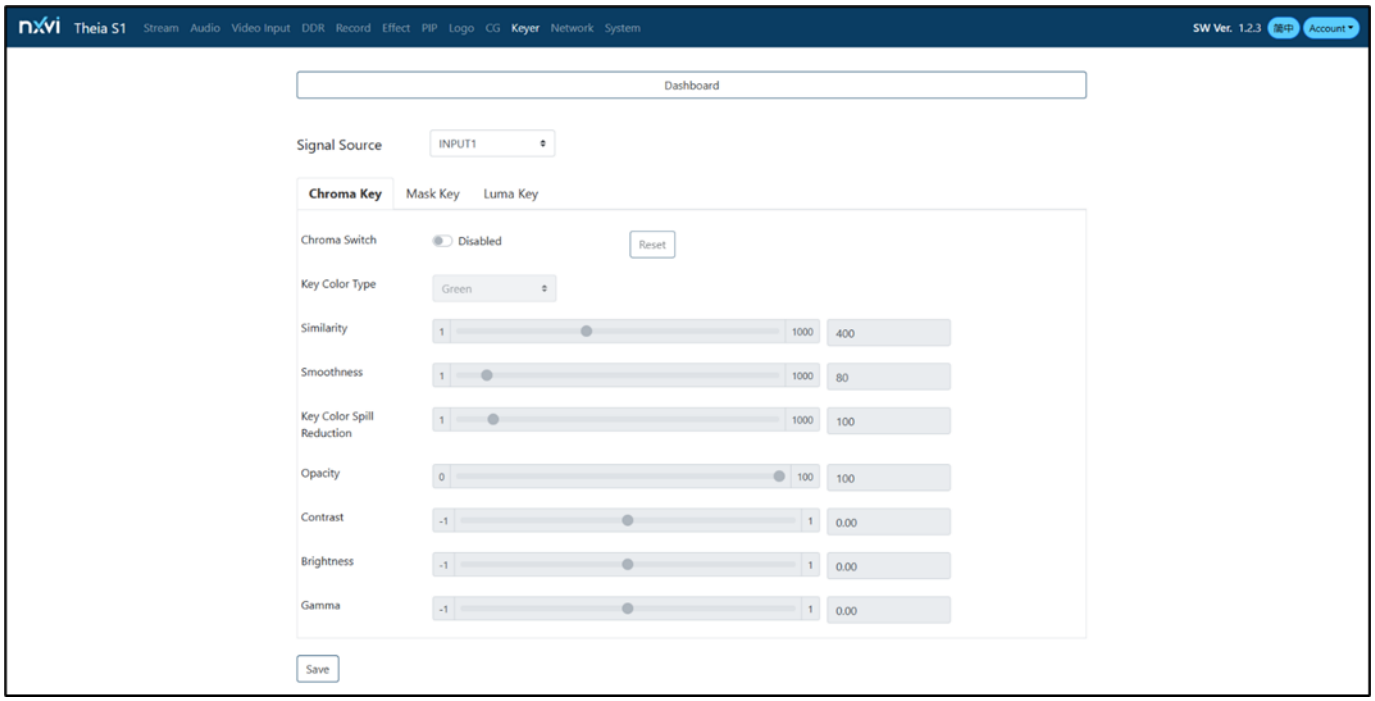

Theia S1
Stream
Audio
Video Input
DDR
Record
Effect
PIP
Logo
CG
Keyer
Network
System
SW Ver. 1.2.3
Account
CG1
CG2
Subtitle 1
Graphic 1
Upload Image
No file chosen
Browse
Upload
Supported image format: BMP, JPG, JPEG, PNG, TGA
Image Selector
Please upload file first
Delete
Chroma Key
Mask Key
Luma Key
Chroma Switch
Disabled
Reset
Key Color Type
Green
Similarity
1
1000
400
Smoothness
1
1000
80
Key Color Spill Reduction
1
1000
100
Opacity
0
100
100
Contrast
-1
1
0.00
Brightness
-1
1
0.00
Gamma
-1
1
0.00
Save

4.10 Keyer Setting

The **Keyer Setting** defines configurations of keying processing over available video sources for mixing and compositing and applying to program (**PGM**) channel in final, with three types of keying options:

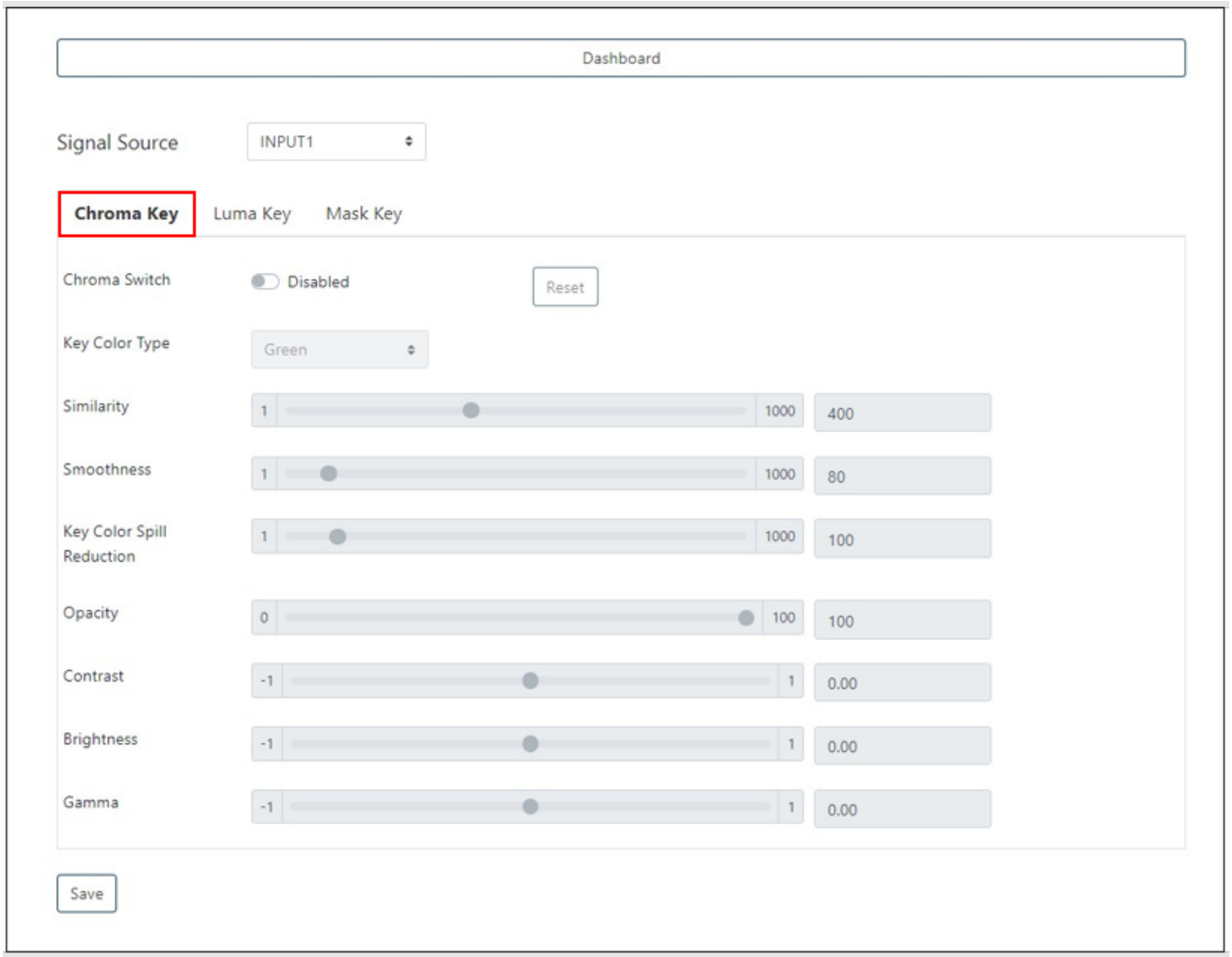
- Chroma Key
- Mask Key
- Luma Key

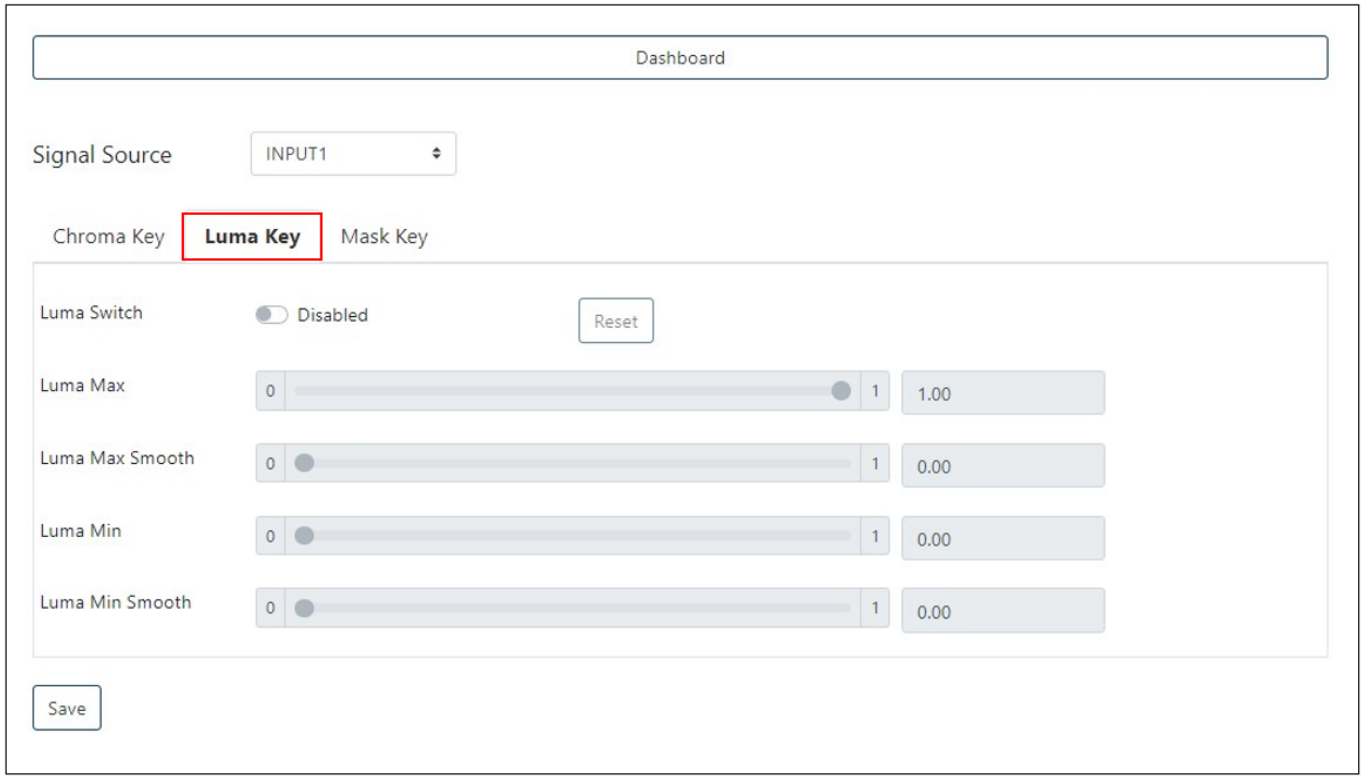
The WebGUI screen of **Keyer Setting** is shown below. Refer to 3.11 Keyer Function for detailed description regarding parameter settings of keying processing. After setting the configurations, click “**Save**” button for applying.

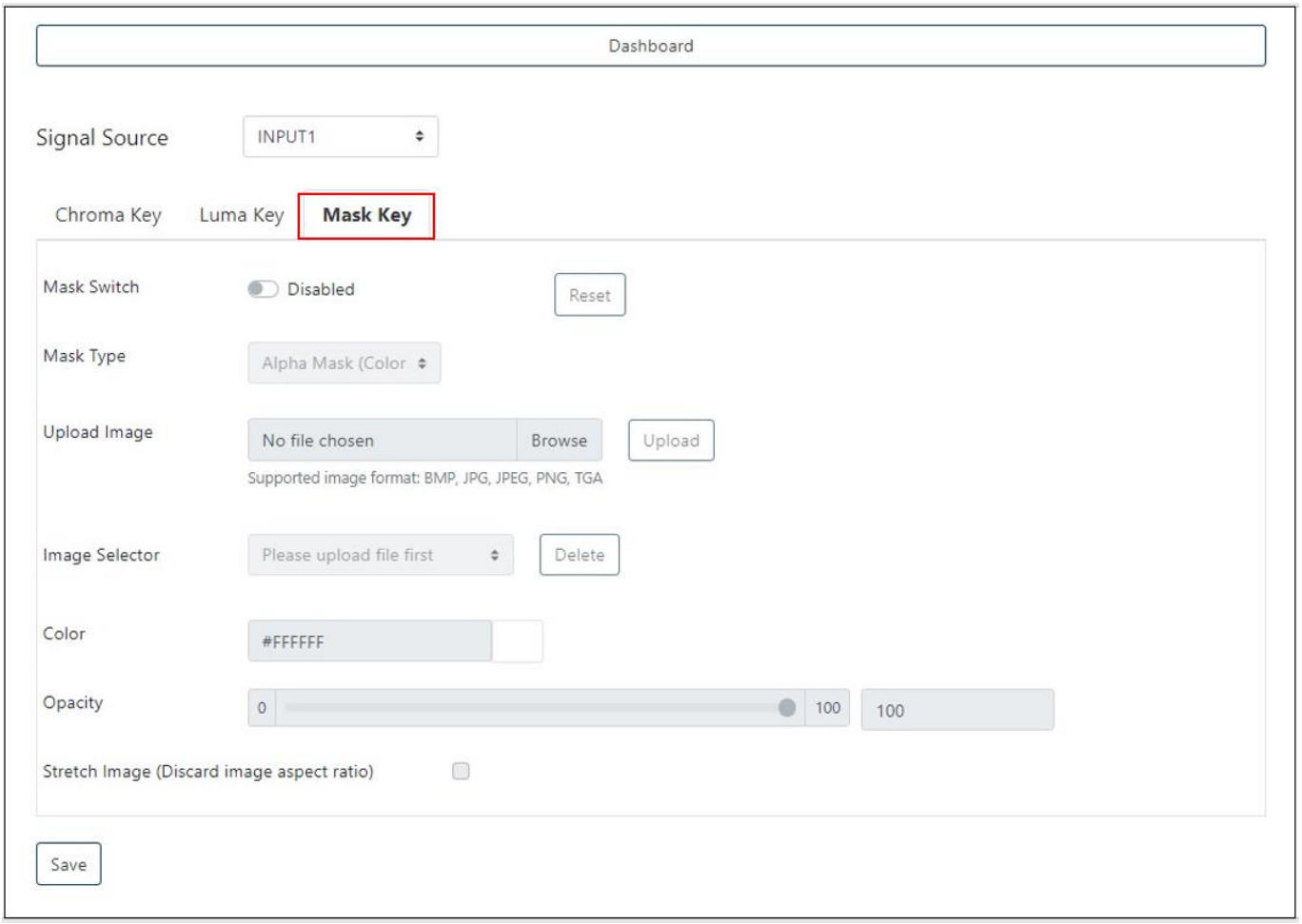


The **Dashboard** option in WebGUI provides summary regarding how keying options (Chroma Key, Luma Key, and Mask Key) are applied to video input sources respectively as figure shown below.

The WebGUI screens of **Keyer Setting** in Chroma Key, Luma Key and Mask Key options are shown below respectively.


Dashboard
Signal Source
INPUT1
Chroma Key
Luma Key
Mask Key
Chroma Switch
Disabled
Reset
Key Color Type
Green
Similarity
1
1000
400
Smoothness
1
1000
80
Key Color Spill Reduction
1
1000
100
Opacity
0
100
100
Contrast
-1
1
0.00
Brightness
-1
1
0.00
Gamma
-1
1
0.00
Save


Dashboard
Signal Source
INPUT1
Chroma Key
Luma Key
Mask Key
Luma Switch
Disabled
Reset
Luma Max
0
1
1.00
Luma Max Smooth
0
1
0.00
Luma Min
0
1
0.00
Luma Min Smooth
0
1
0.00
Save


Dashboard
Signal Source
INPUT1
Chroma Key
Luma Key
Mask Key
Mask Switch
Disabled
Reset
Mask Type
Alpha Mask (Color
Upload Image
No file chosen
Browse
Upload
Supported image format: BMP, JPG, JPEG, PNG, TGA
Image Selector
Please upload file first
Delete
Color
#FFFFFF
Opacity
0
100
100
Stretch Image (Discard image aspect ratio)
Save

4.11 Network Setting

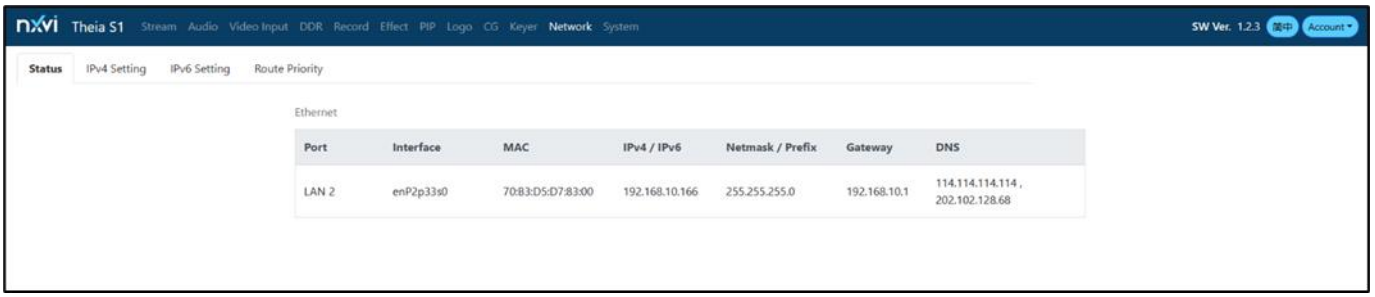
The **Network Setting** provides status and defines configurations of:

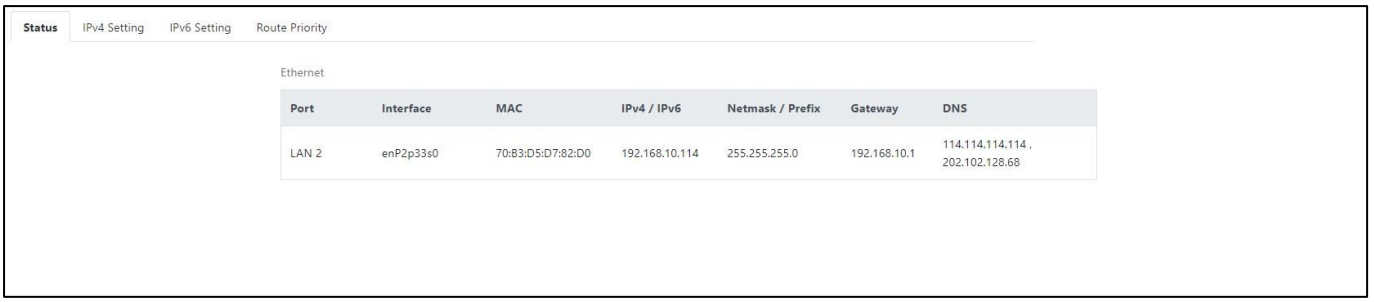
- Network status of port name, interface name, MAC address, IP address, netmask, gateway address, and DNS
- IPv4 setting (DHCP enablement, IP address, netmask, gateway address, and DNS)
- IPv6 setting (DHCP enablement, IP address, netmask, gateway address, and DNS)
- Route priority

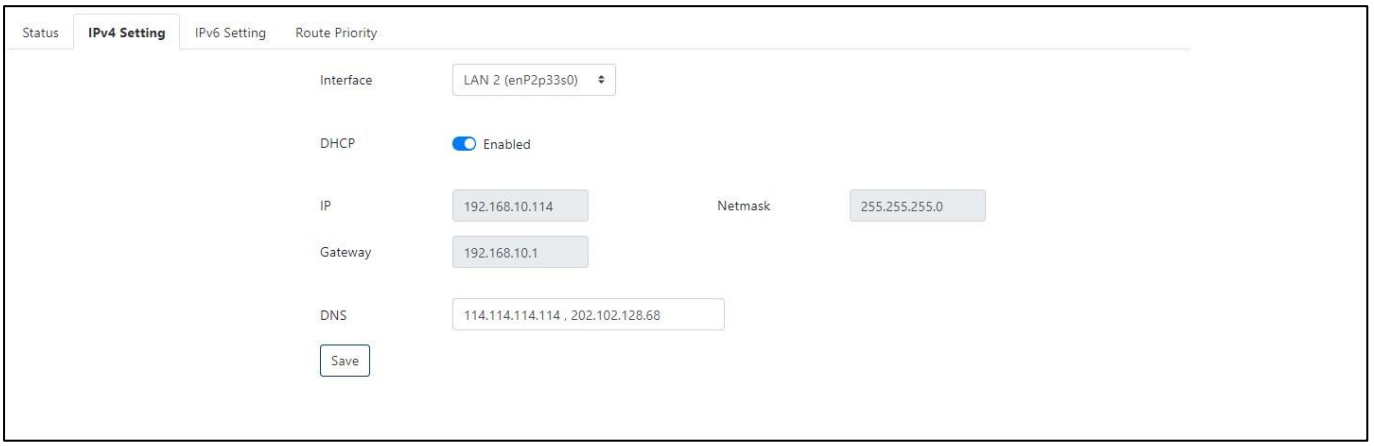
The following table lists all the functions and their settings displayed in **Network Setting**.

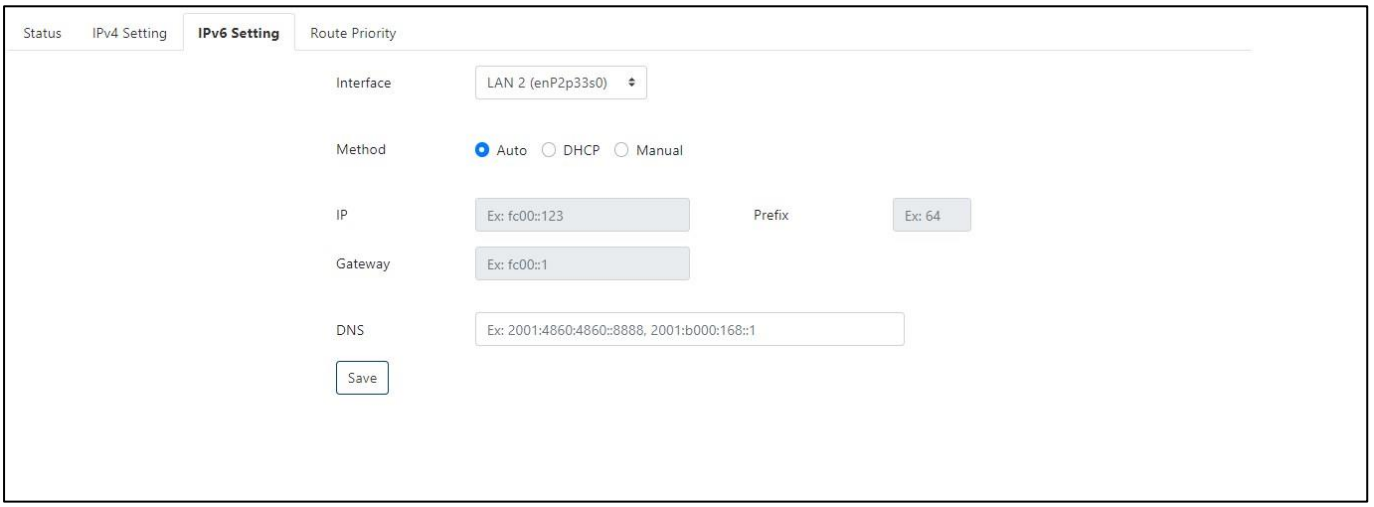
Function	Sub-Function	Value	Default
Status	Port Name	LAN1/LAN2	(Factory Default)
	Interface Name	Ethernet	
	MAC Address	MAC address of Theia S1	
IPv4 Setting	DHCP	Enable/Disable	Disable
	IP Address	IPv4 address assigned to the LAN interface	
	Netmask		
	Gateway Address		
	DNS		
IPv6 Setting	DHCP	Enable/Disable	Disable
	IP Address	IPv6 address assigned to the LAN interface	
	Netmask		
	Gateway Address		
	DNS		
Route Priority	LAN1	High/Low	(Factory Default)
	LAN2	Low/High	

The WebGUI screen of **Network Setting** is shown below. After setting the configurations, click "**Save**" button for applying.




Status
IPv4 Setting
IPv6 Setting
Route Priority
Ethernet
Port
Interface
MAC
IPv4 / IPv6
Netmask / Prefix
Gateway
DNS
LAN 2
enP2p33s0
70:B3:D5:D7:82:D0
192.168.10.114
255.255.255.0
192.168.10.1
114.114.114.114 , 202.102.128.68


Status
IPv4 Setting
IPv6 Setting
Route Priority
Interface
LAN 2 (enP2p33s0)
DHCP
Enabled
IP
192.168.10.114
Netmask
255.255.255.0
Gateway
192.168.10.1
DNS
114.114.114.114 , 202.102.128.68
Save


Status
IPv4 Setting
IPv6 Setting
Route Priority
Interface
LAN 2 (enP2p33s0)
Method
Auto
DHCP
Manual
IP
Ex: fc00::123
Prefix
Ex: 64
Gateway
Ex: fc00::1
DNS
Ex: 2001:4860:4860::8888, 2001:b000:168::1
Save


Status
IPv4 Setting
IPv6 Setting
Route Priority
LAN 1 (eth0)
Low
LAN 2 (enP2p33s0)
High
Priority will be saved in configuration file and takes effect when connected.
Save

4.12 System Setting

The **System Setting** defines system configurations and provides status information including:

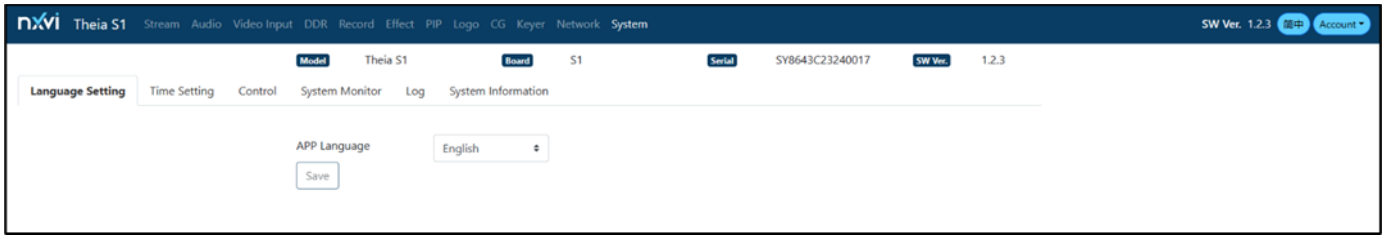
- **Time Setting** for timezone, date, and time
- **Control** for system restart, power off, restore default, and software update
- **System Monitor** for CPU utilization, system temperature, and network bandwidth
- **Log** for checking and exporting system logs, kernel logs, and software logs
- **System Information** for model name, board ID, serial number, software version, firmware version, and MCU version

The following table lists all the functions and their settings displayed in **System Setting**.

Function	Sub-Function	Value	Default
Language Setting	App Language	简体中文/English	English
Time Setting	Timezone	Continent/City	(Factory Default)
	Date	mm/dd/yyyy	
	Time	hh:mm	
Control	System Restart	Enable/Disable	Disable
	Power Off	Enable/Disable	Disable
	Restore Default	Enable/Disable	Disable
	System Update	Firmware Update	Disable
		System Update	Disable
Log	System Log		
	Kernel Log		
	Software Log		
System Information	Model Name	Theia S1	(Factory Default)
	Board ID	Hardware board ID	
	Serial Number	System serial number	
	Software Version	Version number	
	Firmware Version	Version number	
	MCU Version	Version number	

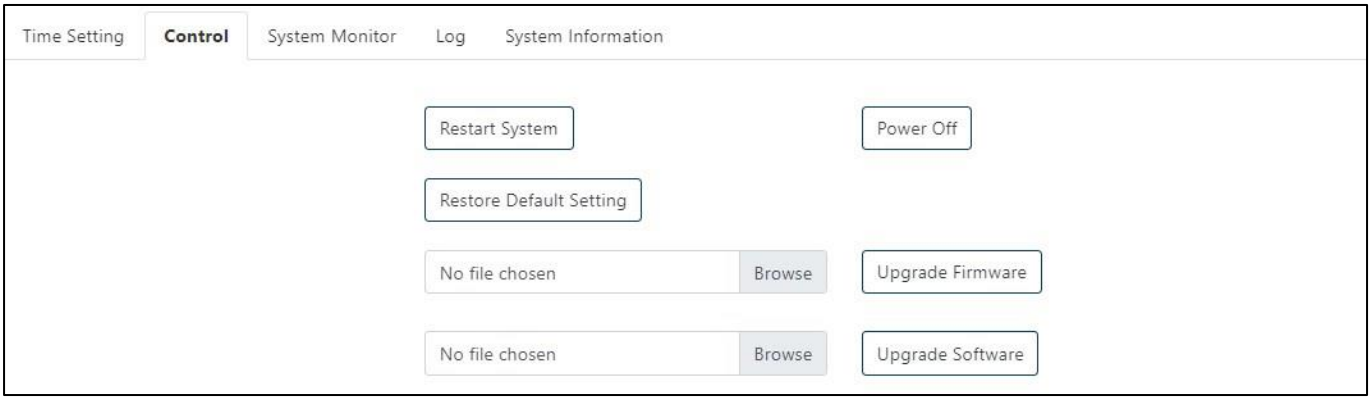
The WebGUI screen of **System Setting** are shown below.

- **Language Setting**

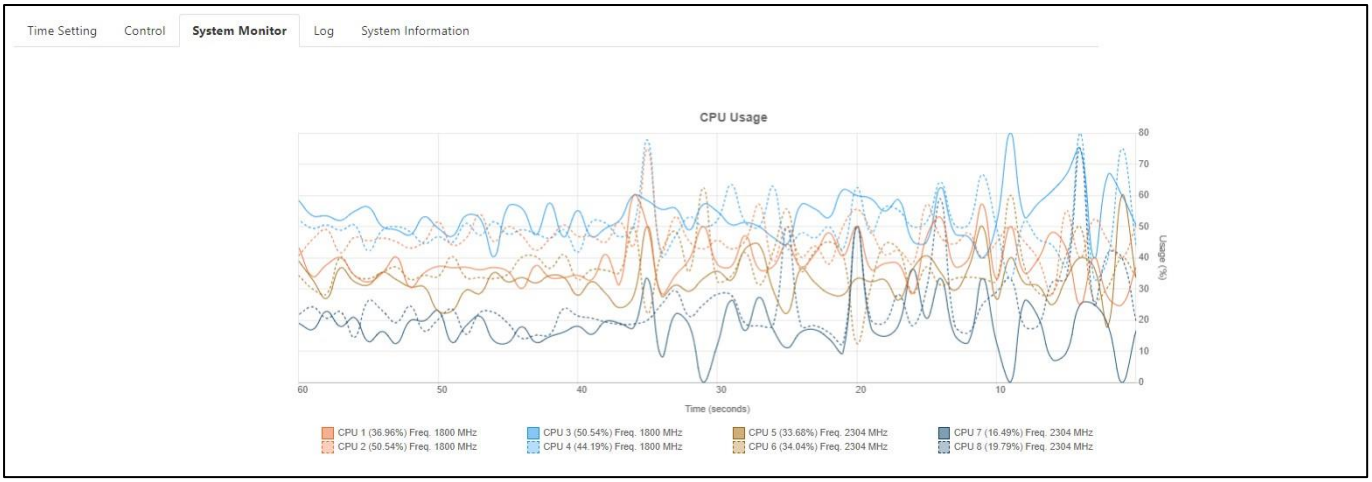


- **Time Setting**

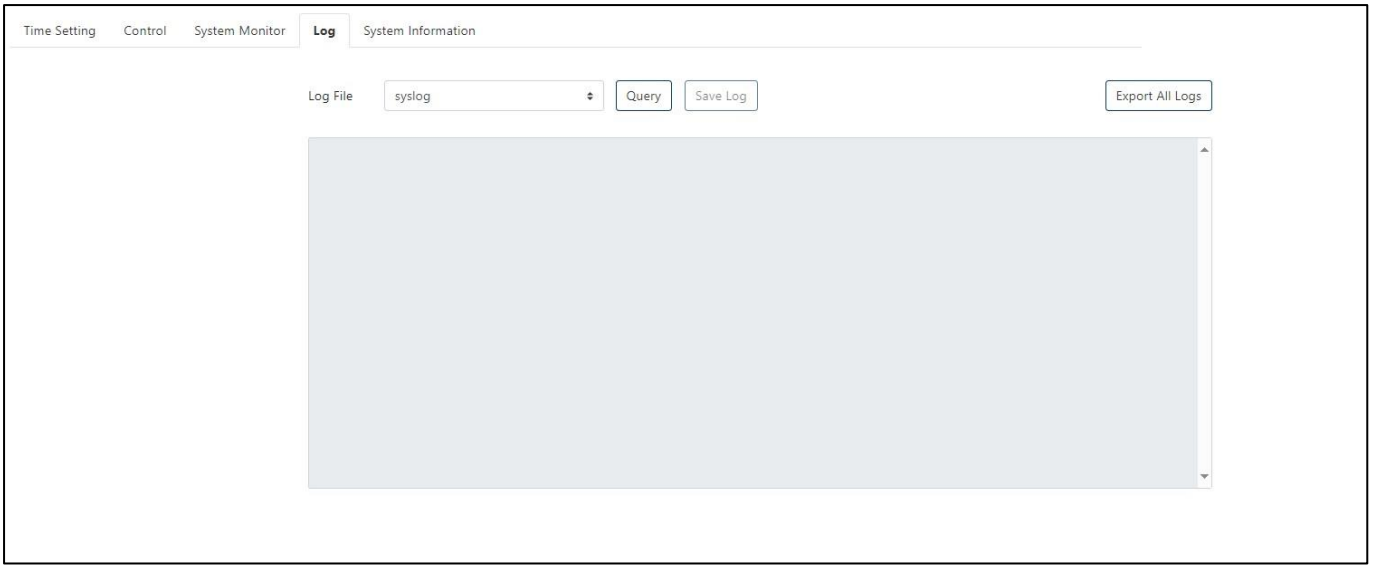
- **Control**



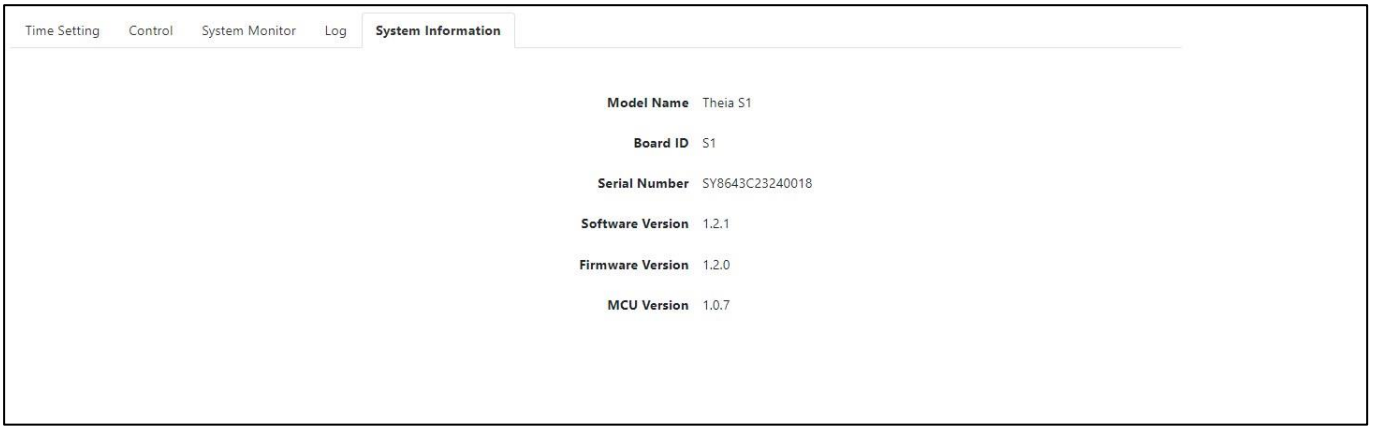
- **System Monitor**



- **Log**



- **System Information**



Chapter 5: Use Cases – Keying, NDI, Rotation, and Cropping

This chapter provides examples on how to perform:

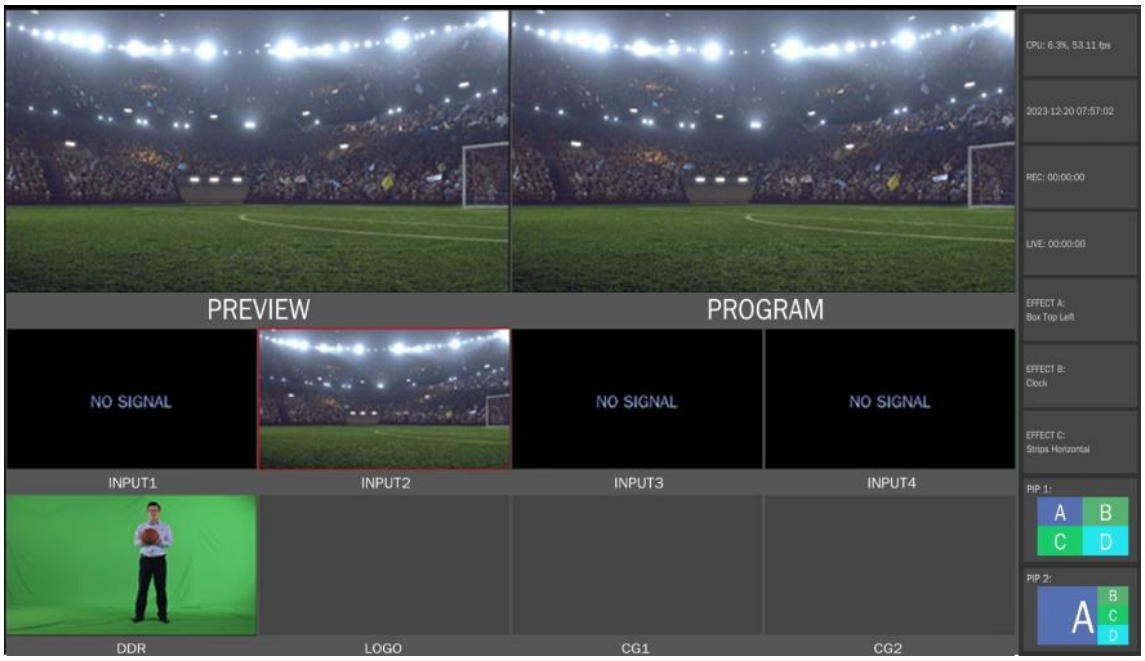
- Chroma keying
- Chroma keying with **PIP** processing
- NDI (Network Device Interface) based video input
- Text based subtitle scrolling
- Chroma keying with **Logo** and **CG** processing
- Landscape and portrait mode switching
- Video rotate and crop
- Luma keying with PowerPoint based video input

on Theia S1 Live Switcher, in order to assist users to be familiar with system for better productivity.

5.1 Chroma Keying

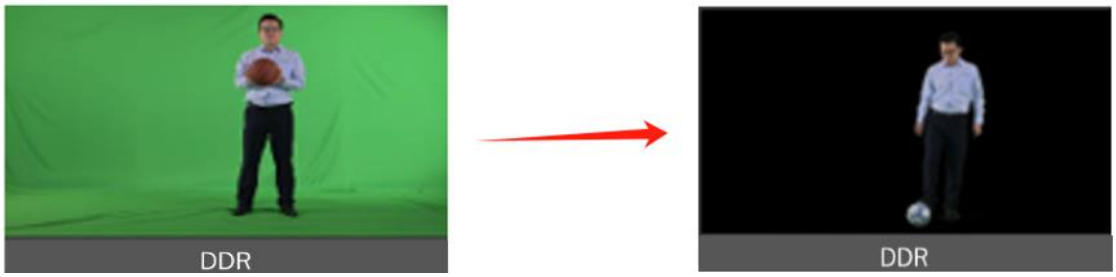
Keying operation in Theia S1 Live Switcher can be performed by using **Menu** key on system panel or through external **WebGUI**. The following steps provide example on how to use **Menu** key for chroma keying setting over **DDR** video source, while WebGUI setting will be the same.

1. Prepare video file in USB storage and connect to USB port in Theia S1 Live Switcher as **DDR** source. Refer to 3.3 Video Input Function for selecting video source in **DDR** and activating playback through **Media (DDR) Control**.

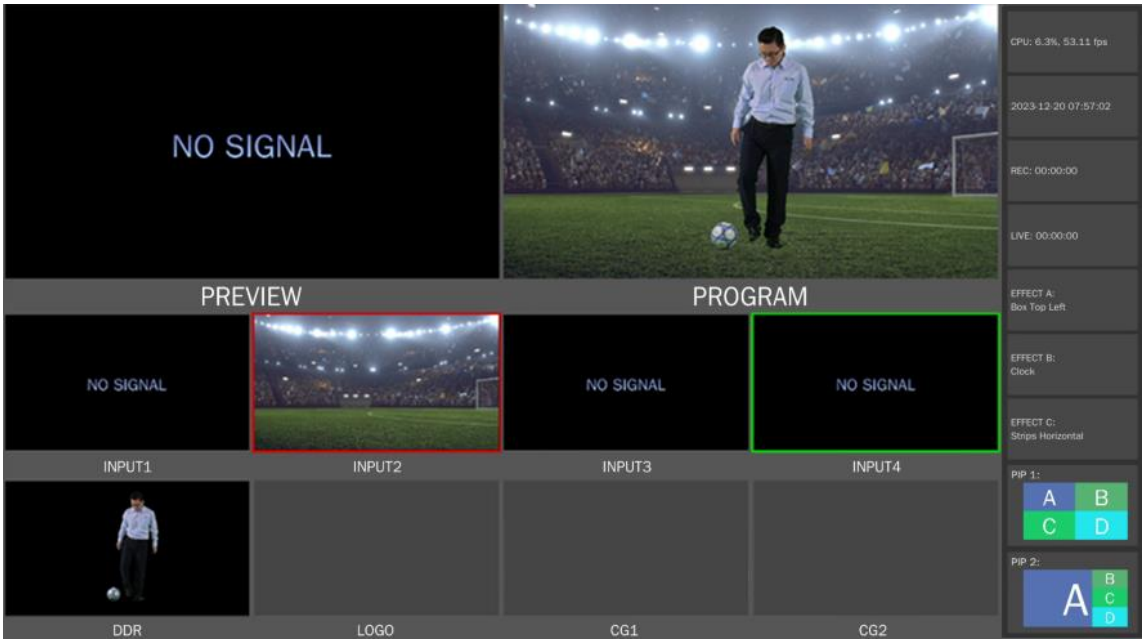


2. Select **Keyer** function in **Menu**. Select **DDR** in **Signal Source**. Refer to 3.11 Keyer Function for details.

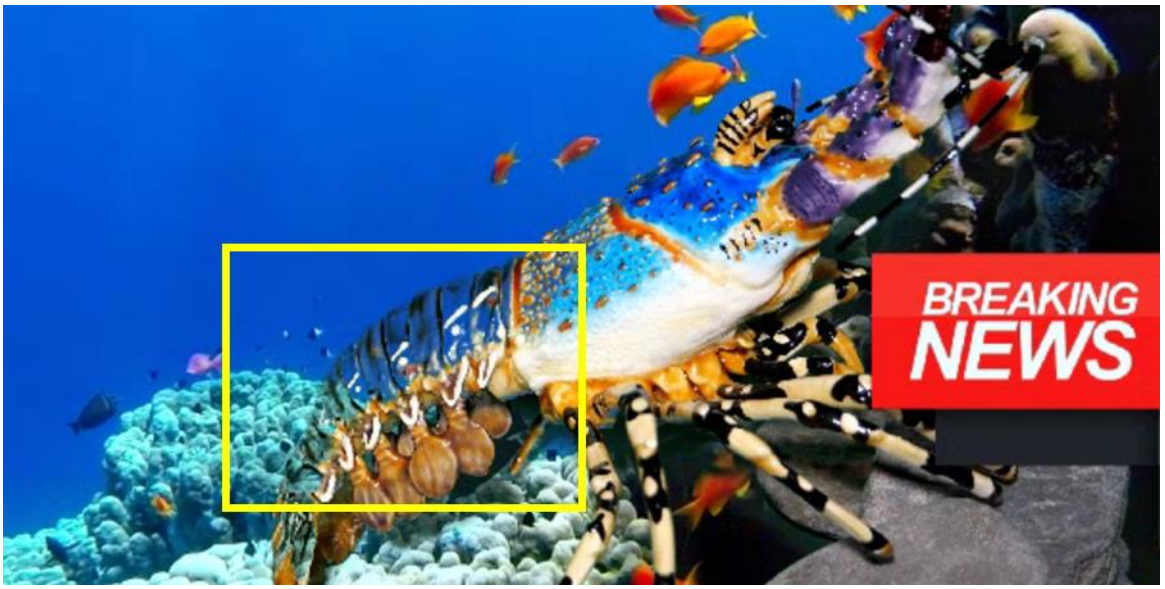
3. Select **Chroma Key** in **Filter Type**. Click **Switch** for enabling keying. The green background in **DDR** window in multiview (**MV**) screen will be keyed out, as shown below.



4. Press **Key** button on panel, and the keyed image will be overlapping over **PROGRAM (PGM)** channel, as shown below.

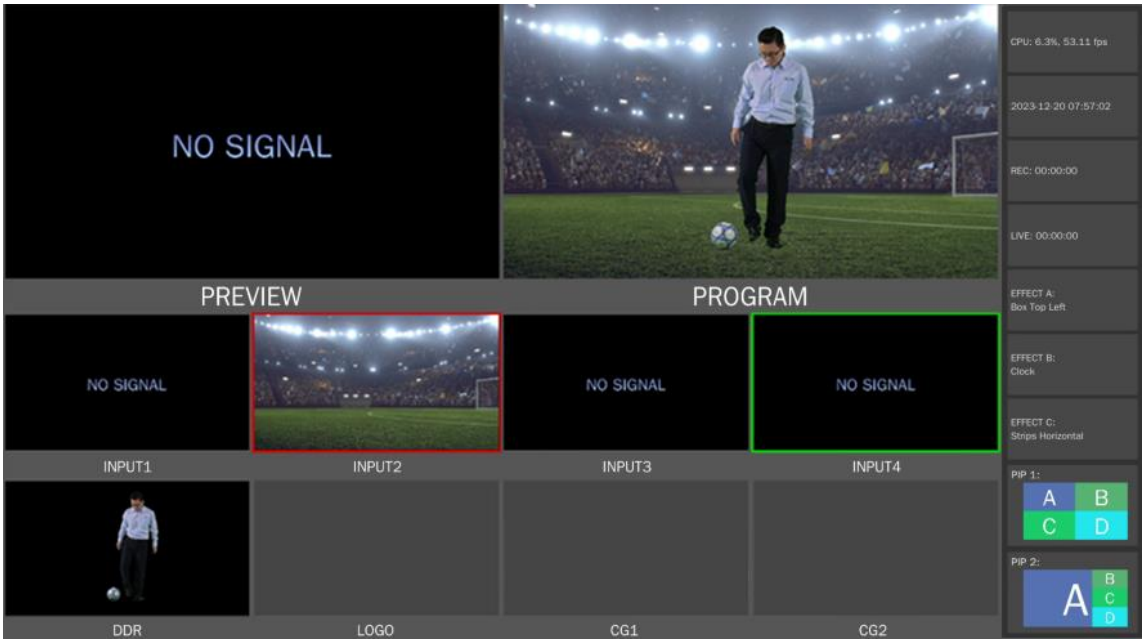


5. Adjust parameters in **Chroma Key** window to fine-tune the keying effect for better overlapped video when necessary, as shown below. Refer to 3.11 Keyer Function for details.



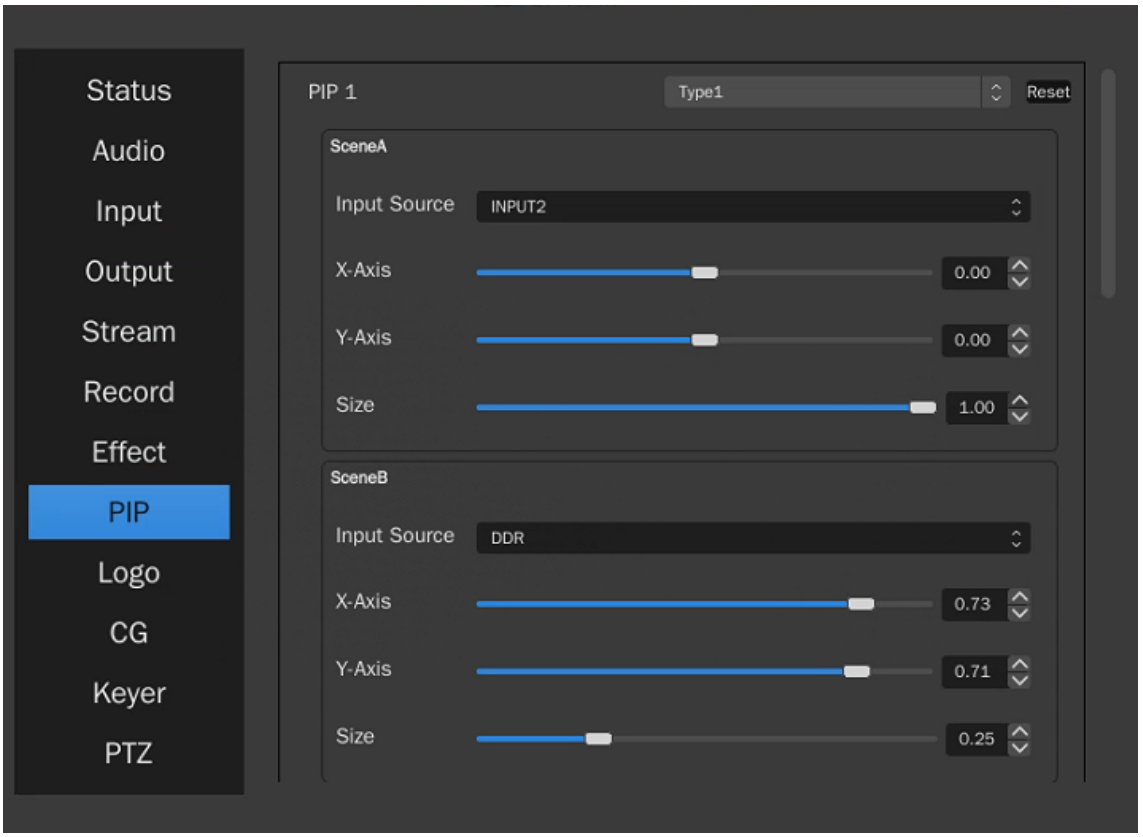
5.2 Chroma Keying with PIP

Similar to 5.1 Chroma Keying for using **DDR** as video source and applying Chroma Keying for overlapping with **PGM** channel, as shown below.

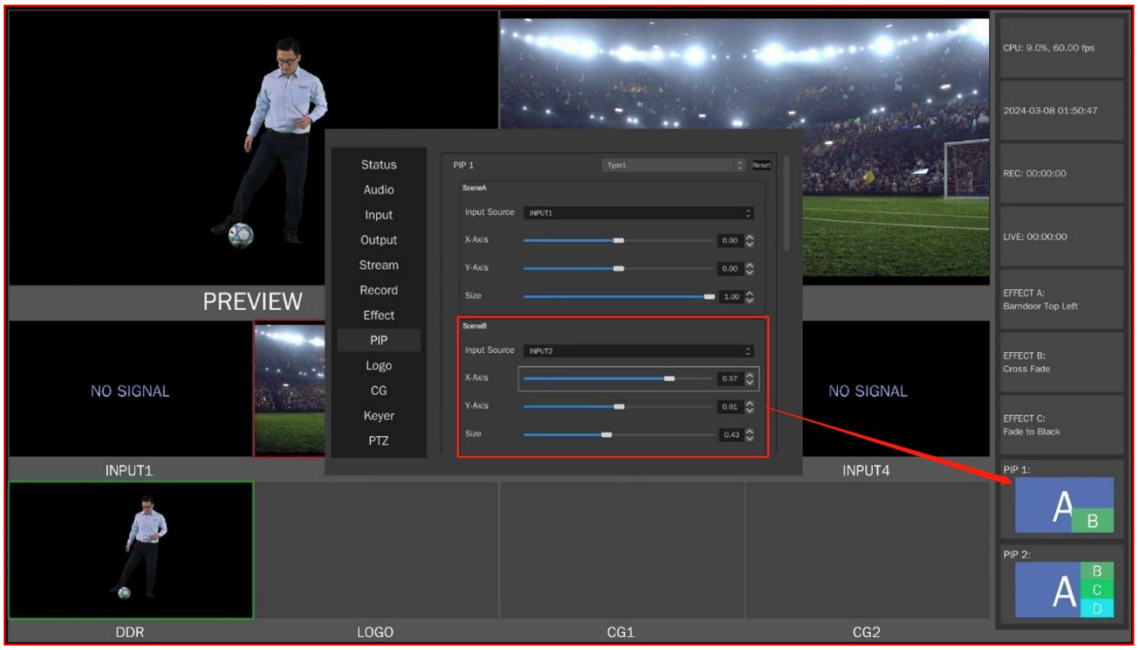


Continue to perform **PIP** processing by following steps.

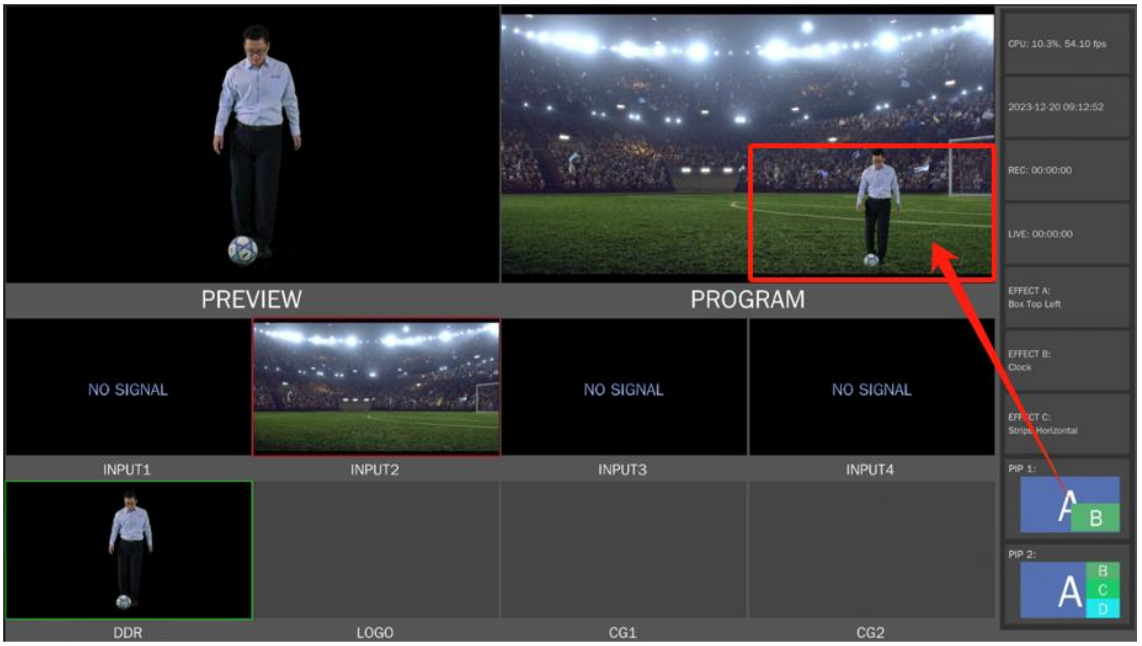
1. Select **PIP** function in **Menu**. Select **Type1** for **PIP** mode in **PIP1** window; select **INPUT2** as **InputSource** to **SceneA**; select **DDR** as **InputSource** to **SceneB**, as shown below.



2. Adjust **Size** and **X/Y-Axis** in **PIP1** window, with **PIP1** preview window displayed in **System Information** panel in multiview (**MV**) screen.



3. Press **PIP1** button on panel to activate **PIP** with **Type1** mode. The overlapped **INPUT2** and **DDR** video sources will be dispalyed in **PROGRAM** (**PGM**) channel, as shown below.



Refer to 3.8 PIP Function for details regarding parameters setting.

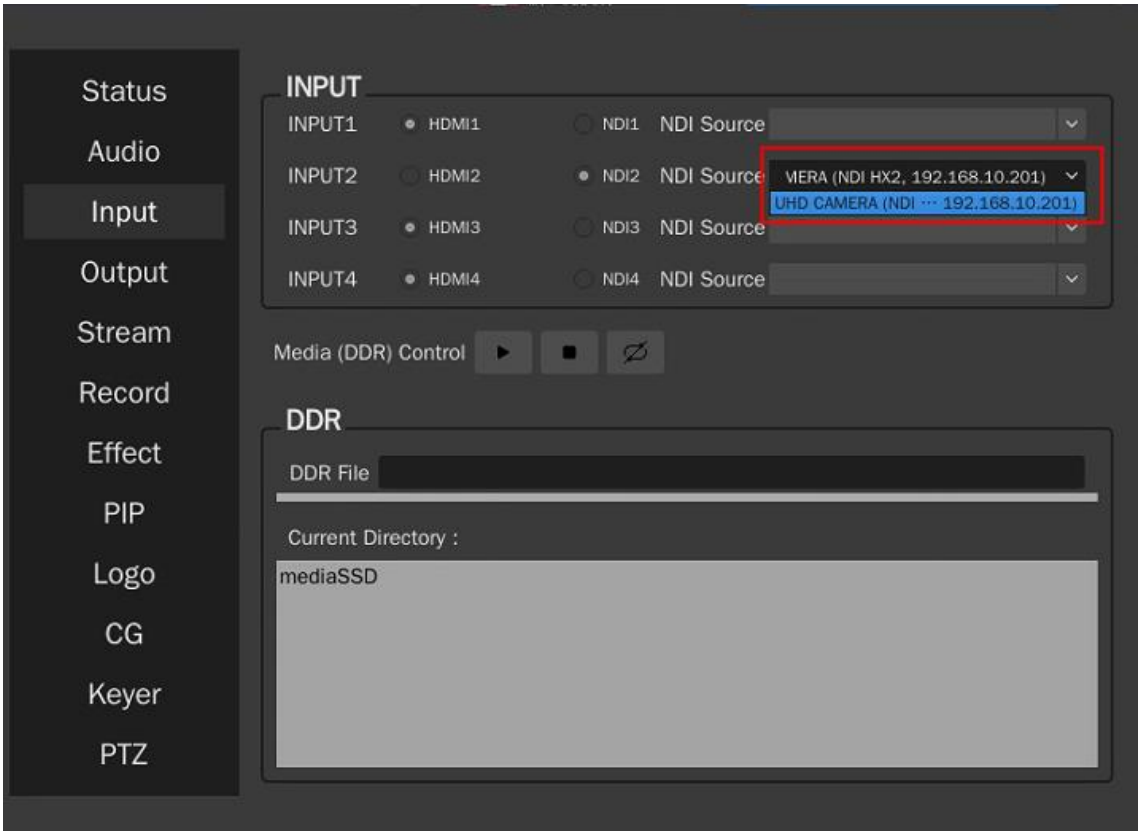
5.3 NDI Video Input

Theia S1 Live Switcher supports NDI (Network Device Interface) devices with options of:

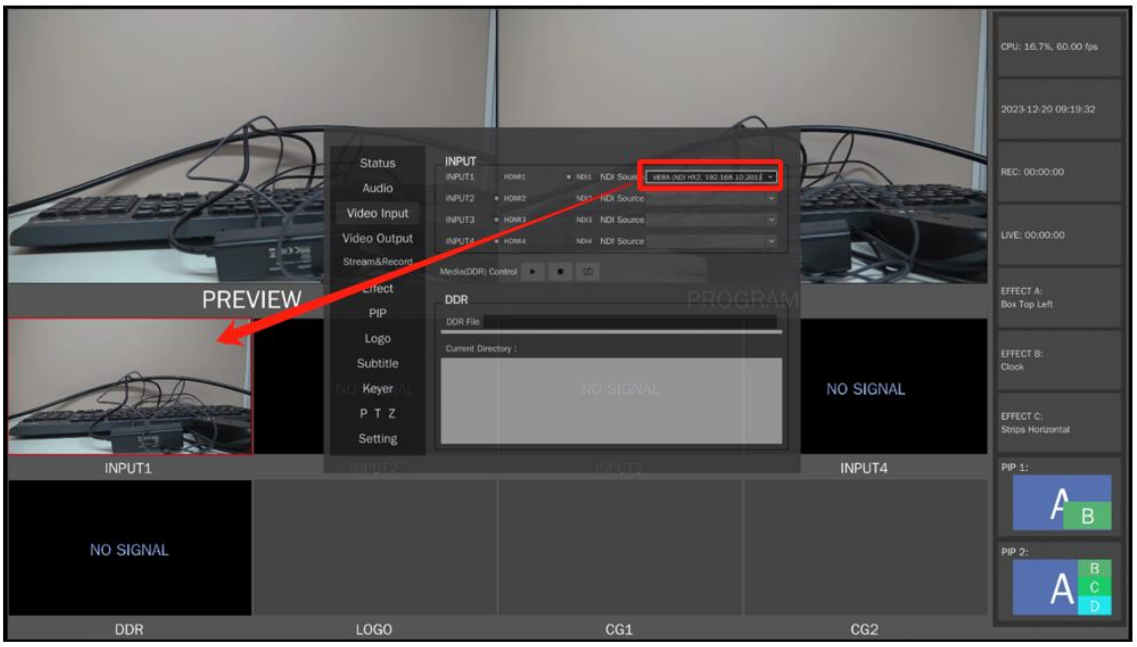
- Full NDI
- NDI NX
- NDI HX2
- NDI HX3

The following steps provide example on how to use **Menu** key for selecting NDI device as video input source, while WebGUI setting will be the same. Note that currently only one NDI video input source is supported in system.

1. Select **Video Input** function in **Menu**. Select **NDI1** for **INPUT1** in **Video Input** window. Theia S1 Live Switcher will automatically search the connecting network domain for NDI signal sources and display them in window, as shown below.



2. Select a NDI device from the NDI source list as the video source to **INPUT1** and the corresponding video content will be displayed in **INPUT1** window in multiview (**MV**) screen, as shown below.

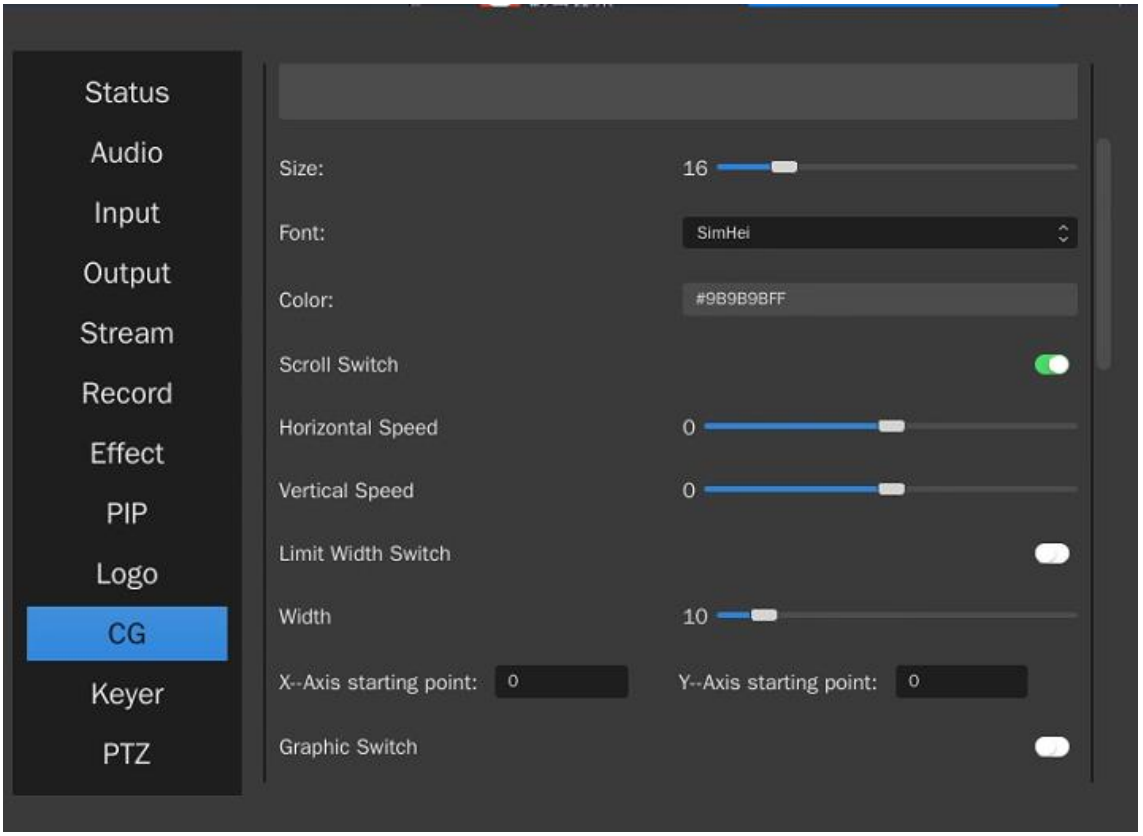


5.4 Text Subtitle Scrolling

Text subtitle scrolling effect can be performed by using **CG** function in **Menu** in direction of:

- Horizontal
- Veritical
- Diagonal (both Horizontal and Vertical are enabled)

with control of scrolling enabling and speeds in both horizontal and vertical directions, as shown below, while WebGUI setting will be the same.



The text subtitle scrolling effects in horizontal and vertical directions are show below.

Text Scrolling off

Horizontal Scrolling

Vertical Scrolling

In addition to defining the direction of test subtitle scrolling, the scrolling area can also be configured based on **Limit Width** and **Width** settings in **CG** function. The **Width** setting to 50%, 70%, and no limit for scrolling area limit are shown below.

Refer to 3.10 CG Function for details regarding parameters setting.

Width Limit 50

Width Limit 70

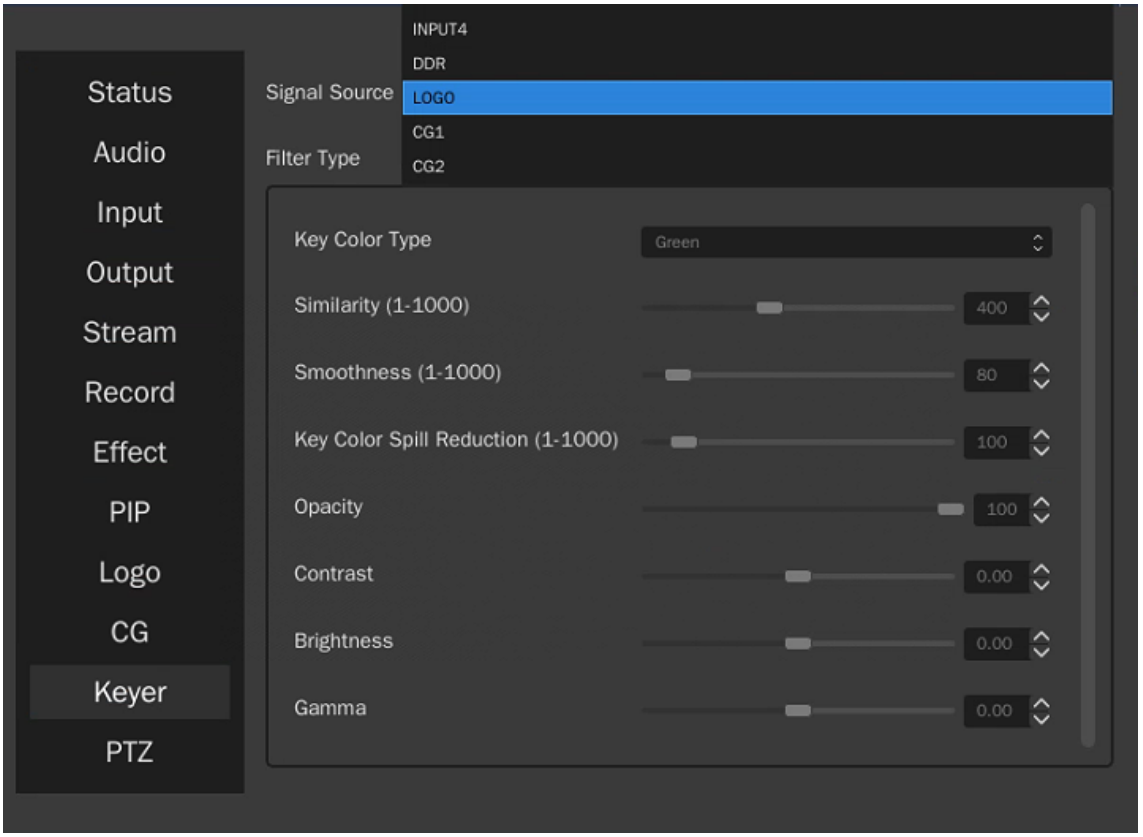
No Width Limit

With text subtitle scrolling support in **CG** function, and the combination of background video content, a more subtle and vivid visual presentation effect can be achieved as shown below.

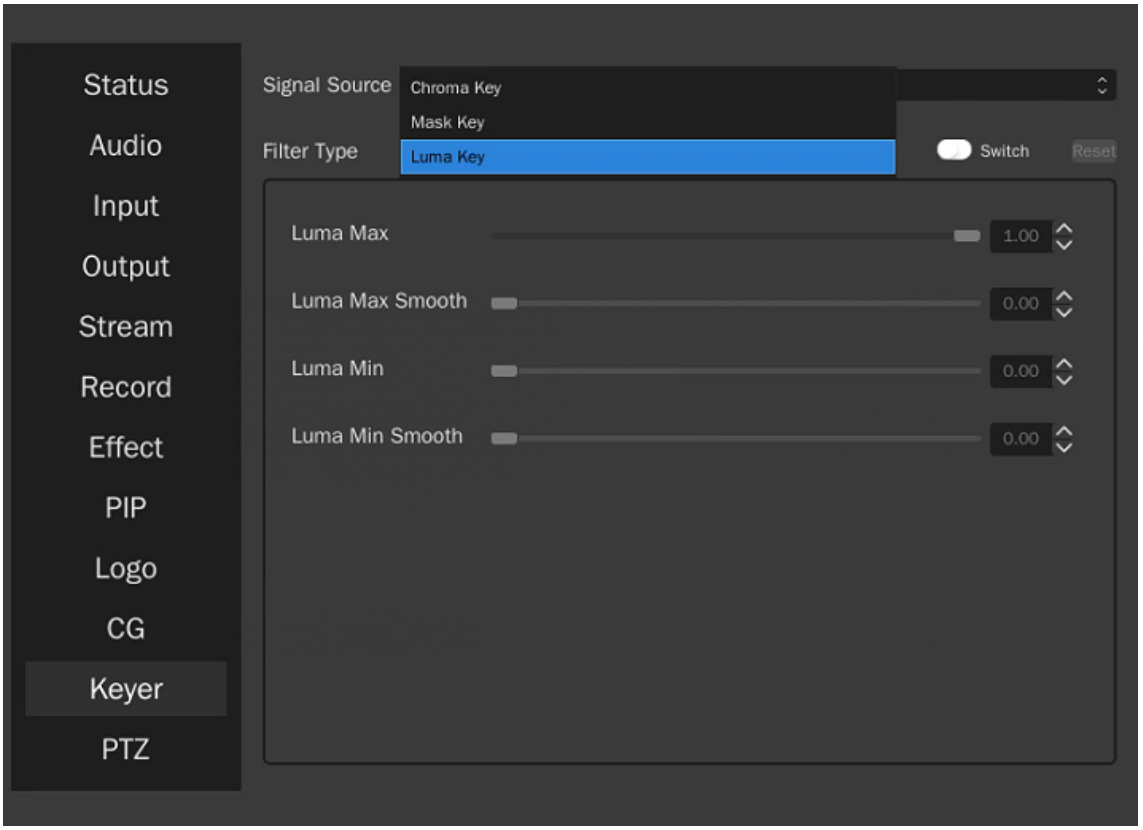
5.5 Luma Keying with Logo

Keying operation can be applied to **Logo** and **CG** files as well and the following steps provide example on how to perform luma keying over **Logo** file by using **Menu** key, while WebGUI setting will be the same.

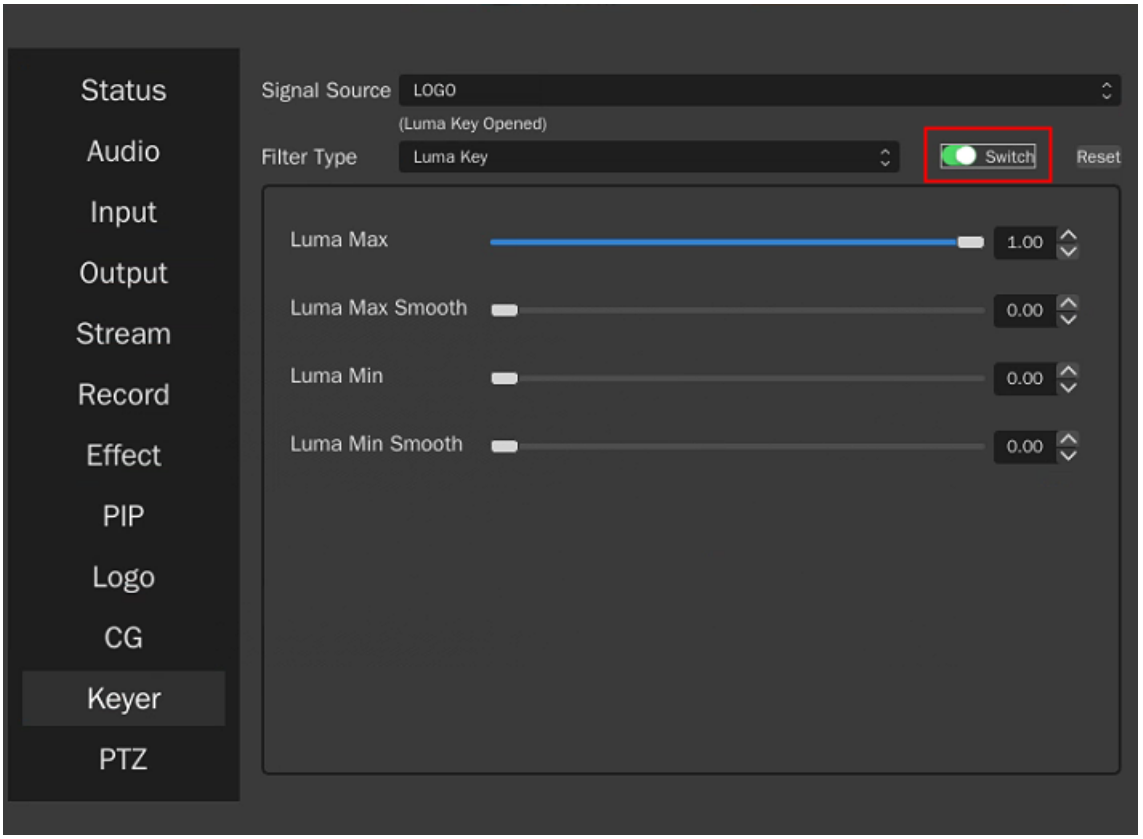
1. Select **Keyer** function in **Menu**. Select **Logo** for **Signal Source** in **Keyer** window, as shown below.



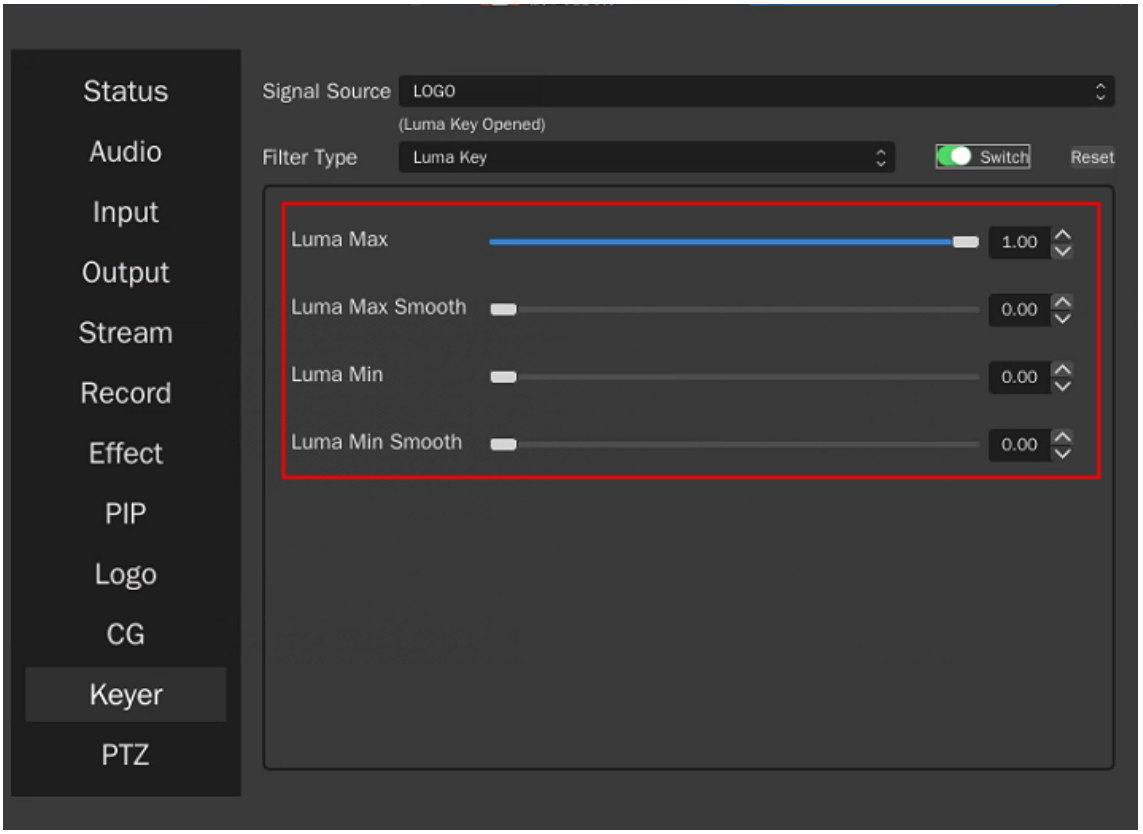
2. Select **Luma Key** in **Filter Type**, as shown below.



3. Click **Switch** button to enable luma keying, as shown below.



4. Adjust the corresponding parameters in Keyer window for luma keying, as shown below.



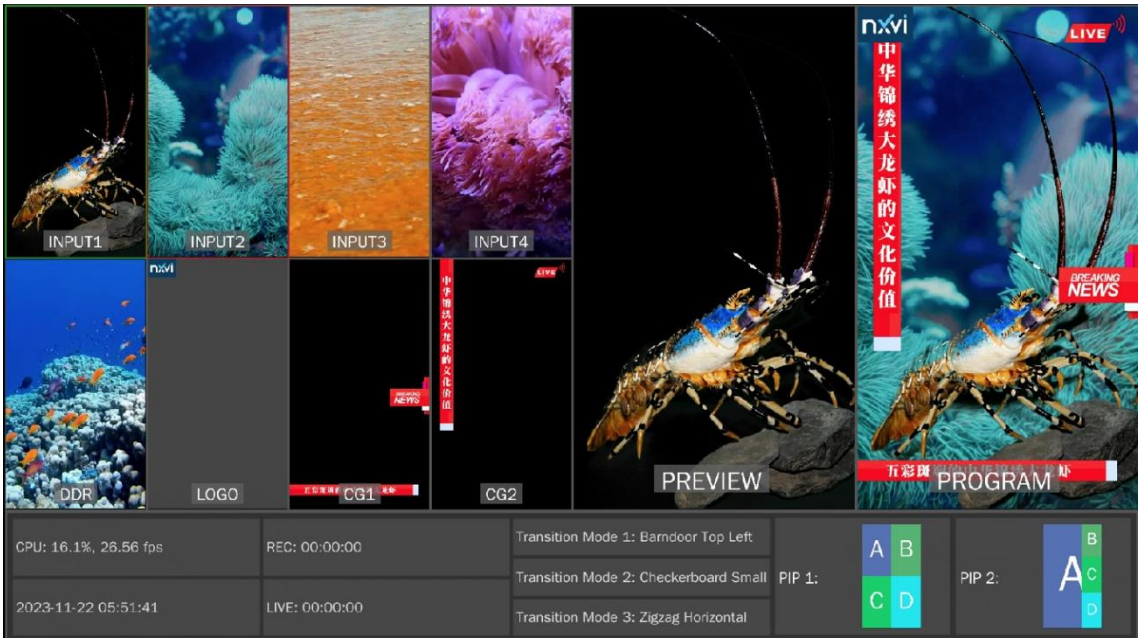
Depending on how parameters are setting, the luma keying over **Logo** file can produce visual effect similar to figure shown below.

Luma Key OFF

Luma Key ON

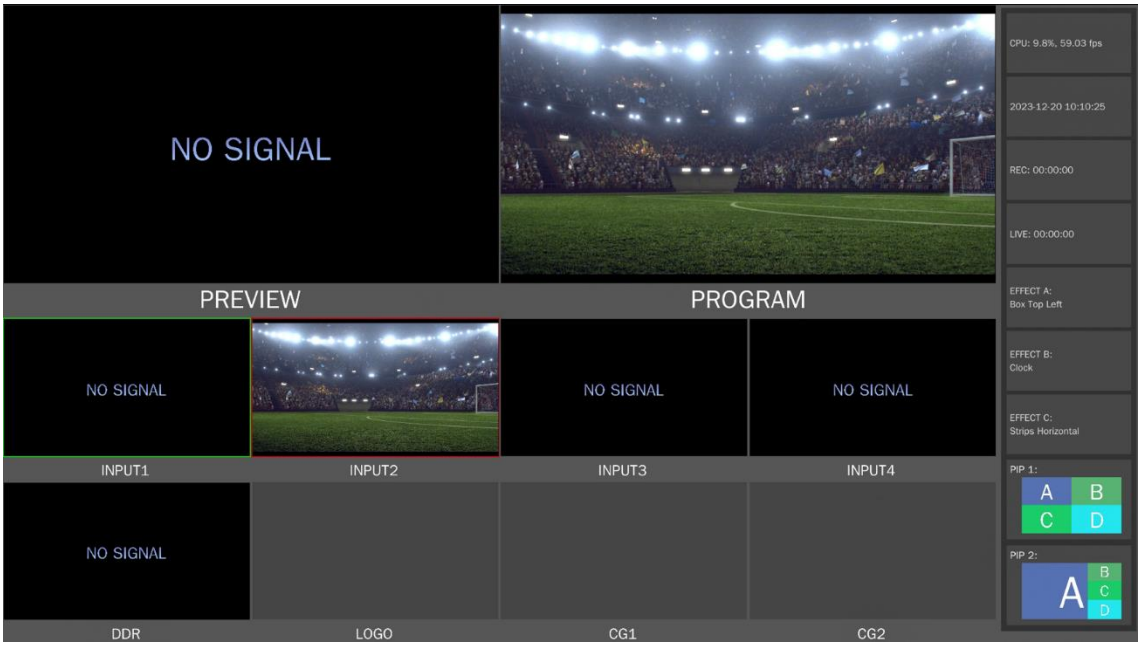
5.6 Landscape and Portrait Mode Switch

Theia S1 Live Switcher adopts landscape mode (Ex. 1920 x 1080) as default in canvas and output for display. The portrait mode can also be supported by changing **Canvas Orientation** in **Video Output** function through **Menu**, as displayed in multiview screen shown below.

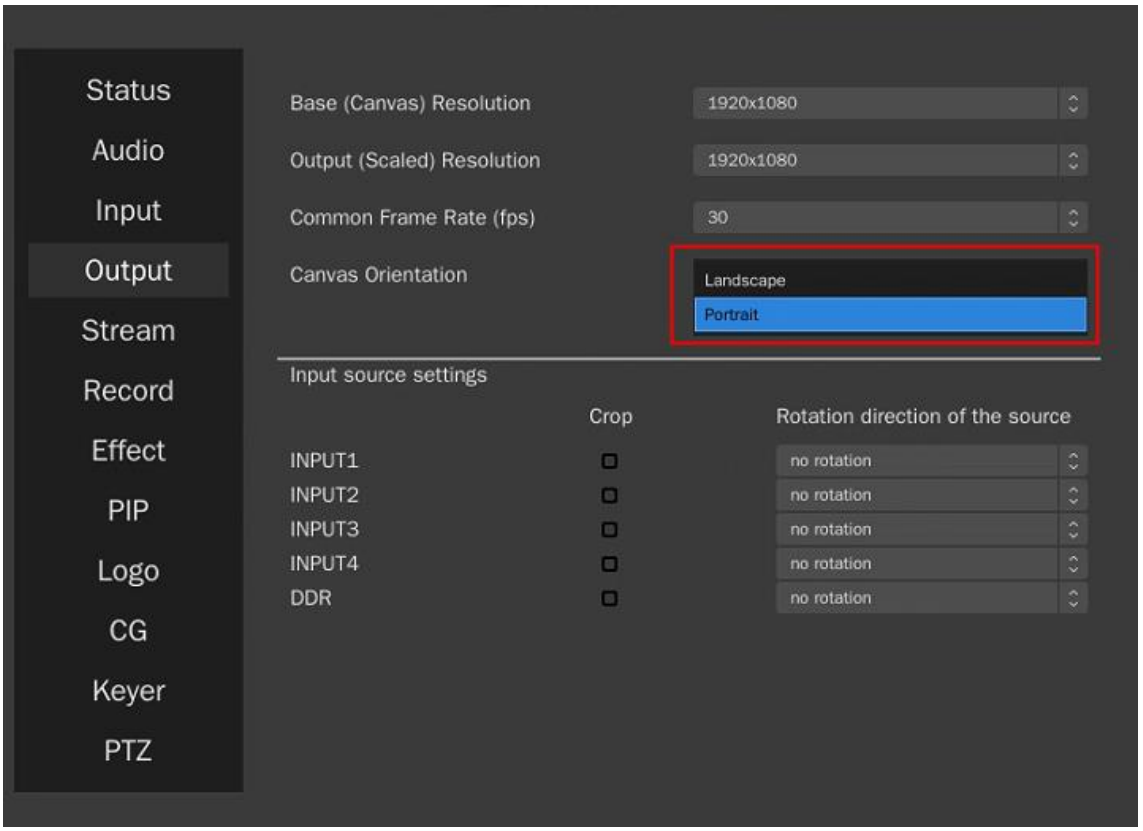


The following steps provide example on how to perform landscape and portrait mode switch by using **Menu** key.

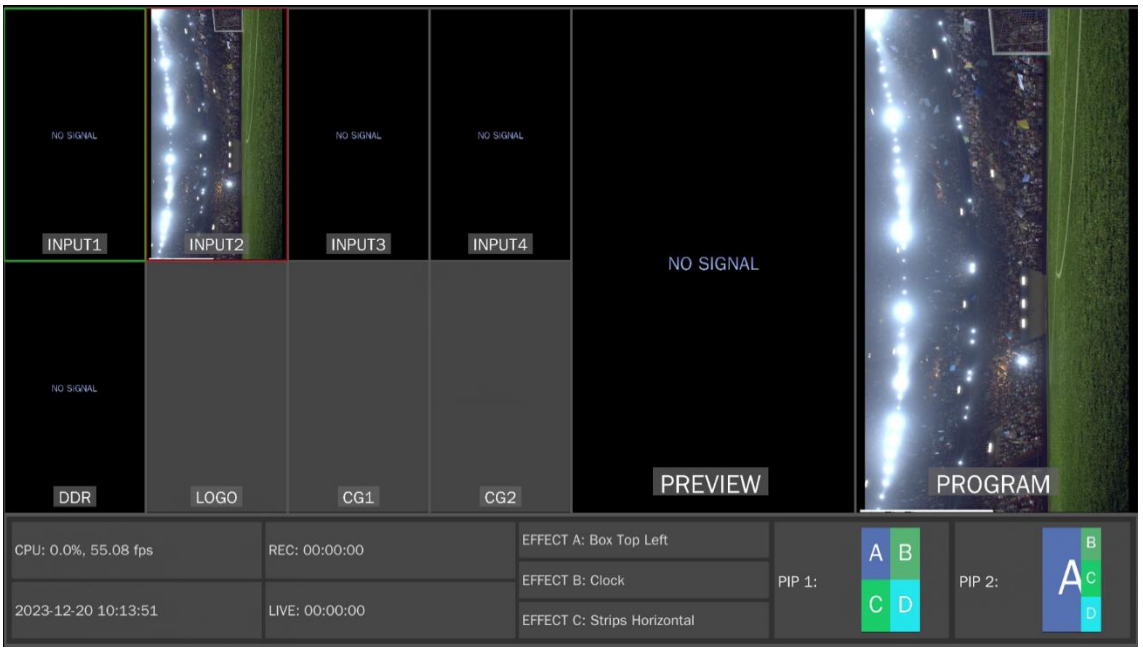
1. Connect video source (in 1920 x 1080 as an example) **INPUT2** as shown below.



2. Select **Video Output** function in **Menu**. Select **Portrait** for **Canvas Orientation** in **Video Output** window, as shown below.



3. When **Portrait** mode is selected in **Canvas Orientation** in **Video Output** window, the multiview (**MV**) screen display will be automatically rotated counterclockwise, as shown below.



5.7 Video Rotate and Crop

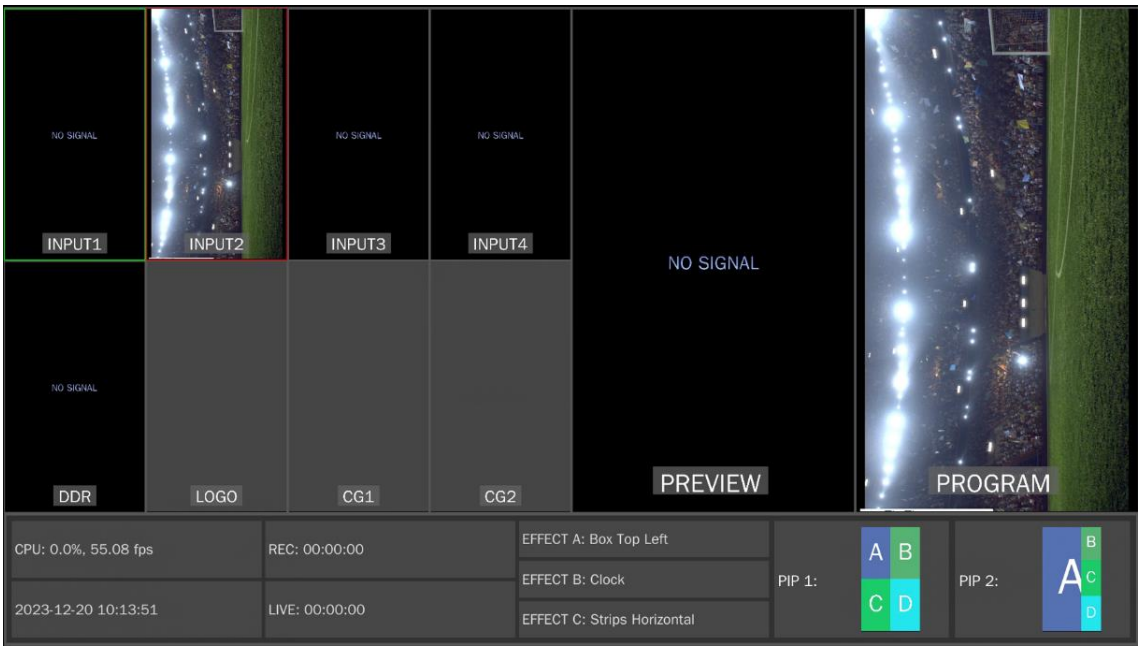
Video sources can be individually configured to perform rotate and crop operations when necessary. Based on **Lanscape** or **Portrait** mode of **Canvas Orientation** in **Video Output** window in **Menu**, the output display will be different in visual effect after applying rotate and crop operations to video sources. The following steps provide example on how rotate and crop opertions will perform over:

- landscape mode based canvas
- portrait mode based canvaus

and how visual effects will be obsered.

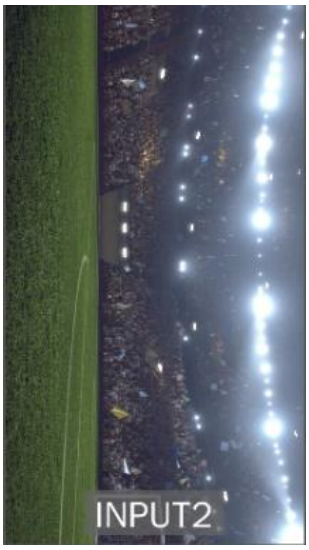
■ Rotate and Crop in Portrait Canvas

1. Configure **Canvas Orientation** to **Portrait** mode as multiview (**MV**) screen shown below.

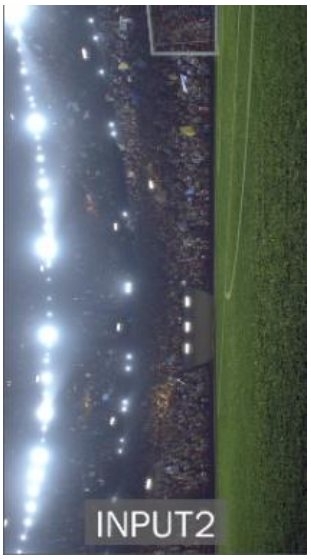


2. Use **INPUT2** source (in 1920 x 1080) as example and rotate in clockwise and counterclockwise diections are shown below.

No Rotation



Clockwise Rotation



Counterclockwise Rotation

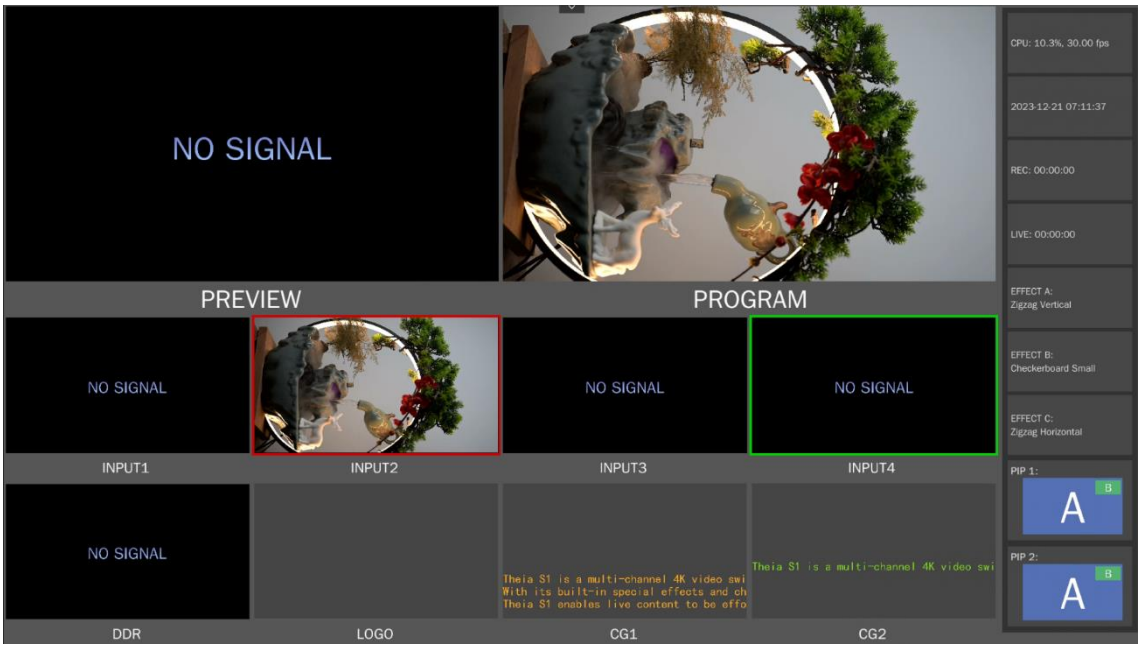
3. As **INPUT2** source (in landscape mode) cannot fill up the entire screen (in portrait mode), the cropping function can be performed to source and system will be automatically scaling source to entire screen, as shown below.

Before Cropping

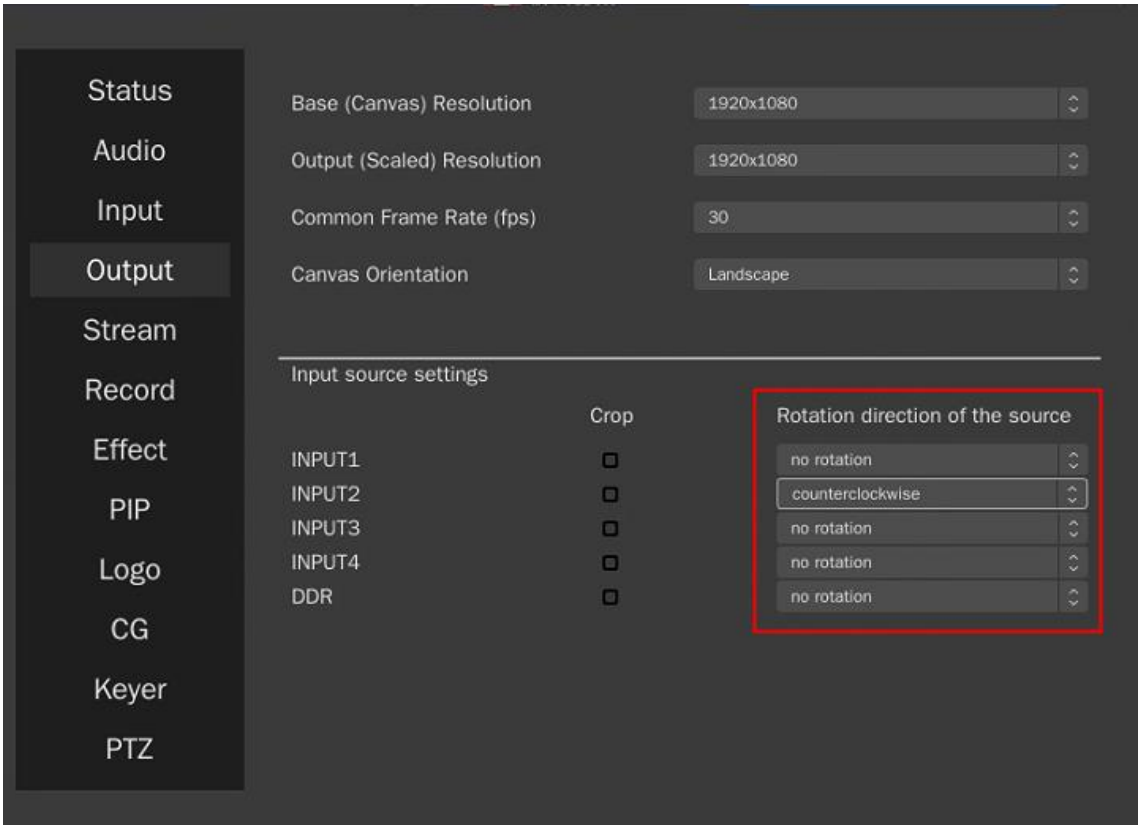
After Cropping

■ Rotate and Crop in Landscape Canvas

1. Configure **Canvas Orientation** to **Landscapte** mode as multiview (**MV**) screen shown below.



2. Use **INPUT2** source (in 1080 x 1920) as example and select rotation direction as shown below.



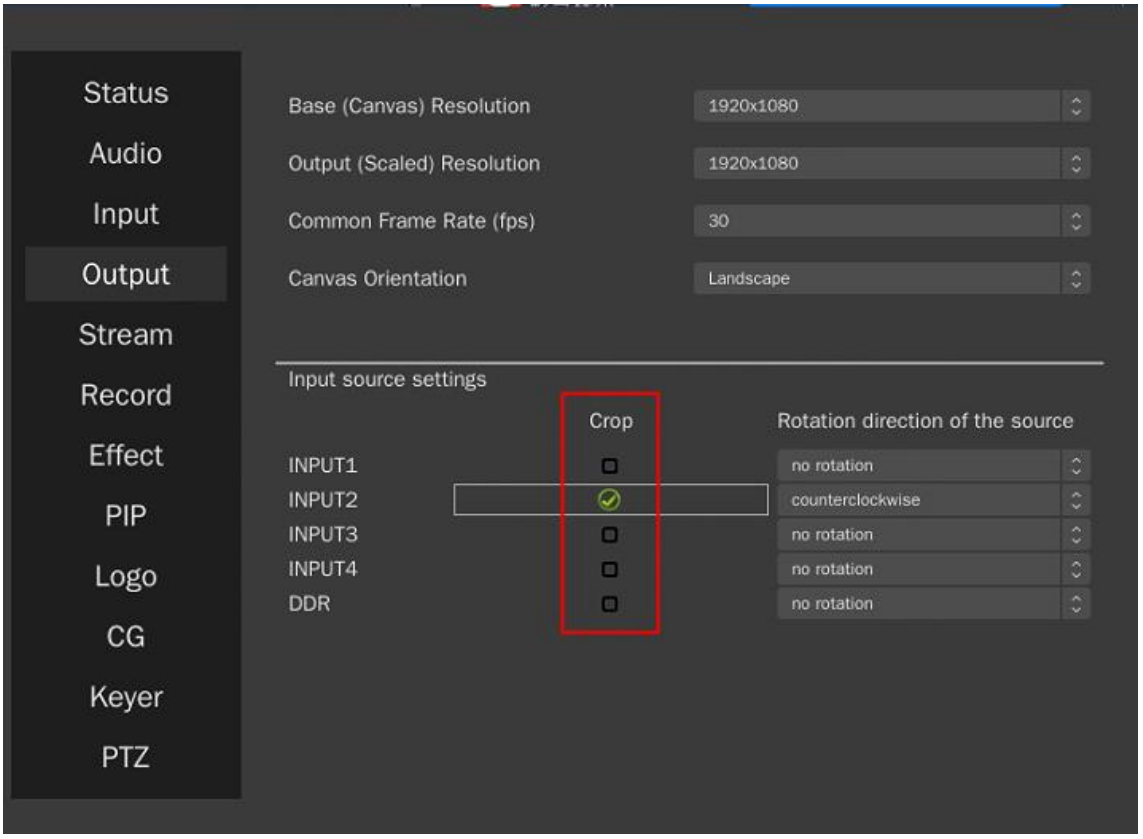
3. **INPUT2** source rotate in clockwise and counterclockwise directions are shown below.

No Rotation

Clockwise Rotation

Counterclockwise Rotation

4. Click **Crop** button in Video Output window for performing video cropping over **INPUT2** source.



5. System will be automatically scaling **INPUT2** source to entire screen, as shown below.

Before Cropping

After Cropping

5.8 Luma Keying with PowerPoint

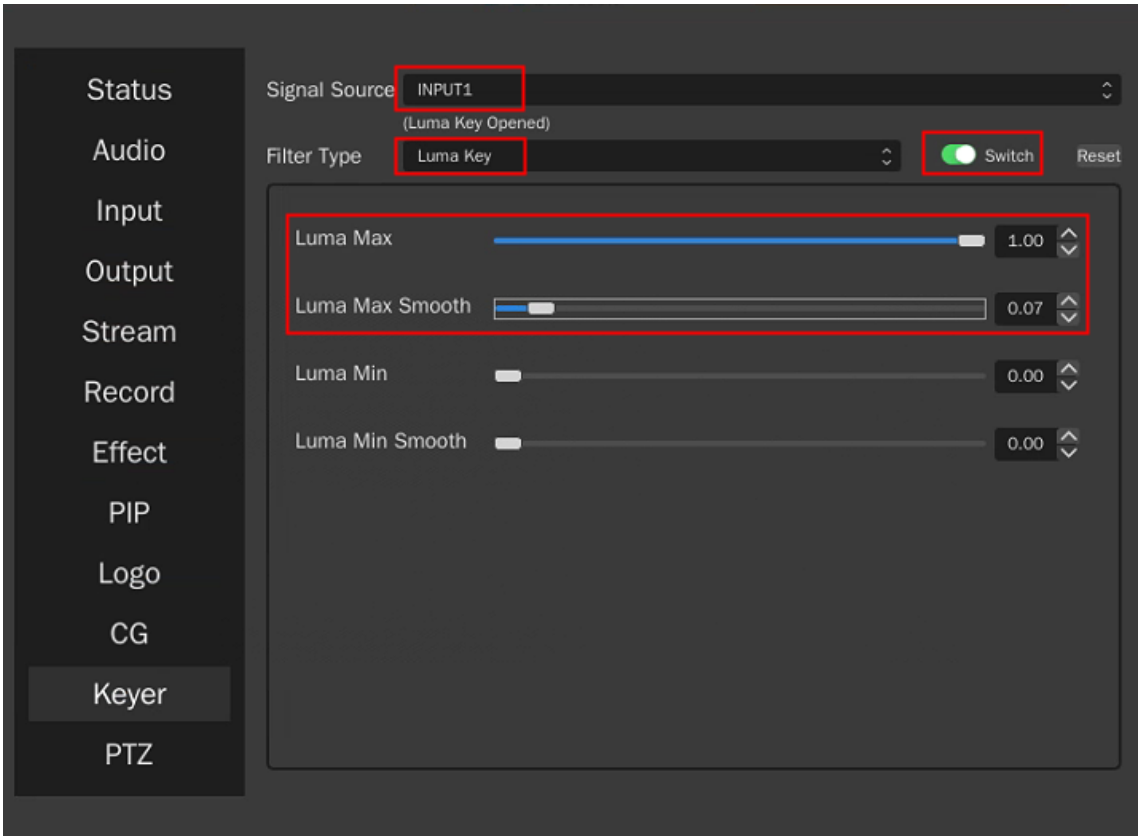
PowerPoint based display from external computer can be a video input source to Theia S1 Live Switcher. By applying **Keyer** function to PowerPoint based video input source, the more sophisticated subtitle effects can be achieved. The following steps provide example on how to use **Keyer** function in **Menu** over PowerPoint video input for subtitile effect creation in program (**PGM**) channel. Two types of subtitle background color:

- While
- Black (Grey)

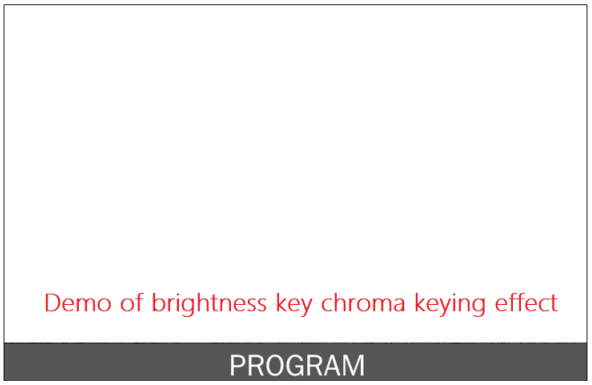
are discussed as reference.

■ Luma Keying for White Background Subtitle

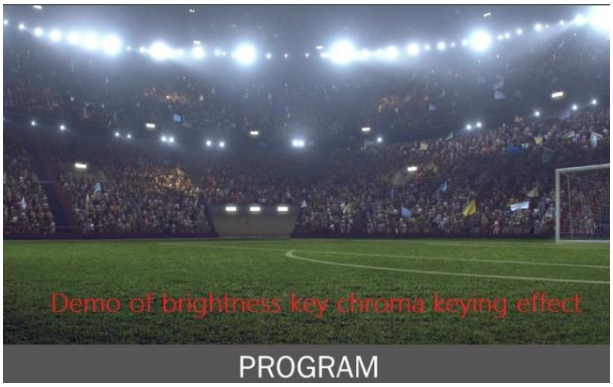
1. Select **Keyer** function in **Menu**. Select **INPUT1** (subtitle video) for **Signal Source**, and **Luma Key** for **Filter Type** in **Keyer** window, plus clicking **Switch** button for enabling, as shown below.



2. Adjust **Luma Max** (suggesting to start from value 1.00) and **Luma Max Smooth** (suggesting to start from value 0.00) parameters to key out whilte background and smooth edges, as shown below.



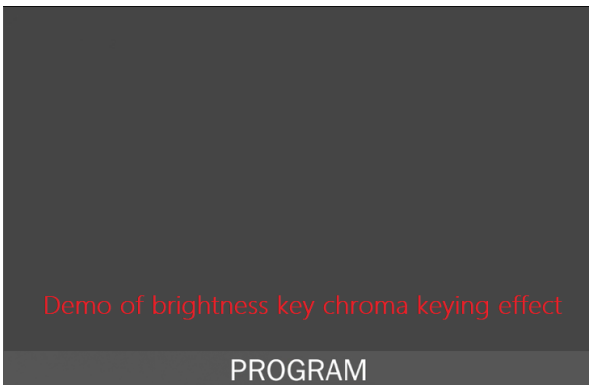
Without Parameter Adjustment



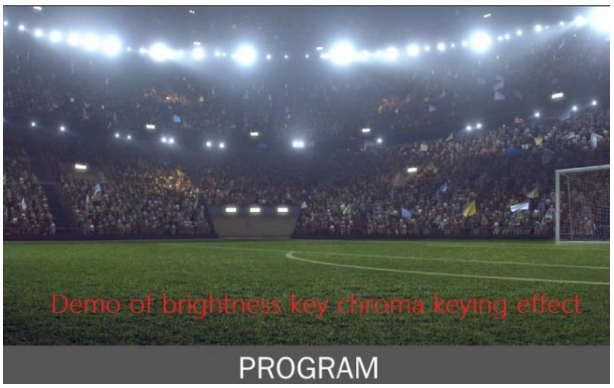
With Parameter Adjustment

■ Luma Keying for Black (Grey) Background Subtitle

1. Similar to step 1 in **Luma Keying for Whilte Background Subtitle** to select **Keyer** function in **Menu**. Select **INPUT1** (subtitle video) for **Signal Source**, and **Luma Key** for **Filter Type** in **Keyer** window, plus clicking **Switch** button for enabling.
2. Adjust **Luma Max** (suggesting to start from value 0.00) and **Luma Max Smooth** (suggesting to start from value 0.00) parameters to key out black (grey) background and smooth edges, as shown below.



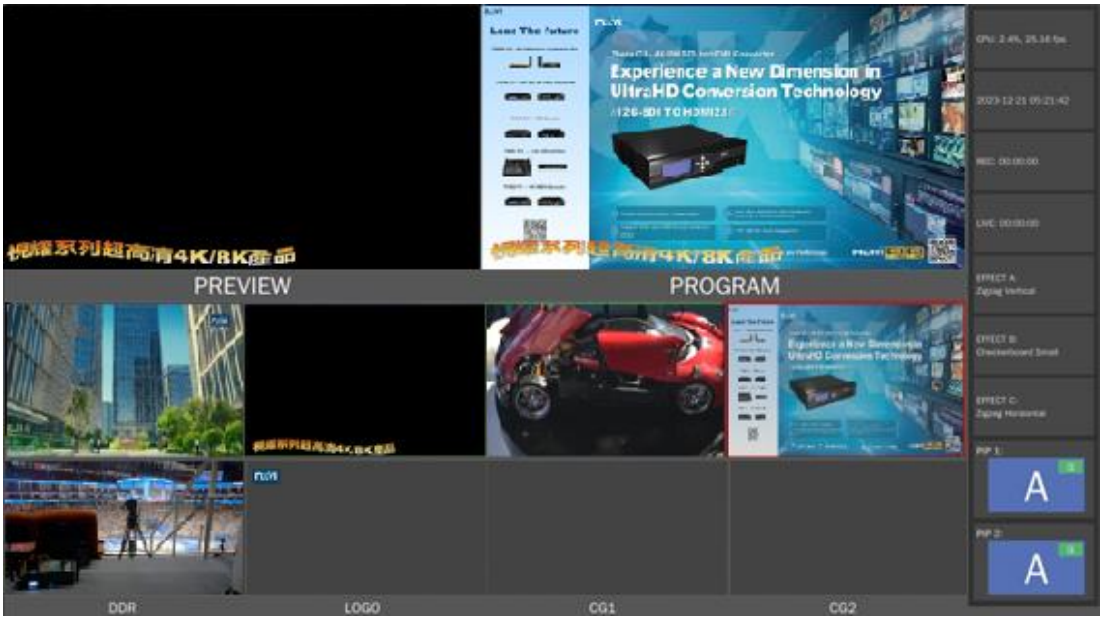
Without Parameter Adjustment



With Parameter Adjustment

■ PowerPoint Video Input

1. Select **INPUT2** (PowerPoint based video source from external computer) in **Signal Source** and perform the required subtitle background color removal by parameters adjustment in luma keying window for applying to program (**PGM**) channel in final, as shown below.



Chapter 6: Use Cases – Streaming

This chapter provides examples on how to perform live streaming to 3rd-party platforms in:

- HLS (HTTP Live Streaming)
- RTMP (Real-Time Messaging Protocol)
- RTP (Real-time Transport Protocol) and UDP (User Datagram Protocol)

network protocols on Theia S1 Live Switcher, with the encoding of video sources from HDMI, NDI, and DDR in HEVC/H.265 and H.264 codec formats.

6.1 HLS Streaming

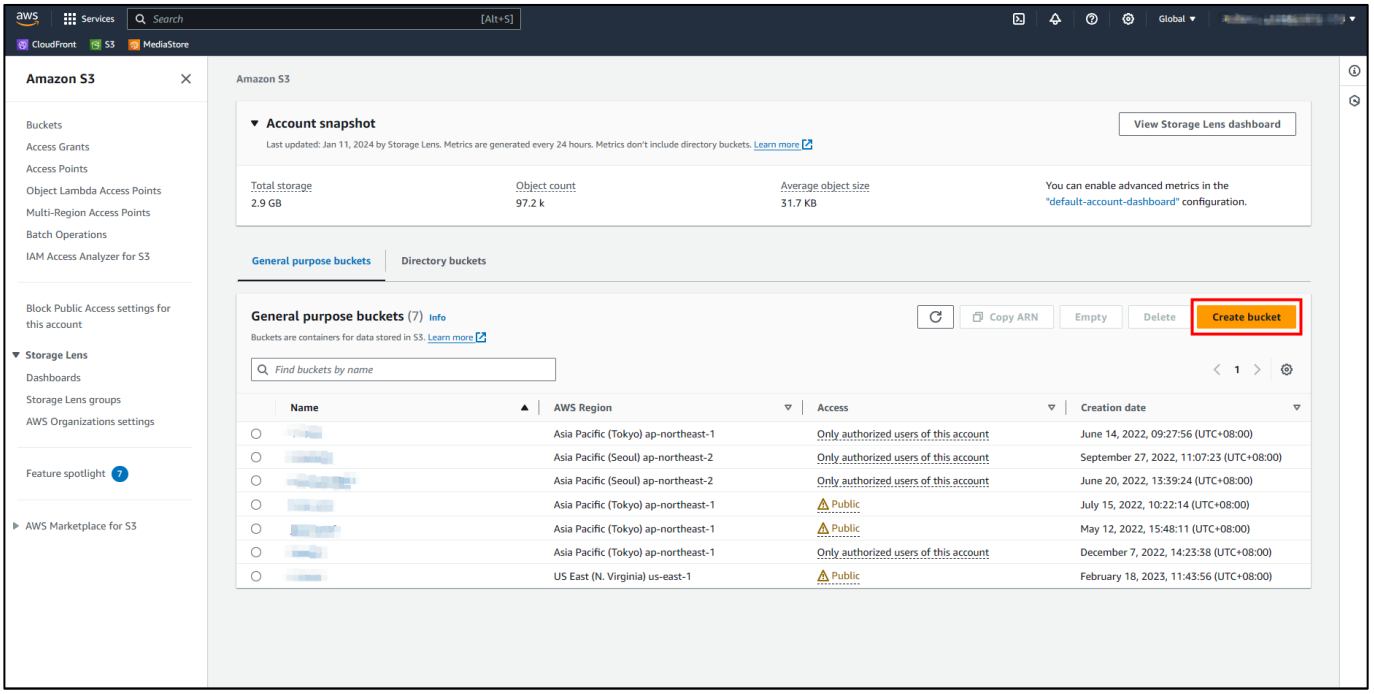
AWS (Amazon Web Services) cloud service platform offers support to HLS streaming. The following steps provide example on how to establish HLS streaming between Theia S1 Live Switcher and AWS platform.

The open-source VLC media player is used as a demonstration tool for playing streaming video. Visit and download VLC at:

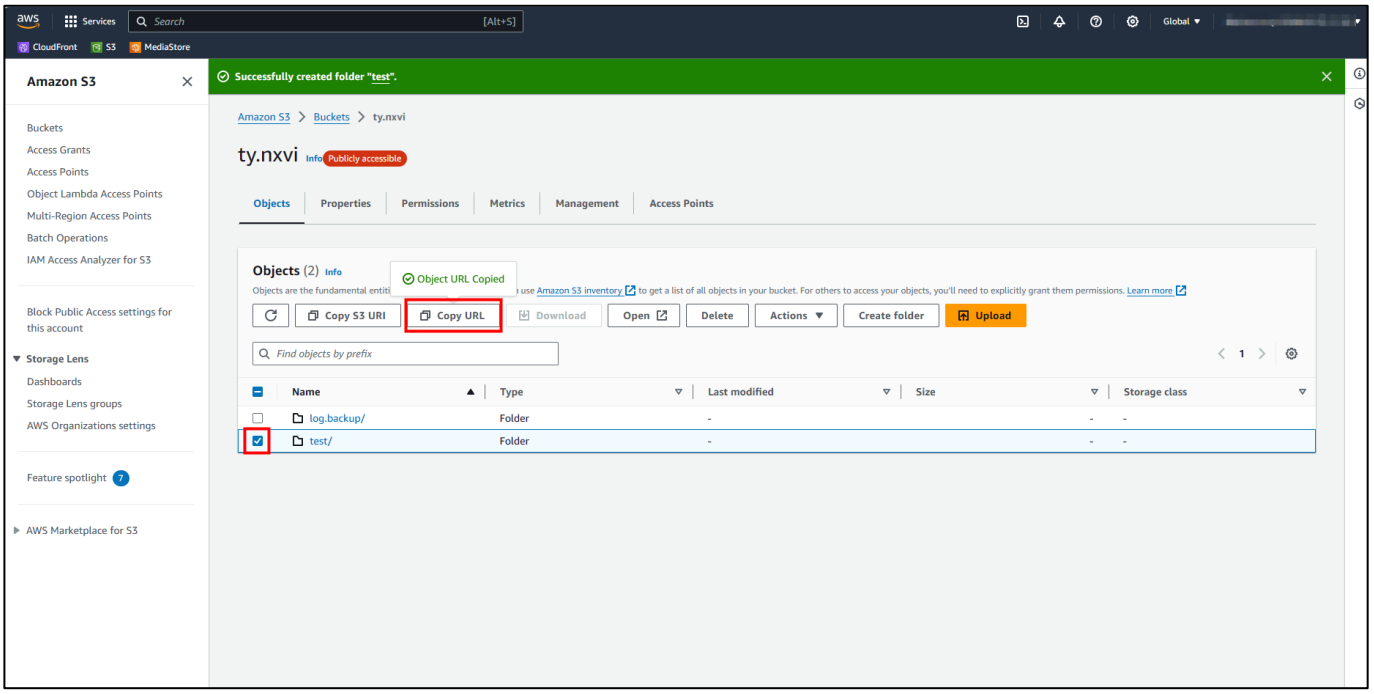
- https://www.videolan.org/

when necessary.

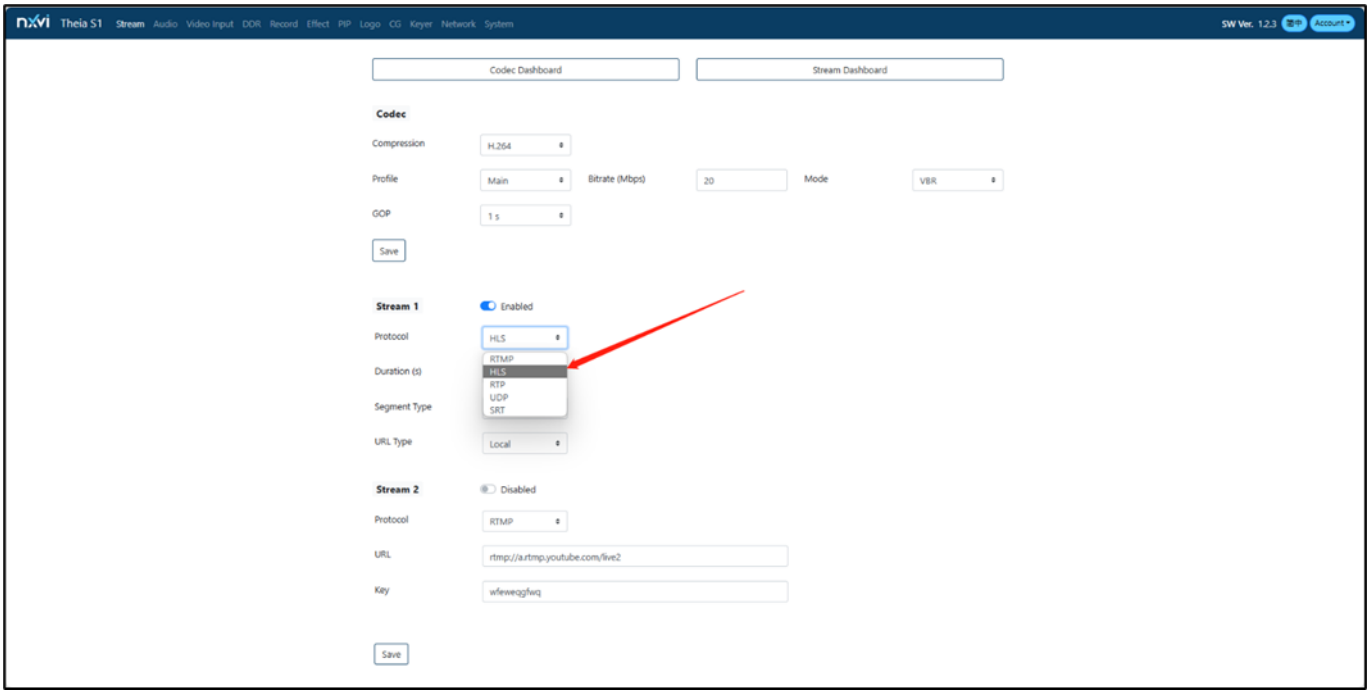
1. Sign in and login to AWS platform at:
   - https://aws.amazon.com/
2. Access AWS console, select S3 service, and create bucket, as shown below.



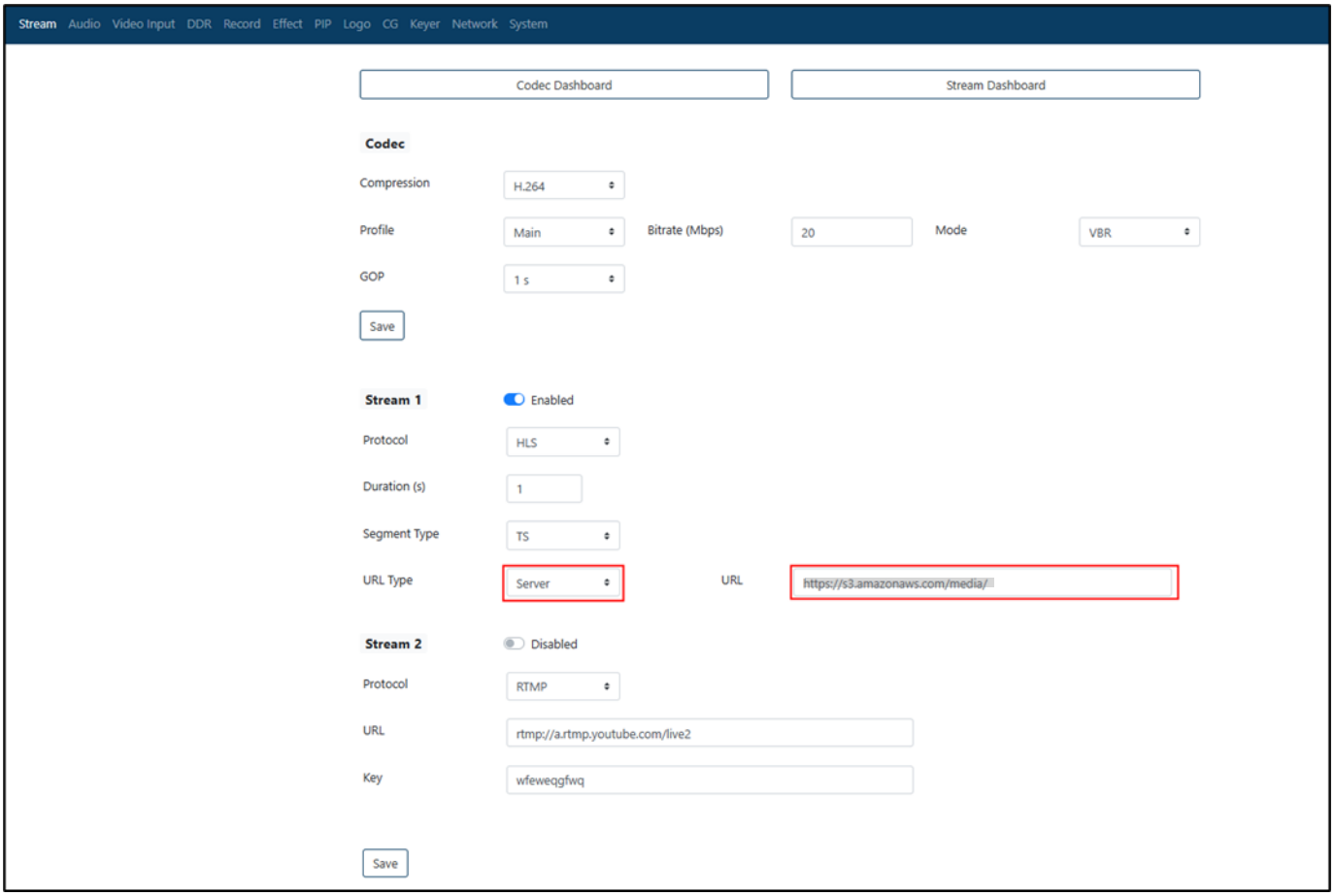
3. In the created storage bucket, create and name a folder, and click **Copy URL** button, as shown below.



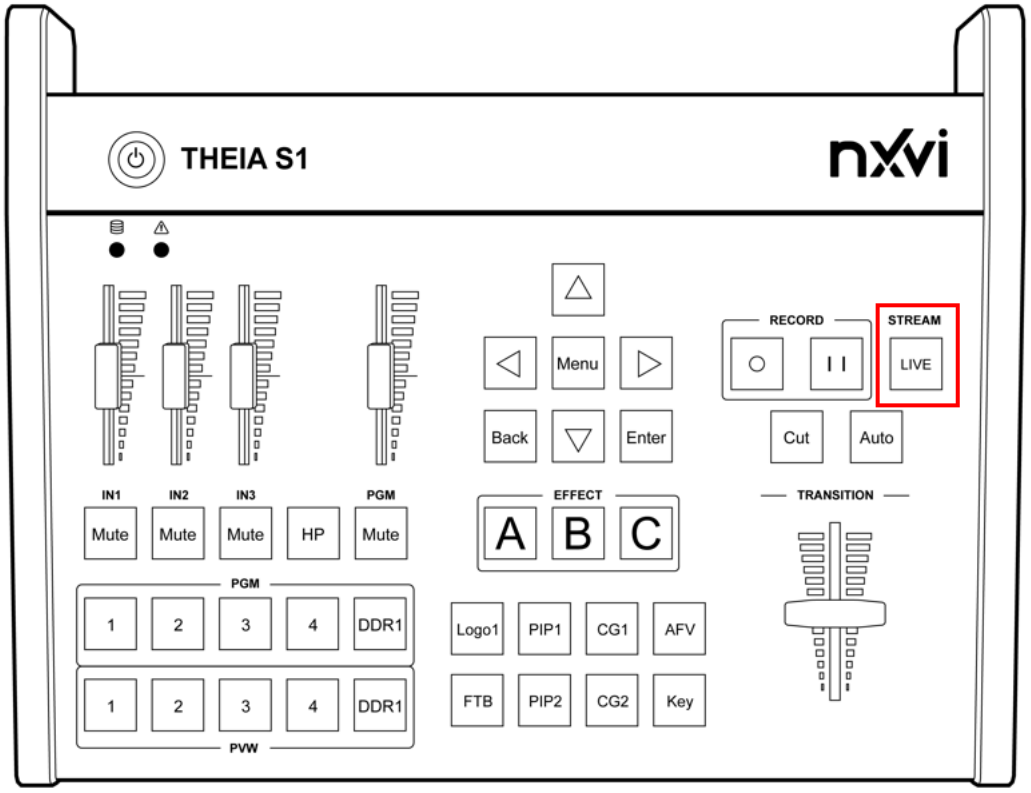
4. Open WebGUI for Theia S1 Live Switcher, select **Stream** setting, and select **HLS** in **Protocol** setting, as shown below.



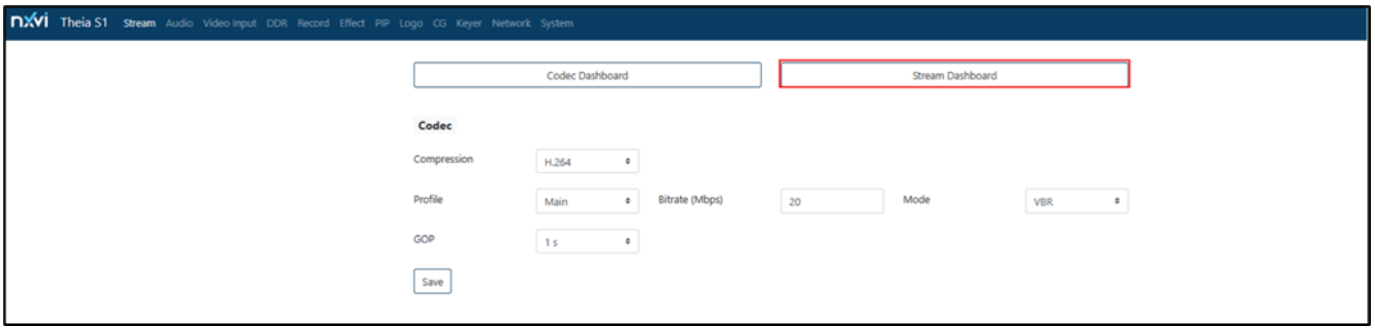
5. Select **Server** in **URL Type**, paste URL from AWS S3 service to **URL**, and click **Save** in WebGUI for applying, as shown below.

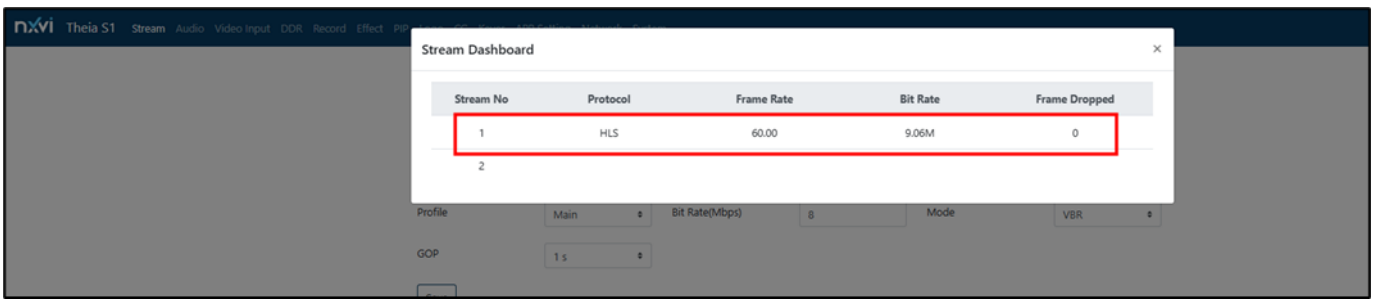


6. Press **LIVE** button on Theia S1 Live Switcher to start the live streaming, as shown below.

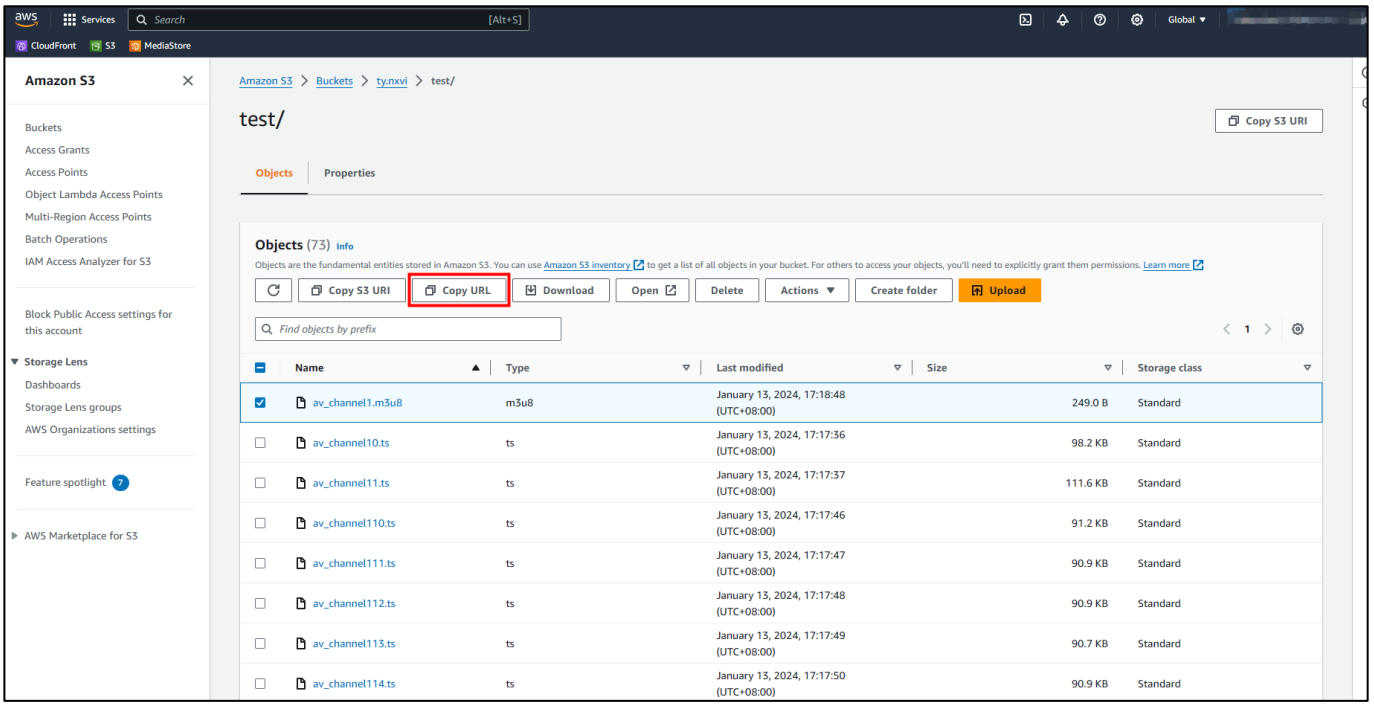


7. Check **Stream Dashboard** in **Steam** setting at WebGUI to confirm the live stream is created accordingly, as shown below.

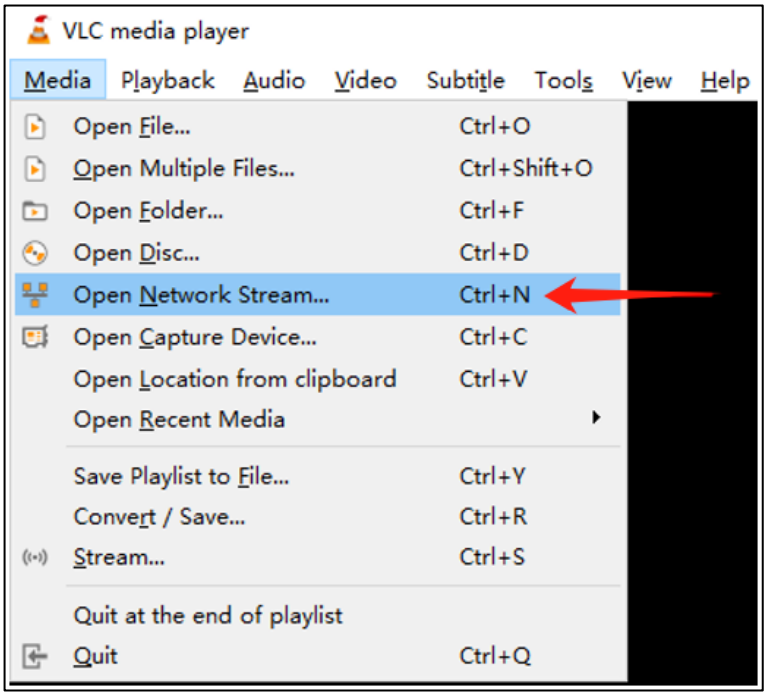




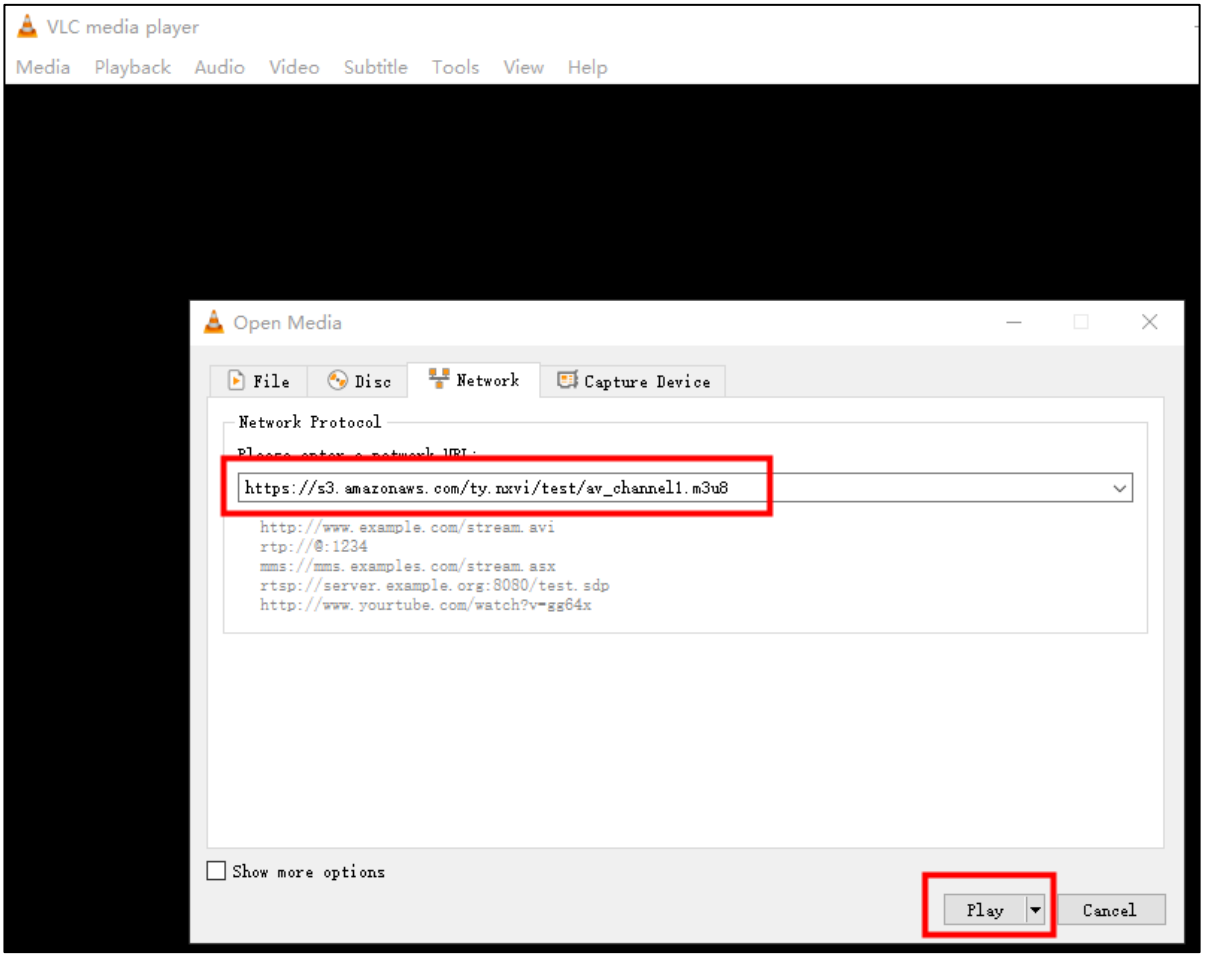
8. In AWS S3 console, navigate the created folder and click on the file with m3u8 file extension, and copy the URL, as shown below.



9. Open VLC media player in client computer, select **Open Network Stream** in **Media** setting, as shown below.



10. Paste URL from AWS S3 service to **Network Protocol** in **Network** setting, and click Play button in VLC media player for playing streaming video, as shown below.



Users can also use:

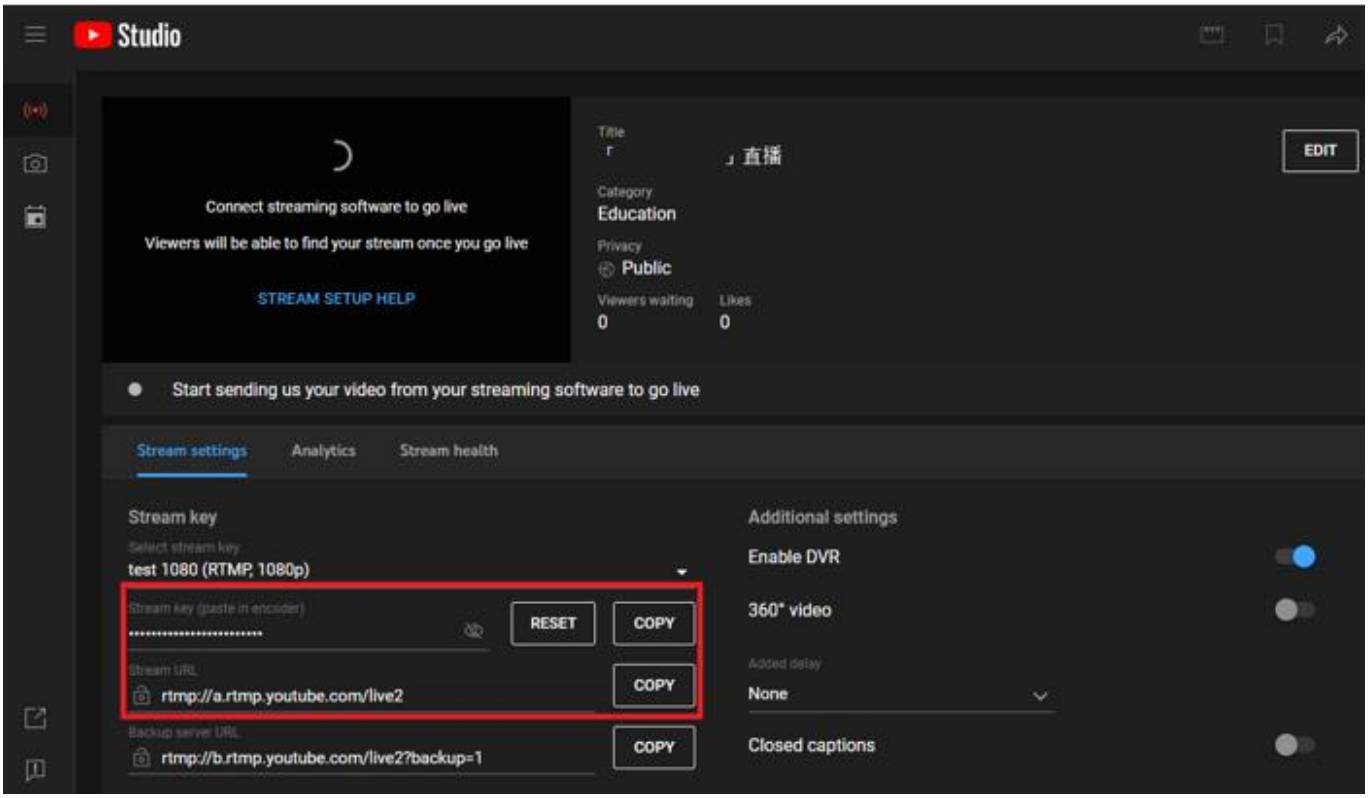
- Safari browser in iPhone, iPad, and MacBook
- Edge browser in Windows

for playing m3u8 file with streaming URL provided.

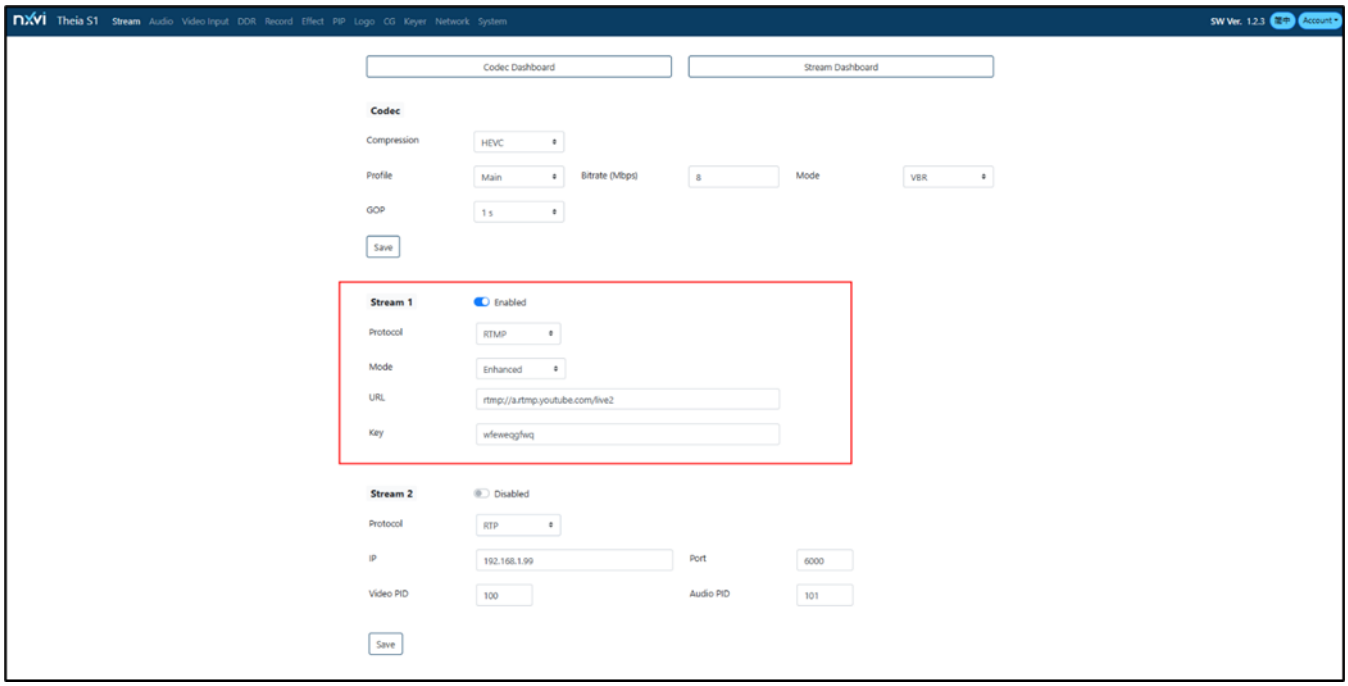
6.2 RTMP Streaming

YouTube and TikTok cloud service platform offers support to RTMP streaming. The following steps provide example on how to establish RTMP streaming between Theia S1 Live Switcher and YouTube Live platform.

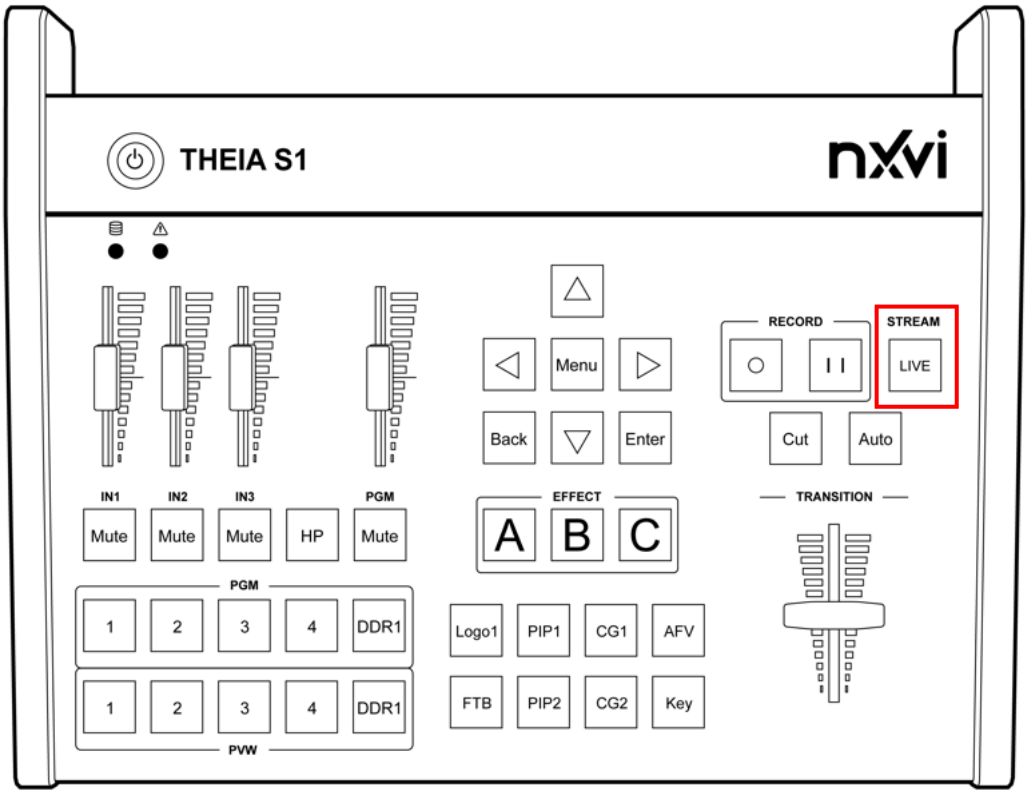
1. Visit YouTube Live platform at:
   - https://www.youtube.com/live_dashboard
2. Copy Stream key and Stream URL from YouTube Live platform dashboard, as shown below.



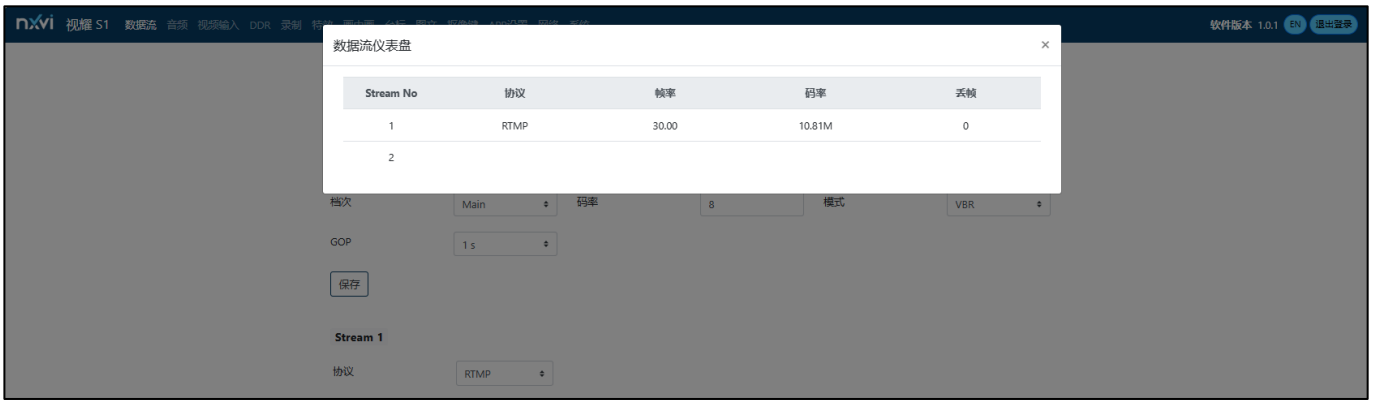
3. Open WebGUI for Theia S1 Live Switcher, select **Stream** setting, and select **RTMP** in **Protocol** setting, as shown below.



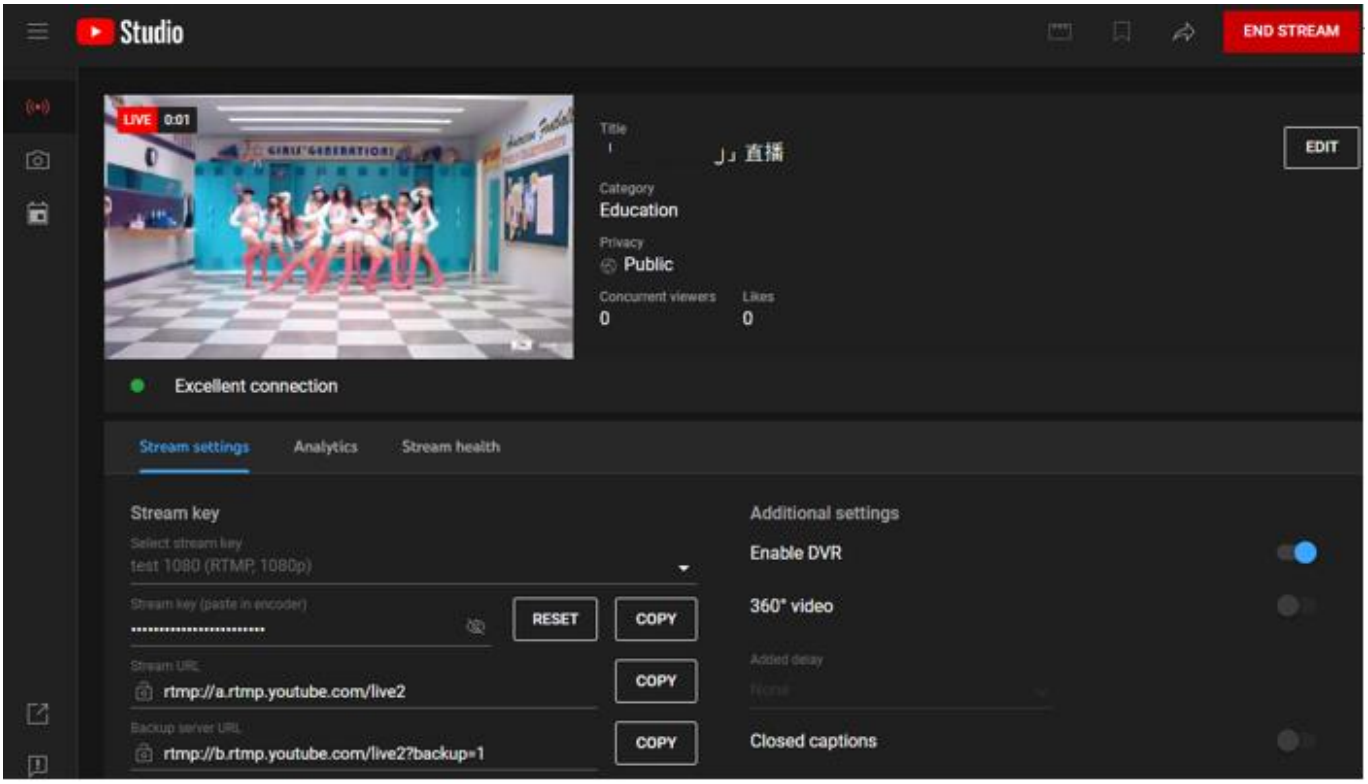
4. Press **LIVE** button on Theia S1 Live Switcher to start the live streaming, as shown below.



5. Check **Stream Dashboard** in **Steam** setting at WebGUI to confirm the live stream is created accordingly, as shown below.



6. Users will see video streaming on YouTube Live platform, as shown below.



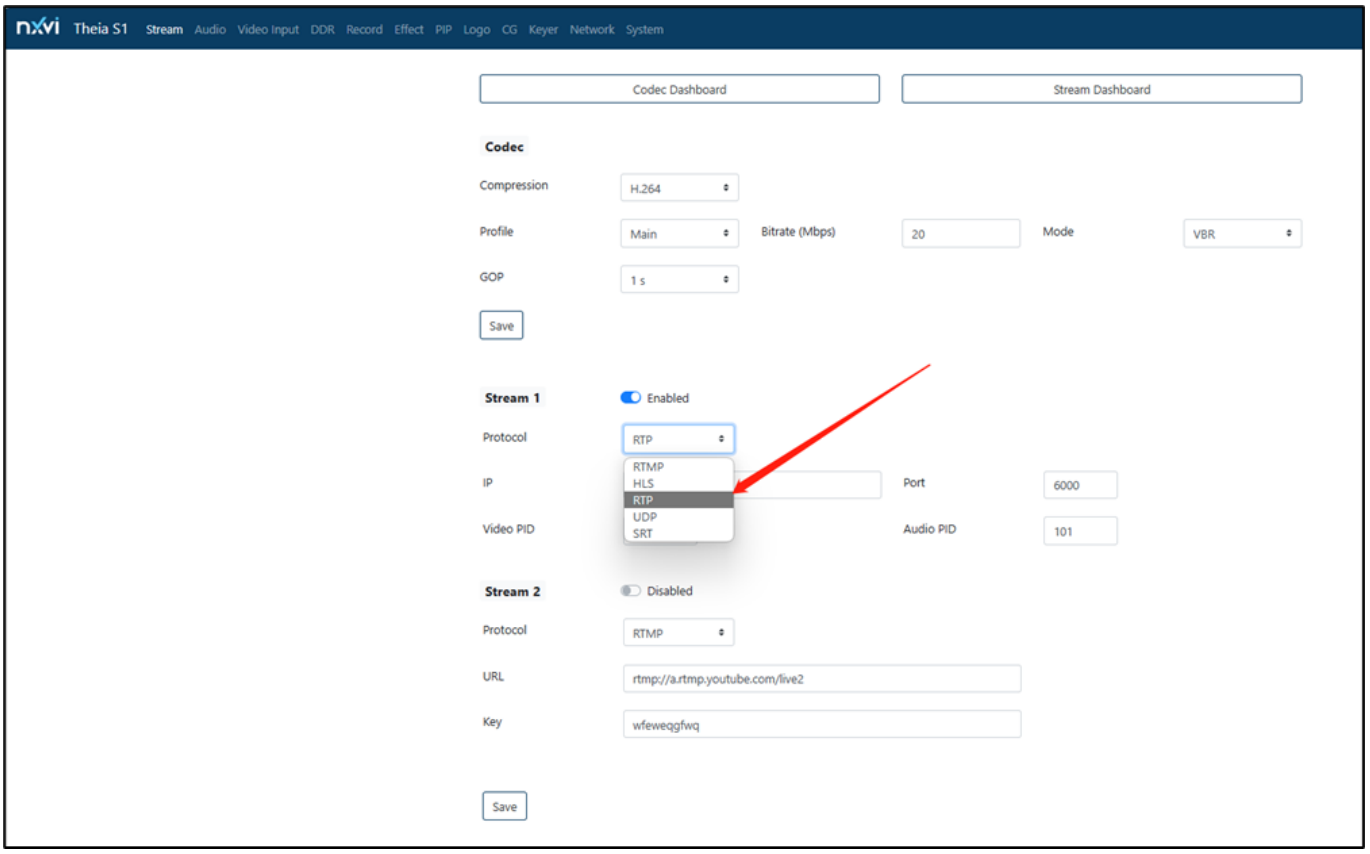
7. Press **LIVE** button on Theia S1 Live Switcher to stop RTMP streaming when necessary.

6.3 RTP/UDP Streaming

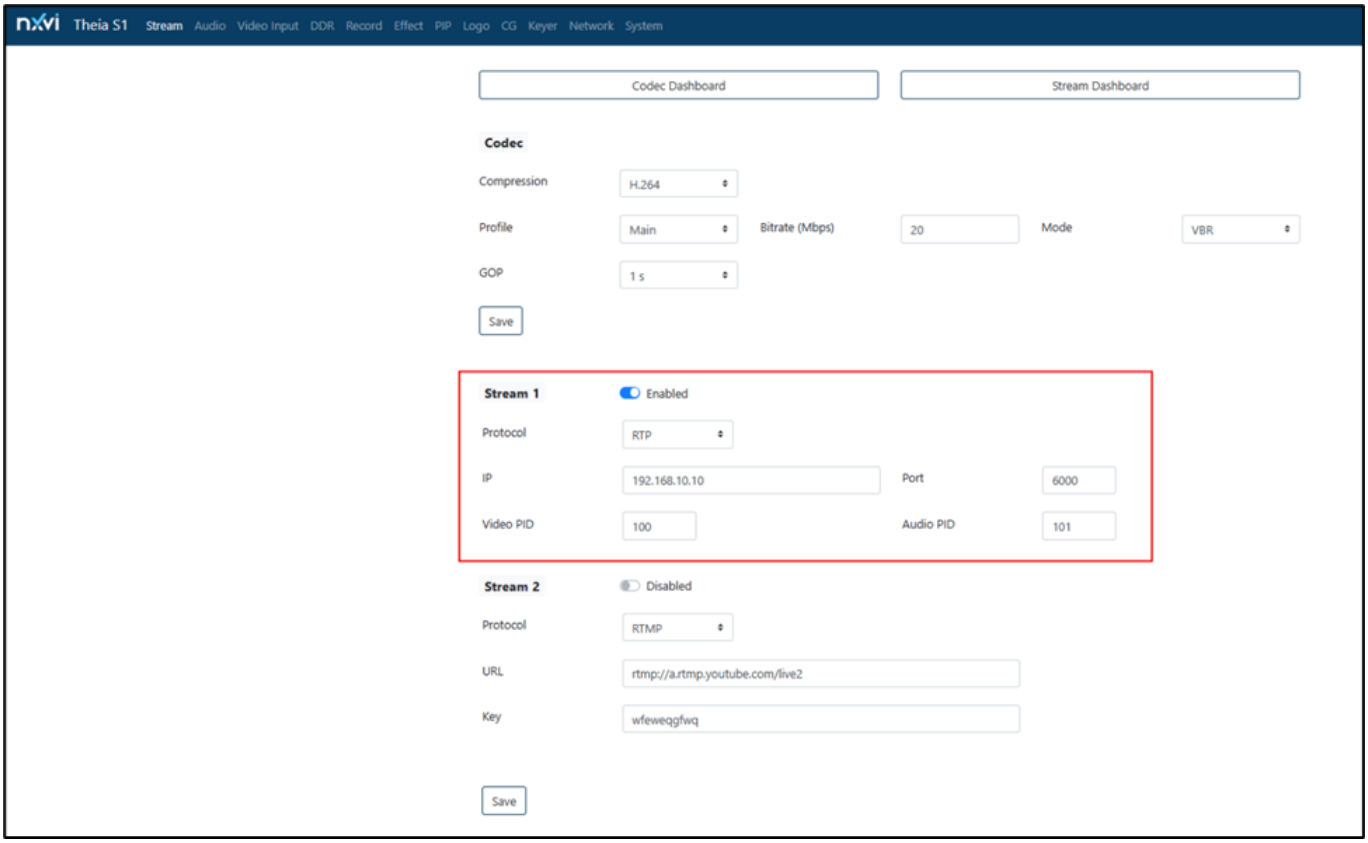
The point-to-point streaming protocols, such as RTP and UDP, are supported in Theia S1 Live Switcher. The following steps provide example on how to establish RTP and UDP streamings between Theia S1 Live Switcher (acting as a streaming server) and the remote system (acting as a client) respectively. The open-source VLC media player is used as a demonstration tool for playing streaming video.

■ RTP Streaming

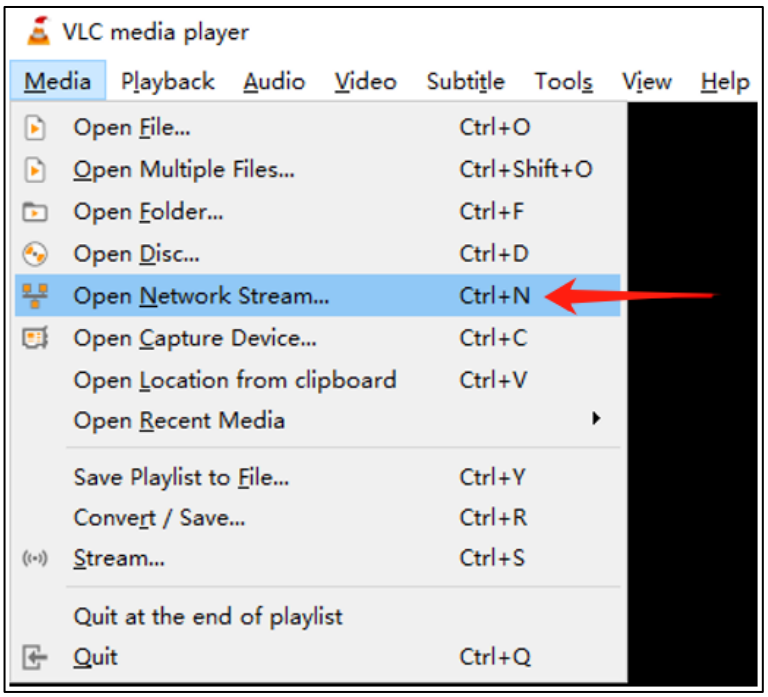
1. Open WebGUI for Theia S1 Live Switcher, select **Stream** setting, and select **RTP** in **Protocol** setting, as shown below.



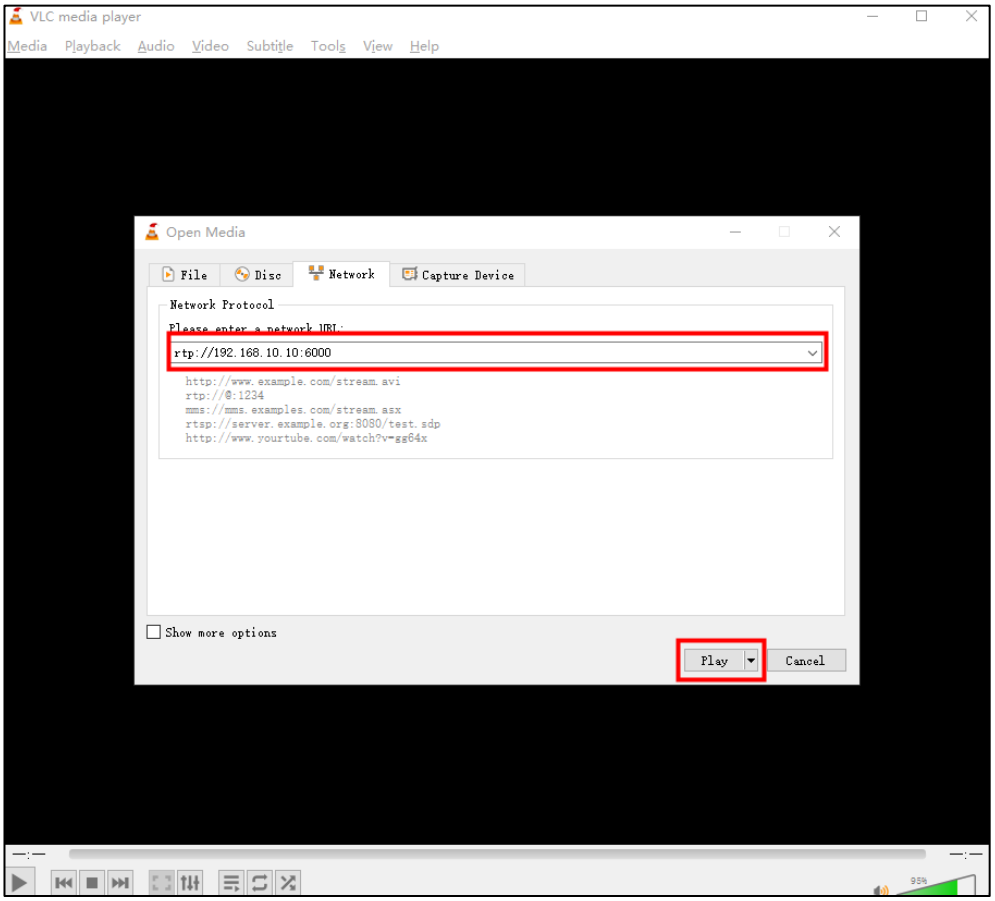
2. Enter **IP** adress, **Port** number, **Video PID**, and **Audio PID**, and click **Save** in WebGUI for applying, as example shown below, with streaming address as rtp://192.168.10.10:6000.



3. Open VLC media player in client computer, select **Open Network Stream** in **Media** setting, as shown below.

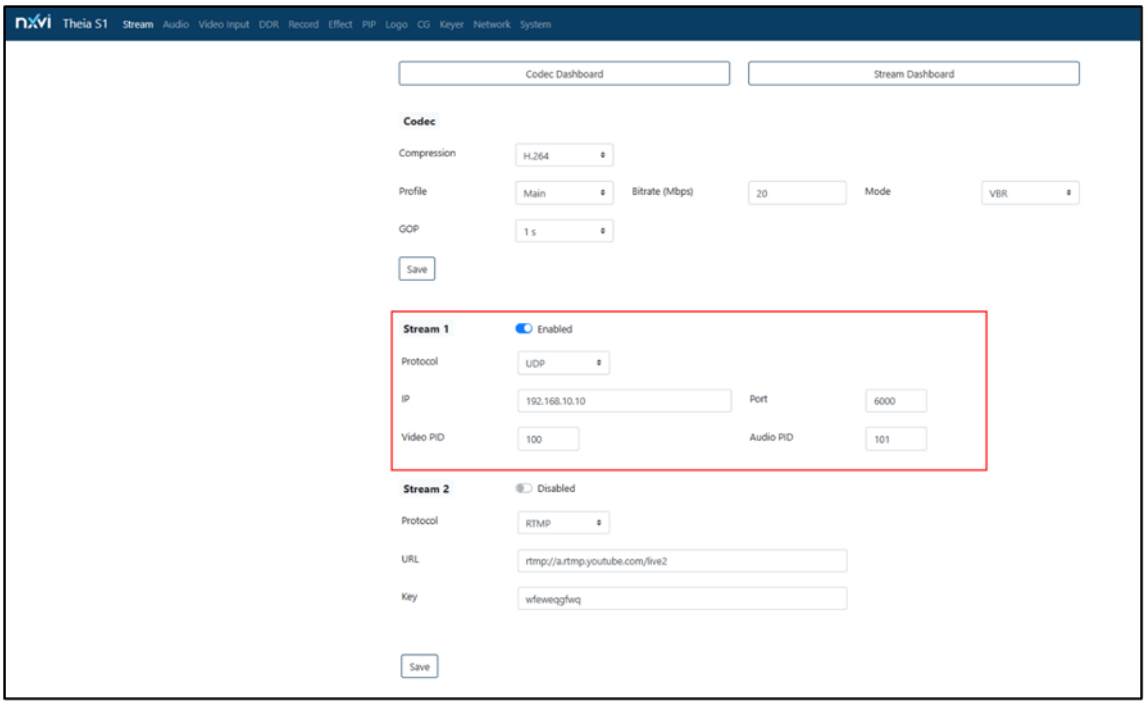


4. Enter RTP IP address to **Network Protocol** in **Network** setting, and click **Play** button in VLC media player for playing streaming video, as shown below.

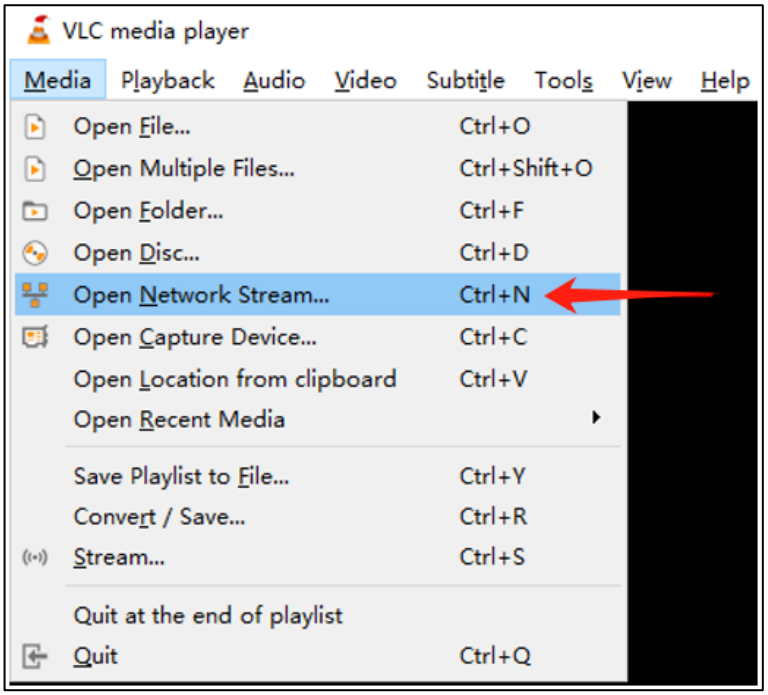


■ UDP Streaming

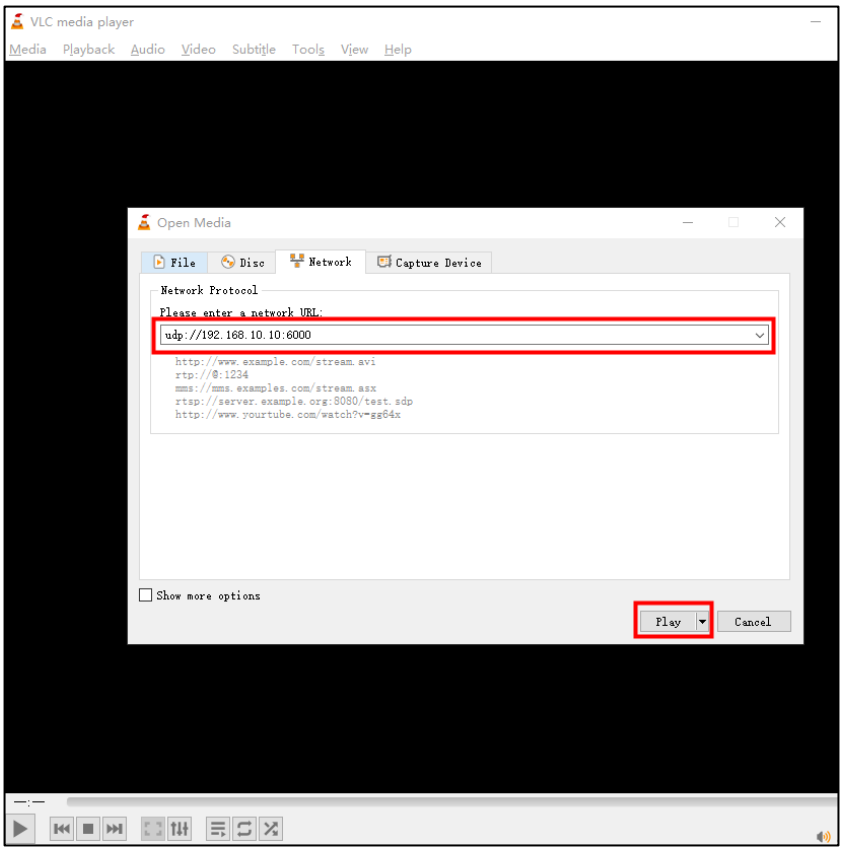
1. Open WebGUI for Theia S1 Live Switcher, select Stream setting, and select UDP in Protocol setting. Enter IP adress, Port number, Video PID, and Audio PID, and click Save in WebGUI for applying, as example shown below, with streaming address as udp://192.168.10.10:6000.



2. Open VLC media player in client computer, select Open Network Stream in Media setting, as shown below.



3. Enter UDP IP address to **Network Protocol** in **Network** setting, and click **Play** button in VLC media player for playing streaming video, as shown below.



Appendix 1 System Update

Theia S1 Live Switcher will periodically introduce new features or enhancements through system updates. Customers can download new system update through web or contact distributors to obtain the latest version of update. A PC system is required in performing system update to Theia S1 Live Switcher. The following steps provide example on how to apply system update to Theia S1 Live Switcher.

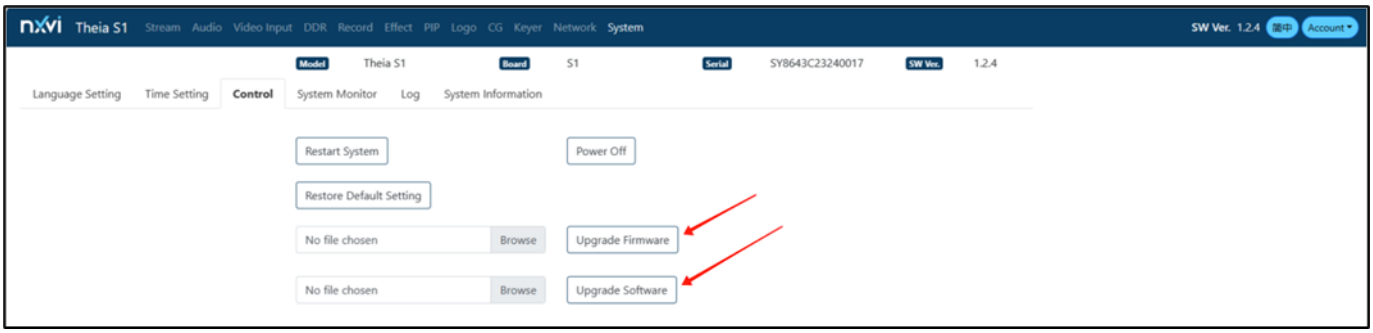
Note that it may take few minutes to complete system update. Any interrupts during system update can lead to system failure and should be avoided.

1. Prepare a PC system for keeping Theia S1 Live Swithcer system update image(s). Connect PC to official system update images website for downloading, or contact distributor for retrieving system update. There are two types of system update images available in update:

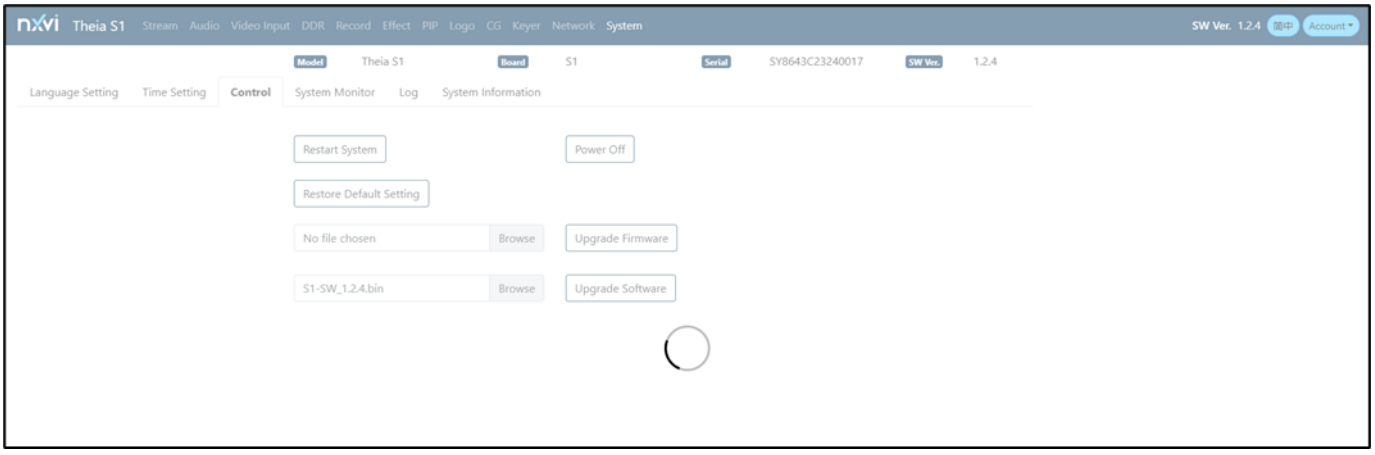
   - Firmware image
   - Software image

   and may be only one is included in specific update release. They need to be applied separately. Check version numbers of system update images to ensure correct ones are applied.

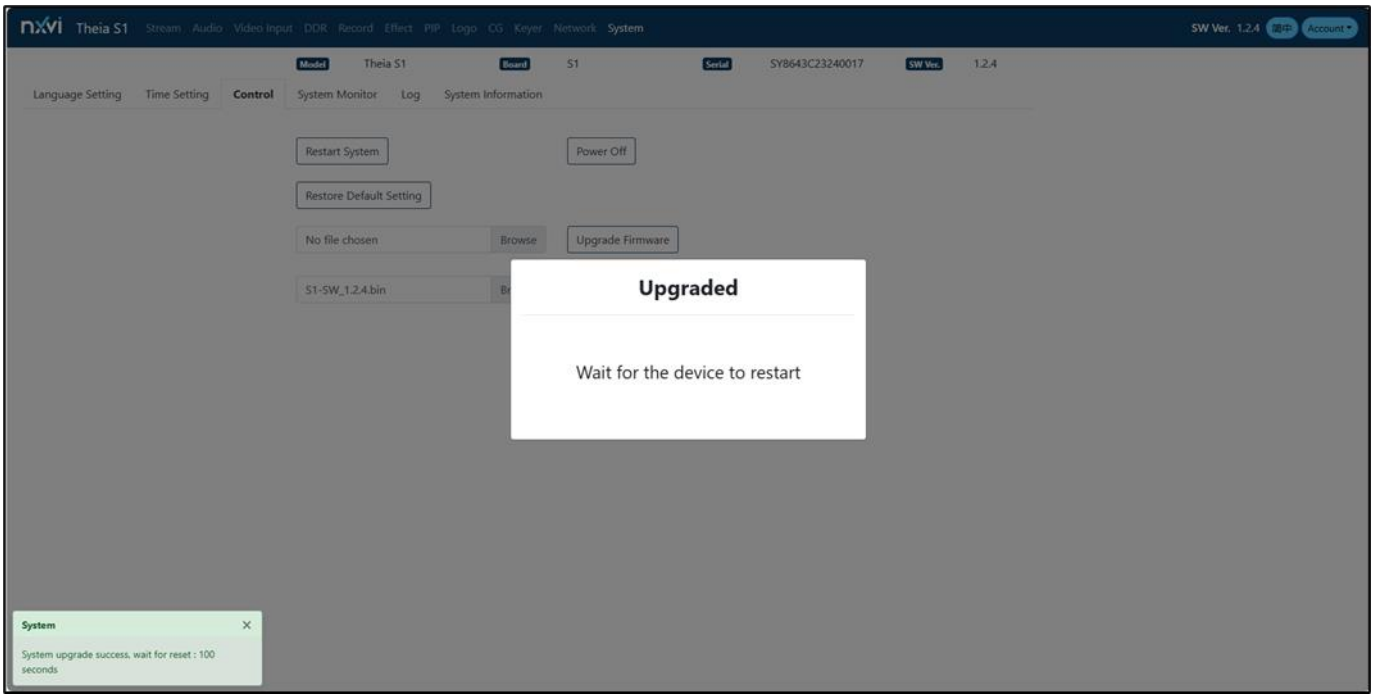
2. Open WebGUI for Theia S1 Live Switcher, select **System** setting, and select **Control** setting, as shown below. Browse PC system for selecting firmware update and software update images.



3. During firmware or software image update process, an updating status symbol (a spinning icon) in WebGUI will be observed to indicate the progress, as shown below. Note that firmware and software image updates need to be applied separately.



4. Once system update is completed, a successful window will be displayed in WebGUI, as shown below. Theia S1 Live Switcher will perform automatically reboot after system update. Note that firmware image update may take longer time (in minutes) to complete.



Appendix 2 System Specification

Feature		Specification
Interface	Video Input	4ch 4K video input (Full HD compatible), including **HDMI and NDI** interfaces (HDMI1 supports 4:2:0/4:2:2/4:4:4/RGB chroma subsampling, HDMI2/3/4 supports 4:2:2/4:4:4/RGB chroma subsampling; audio sampling rates in 32/44.1/48kHz).
	Video Output	1ch HDMI output for Program (4Kp60p with 48kHz audio sample rate)
		1ch HDMI output for Multiview (1080p60)
	Unbalanced Analog Audio	1ch stereo input (32/44.1/48kHz) 1ch stereo output in 3.5mm jack (48kHz)
	Ethernet	Gigabit Ethernet x2 (10/100/1000Mbps)
Video Resolution	Input	3840×2160 in 30p, 50p, 59.94p, 60p
		1920×1080 in 25p, 29.97p, 30p, 50p, 59.94p, 60p
		1920×1080 in 50i, 59.94i, 60i
		1280×720 in 25p, 29.97p, 30p, 50p, 59.94p, 60p
	Output	3840×2160 in 25p, 30p, 50p, 60p
		1920×1080 in 25p, 30p, 50p, 60p
		1280×720 in 25p, 30p, 50p, 60p
	Output (Multiview)	1920×1080 in 60p
Graphic Keyers	Keyer	Chroma, Mask, Luma
	CG-Keyer x2, Logo-Keyer x1	Logo, subtitle, graphic and news ticker support
	PIP-Keyer x2	Up to 5-source selection
Transition Effect		Built-in over 30 effects
Media Player		DDR Player x1
		External USB storage for DDR playback
Media Storage		USB x2 for recording and playback
Program Recording		1ch HEVC/AVC 4K/Full HD
Streaming	Codec	HEVC/AVC (video) with AAC (audio)
	Protocol	HLS, RTMP, RTP, SRT, and UDP Support 2 streams pushing simultaneously
Power	Input	AC Adapter 110-240 V, 50/60Hz with DC 12V/5A output
	Consumption	< 40W
Dimension		342mm (W) x 266.8mm (D) x 58.2mm (H)
Operation Temperature		0℃ ~ 40℃
Storage Temperature		-20℃ ~ 60℃
Certification		CE/FCC (Class B)/TUV/CB/RoHS/KC

Appendix 3 Streaming and Recording Guidelines

Theia S1 Live Switcher supports multiple video inputs with maximum resolution in 4Kp60 for streaming and recording. To achieve best system performance for streaming and recording, in terms of resolution and frame rate, under multiple video inputs circumstances, some functions in Theia S1 Live Switcher are recommended to be off, as shown below.

■ 4Kp60 Output

Video Input (HDMI/NDI/DDR)	Logo	CG	PIP	Streaming	Recording	PGM	FPS
2ch 4Kp60	Off	Off	Off	On	On	On	60
4ch 4Kp60	Off	Off	Off	Off	Off	On	≈60

■ 4Kp50 Output

Video Input (HDMI/NDI/DDR)	Logo	CG	PIP	Streaming	Recording	PGM	FPS
3ch 4Kp60	Off	Off	Off	On	On	On	50
4ch 4Kp60	Off	Off	Off	Off	Off	On	50

■ 4Kp30 Output

Video Input (HDMI/NDI/DDR)	Logo	CG	PIP	Streaming	Recording	PGM	FPS
2ch 4Kp30 + 1ch 1080p60 (Chroma Key)	On	On	On	On	On	On	30
3ch 4Kp30	On	On	On	On	On	On	30

■ 1080p60 Output

Video Input (HDMI/NDI/DDR)	Logo	CG	PIP	Streaming	Recording	PGM	FPS
4ch 1080p60 + 1ch 1080p60 (Chroma Key)	On	On	On	On	On	On	60

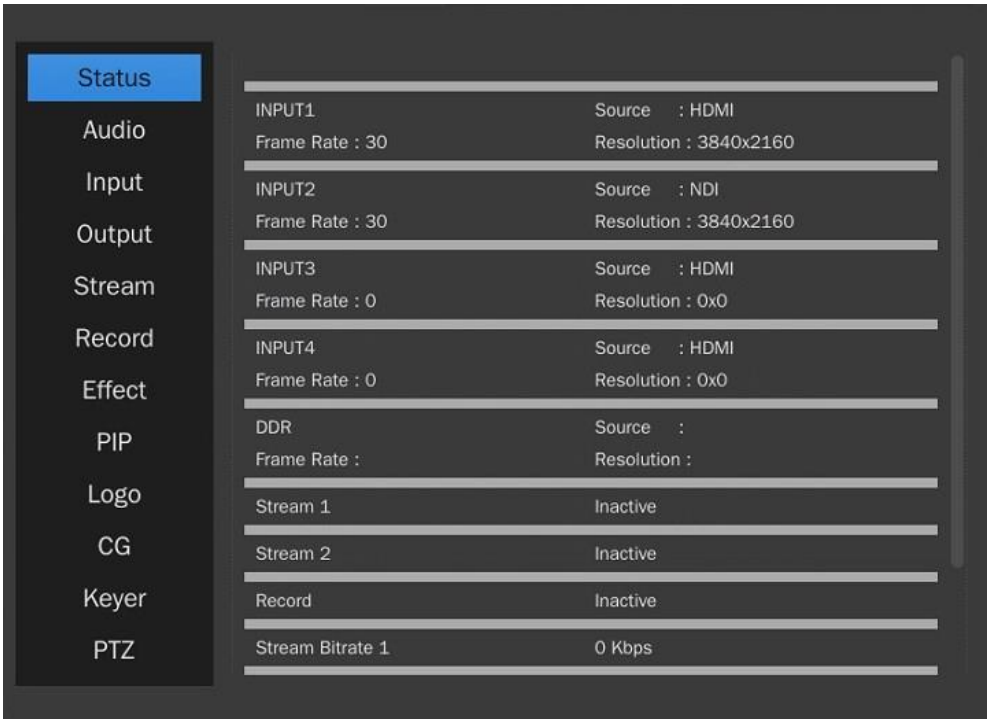
Appendix 4 Selection Keys in Menu

To browse functions and enable selections in **Menu** of Theia S1 Live Switcher, use:

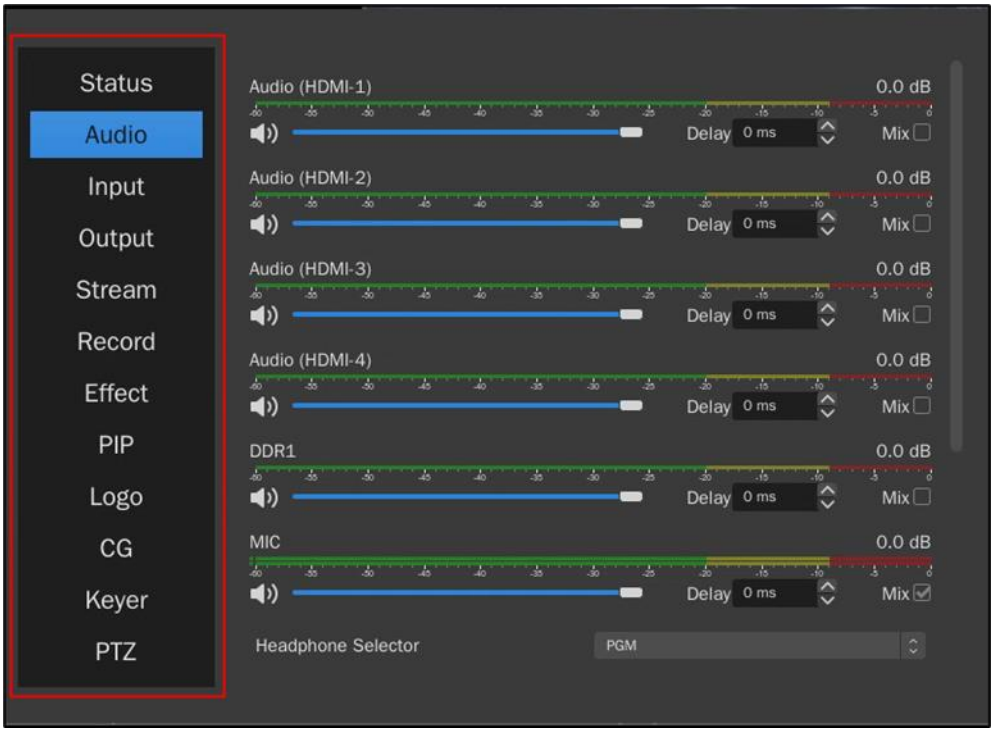
- △ for up movement or value increment
- ▽ for down movement or value decrement
- ◁ for left movement
- ▷ for right movement or move to next level
- **Back** for back to previous level
- **Enter** for selection or enabling

keys on panel to perform the required movements, adjustments, or activations.
The following figures show how these keys are working in **Menu**.

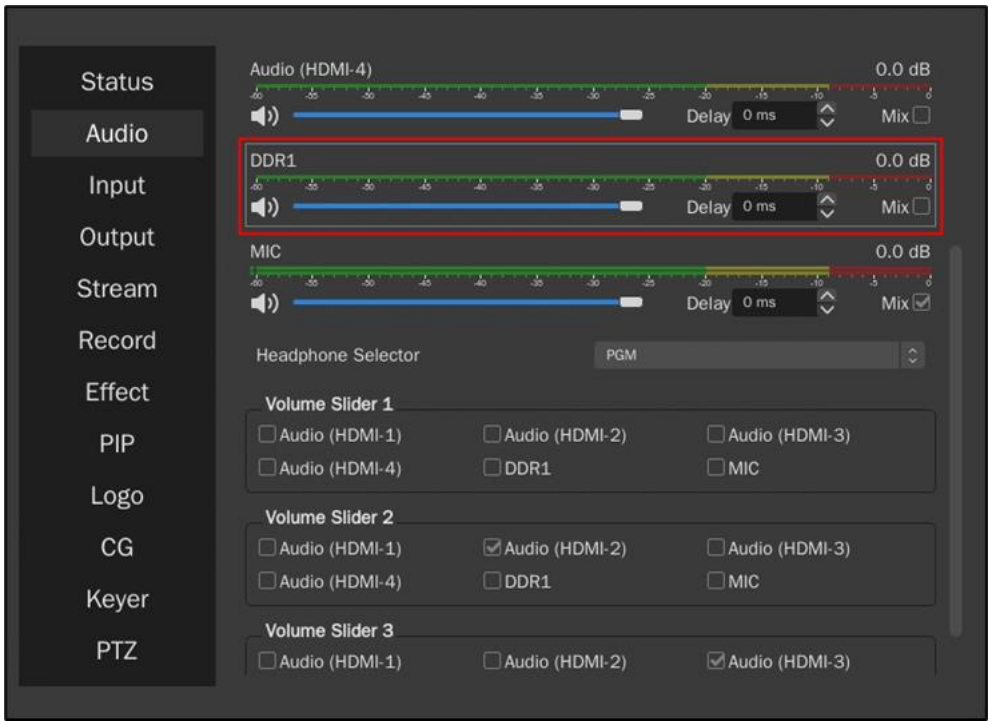
Press **Menu** key on panel to open **Menu** window, as shown below.



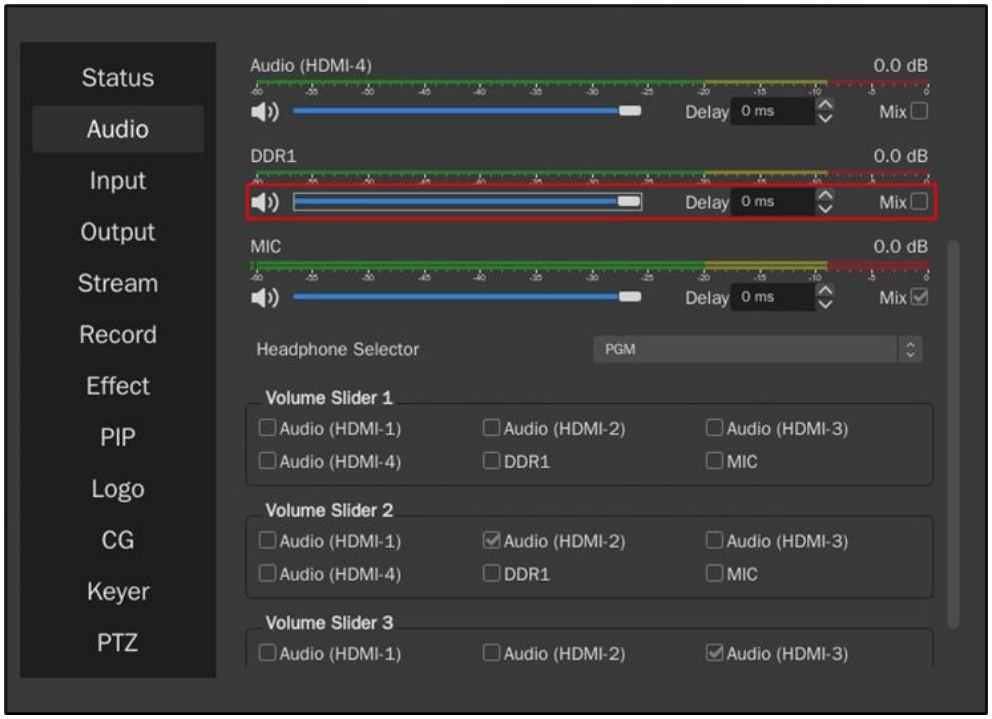
Press ▽ (down movement) key to select **Audio Function**, as shown below.



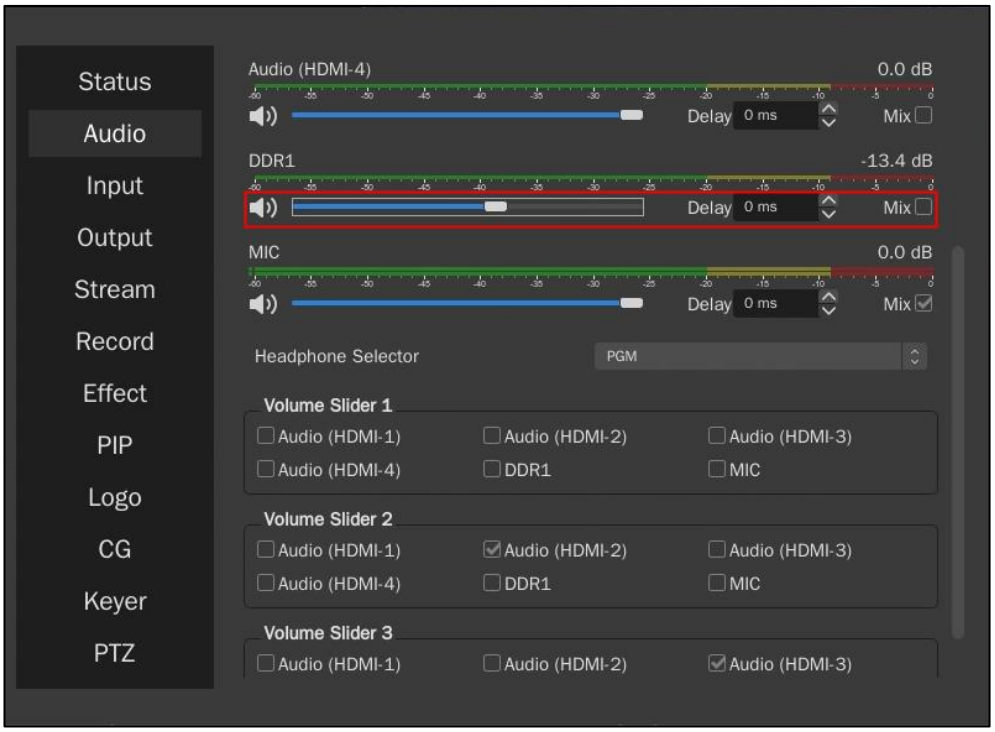
Press ▷ (right movement) key to move to subfunction window, and keep pressing ▽ (down movement) key until **DDR1** subfunction is highlighted, as shown below.



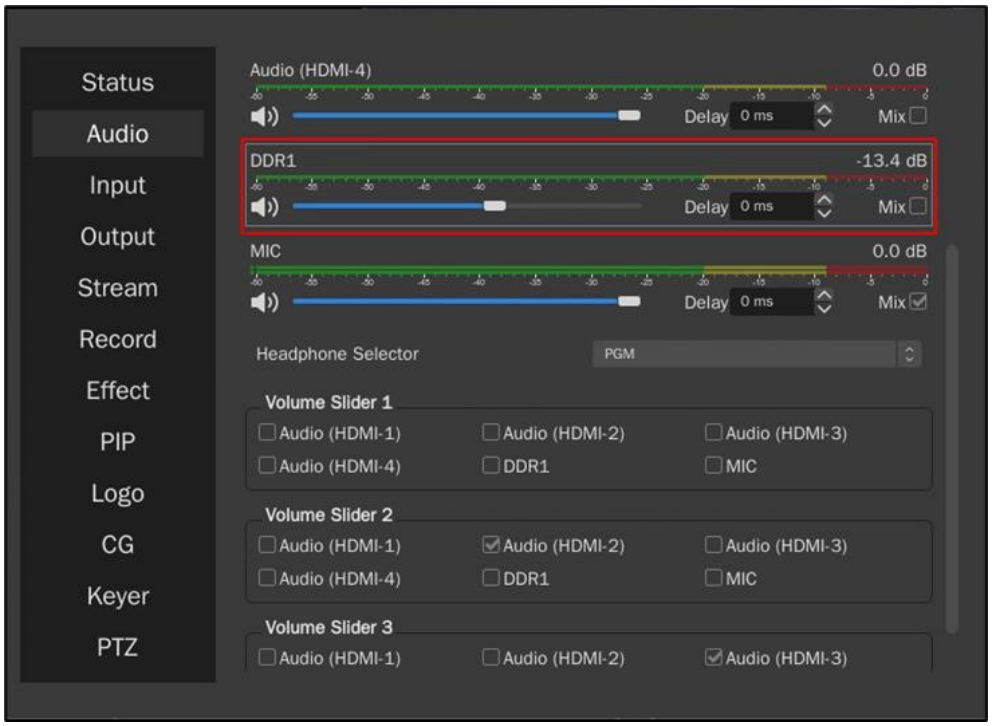
Press **Enter** key to select **DDR1** subfunction, and press ▷ (right movement) key, as shown below.



Press △ (value increment) and ▽ (value decrement) keys for **DDR1** value adjustment, as shown below.



After the completion of adjustment, press **Back** key to exit from current selection and return to previous hightlight mode, as shown below.



Press **Back** key to exit from **DDR1** subfunction to **Audio** function, when necessary.

Press **Menu** key again to close **Menu** window.