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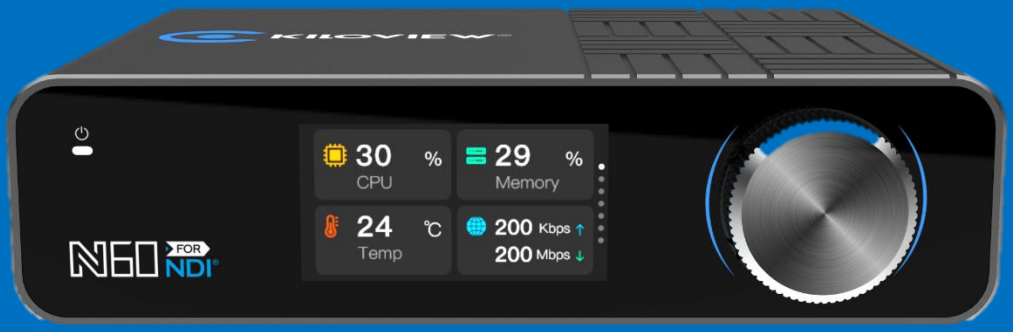

N60
4K UHD HDMI/NDI Bi-Directional Converter

USER MANUAL

Changsha KILOVIEW Electronics Co.,Ltd

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1 Product Introduction

Kiloview N60 HDMI to NDI Converter is Kiloview's latest NDI converter(I/O). Adopting the leading FPGA technologies, advanced-level AVC/HEVC algorithm and NDI algorithm, N60 comes with more powerful performance, more excellent encoding quality, better low-latency performance and perfect function.

With the resolution up to 4K UHD (3840x2160@60Hz), N60 can encode a 4K HDMI signal into an NDI video stream under encoding mode. When decoding, it will decode the NDI to HDMI. Encoding or encoding, it depends on your end needs.

N60 supports Speed HQ and AVC (H.264)/HEVC (H.265) codec, which means N60 supports IO conversion between NDI High-bandwidth and NDI|HX. Under encoding mode, N60 can simultaneously output NDI and NDI|HX video streams up to 4K resolution. When decoding, N60 can automatically adapt to NDI or NDI|HX stream. Using NDI technology, combined with Kiloview's own in-depth optimization of video encoding and network transmission technology, N60 can achieve ultra-low latency as low as 80ms from video encoding to decoding.

N60 supports professional YCbCr 4:2:2 color space and 10bit color depth with AVC (H.264) /HEVC (H.265) video encoding (compatible YCbCr 4:2:0 and 8bit AVC/HEVC video encoding), which promises higher color and image quality, particularly to fulfill the needs in the broadcasting and medical image industries. Combined with the IP interconnection advantages of NDI technology and a complete product ecological chain, N60 can help to gain a leading edge in UHD video IP services

N60 support 2x1000M Ethernet ports, one of which supports PoE (IEEE 802.3AT). N60 has HDMI 2.0 video input interface and output interface. When encoding, the HDMI output interface will loop out the video signal via HDMI; when decoding, the decoded NDI video will be output from the HDMI interface.

As the latest product, N60 further improves the user experience. It provides a color LCD display and a scroll wheel on the front panel. N60 can display the device status and obtain configuration parameters, the recording operations and IP address configuration. At the same time, LCD display can work as a Tally.

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With exquisite and compact appearance, N60 has an excellent heat dissipation design, which is convenient for you to use in different scenarios. Cold shoe fixing accessories, V-Mount and other expansion are provided with additional cost.

Product Features

- ➢ **Bi-Directional converting, encoder and decoder, all-in-one**
- Plug and play, converting HDMI to NDI, or NDI to the monitor easily.
- Support NDI and NDI|HX encoding with resolution up to 4Kp60, to ensure high quality video transmission.
- A built-in LCD panel and scroll wheel for easy management and configuration, working as a big Tally.
- Support PoE+ (IEEE 802.3AT) and 12V-18V DC input.
- Configured with 1 x HDMI input and 1 x HDMI output interface, loop out for monitoring on the display while encoding or output for using via HDMI.
- ➢ **Support up to 4k UHD video resolution, to ensure high quality video transmission**
- Support encoding HDMI to NDI and decoding NDI to HDMI with resolution up to 4K UHD (3840x2160@60Hz).
- Provide standard camera screw to install on the camera.
- Optional control cable/Ethernet for PTZ control over Visca/Visca over IP/Pelco supported (Note: Customize available for other unlisted PTZ protocols, PTZ function is not available in current version).
- Support YCbCr 4:2:2 color space and AVC (H.264)/HEVC (H.265) video coding up to 10bit color depth (also backward compatible with YCbCr 4:2:0 and 8bit conventional AVC/HEVC Encoding).
- Precise clock and intelligent algorithms ensure frame synchronization and accurate video and audio synchronization.

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Technical parameters

Item	N60
Basic interface and function	
Input interface	1x HDMI 2.0
Output interface	1x HDMI 2.0
Audio port	1x 3.5mm Line in 1x 3.5mm Line out
Network	2x 1000Mbps Ethernet Port (100M/1000M Compatible) Ethernet 1 with PoE (IEEE 802.3AT, 24W Max)
Video resolution	**Input: up to** 3840x2160@60fps (4Kp60), lowest 720p50 **Output: up to** 3840x2160@60fps (4Kp60), lowest 720p50
Video encoding and decoding	**Speed HQ (NDI CODEC):** SHQ0, SHQ2 **ISO MPEG-4 Part 10:** Advanced Video Coding (AVC)/ITU H.264 **ISO MPEG-H Part 2:** High Efficiency Video Coding (HEVC)/ITU H.265 **AVC (H.264):** Baseline, Main, High, High10, High 4:2:2 up to 5.2 level **HEVC (H.265):** Main, Main Intra, Main10, Main10 Intra, Main 4:2:2 10, Main 4:2:2 10 Intra up to 5.1 High Tier
Audio encoding and decoding	NDI Audio; AAC-LC; Opus; G.711 a-Law/u-Law; other software expansion
USB	1x USB 3.0 (Type-A) 1x USB 3.0 (Type-C)
TF expansion interface	1x TF(MicroSD) interface, SDXC(SD 3.0). Rate up to 104MB/s, capacity up to 2TB
Human-computer interaction	1.91" LCD screen, Kiloview Magic Rotor
Tally	Built-in OLED panel available as front/rear Tally
Power	DC12V/2A or PoE
Mounting	Support cold-shoe mounting and V-mounting
Power consumption	16W MAX
Dimension	135x98x35mm
Weight	545.00g
Working temperature	-20°C~45°C

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Storage temperature	-20°C~70°C

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2 User guide

- Installation and Connection

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

- Network Connection and Configuration

The easiest way for network connection is to connect the device to the network by wire, automatically obtain the IP address and DNS from the network without any setting on the device. After that, use NewTek Studio Monitor and connect the NDI stream of the device, click the gear button ( ) in the lower right corner of the software interface, you can directly open the login link without manually entering the URL. (For the first login or the first login after restoring the factory settings, you will need to agree to the “EULA” that pops up. Otherwise, the NDI stream service of the device cannot be used normally).
If you want to set the network manually, you can use the default IP address 192.168.1.168 to login the web page. The default username and password is “admin/admin”

- NDI Streaming

NDI has the function of automatic discovery. After the device is connected to the network, other NDI enabled tools (such as Newtek Studio monitor, OBS, vMix) can automatically discover the device and pull the NDI stream directly.

- NDI Decoding

To find the NDI source in the same LAN or manually adding the source across the network and decode the corresponding source to the display.

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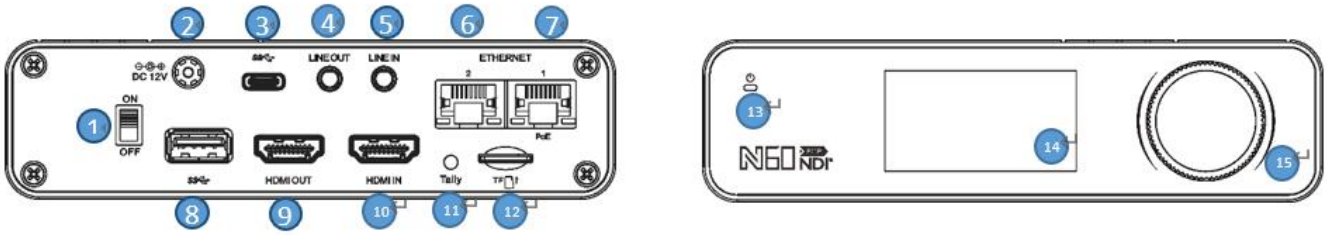
3 Packing list and Interface description

3.1 Packing list

Name	Unit	Quantity
NDI Converter	PCS	1
DC 12V/2A power adapter	PCS	1
Certificate/Warranty card	PCS	1
Cold shoe screw	PCS	1
Cold shoe cradle	PCS	1
Quick start guide	PCS	1

3.2 Interface description



1	Power Switch	2	Power Port
3	Type-C expansion port	4	Line Out
5	Line In	6	1000M Ethernet port
7	1000M Ethernet- PoE	8	USB expansion port
9	HDMI OUT	10	HDMI IN
11	Tally	12	Micro SD/TF slot
13	Status Indicator	14	LCD screen
15	Scroll wheel		

3.3 Led indicators

Tally/LCD screen	**Video Status**	
	Green Light	PVW

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	Red Light	PGM		
Led indicators	**Name**	**Color**	**Status**	**Description**
	Power	White	Always ON	Power connected
			OFF	No power supplied or power failure

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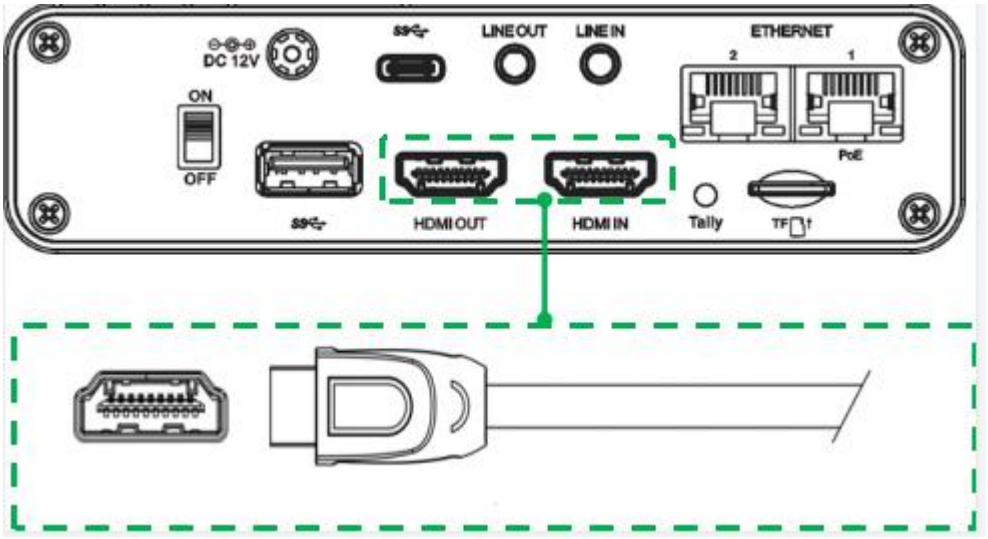
4 Installation and connection

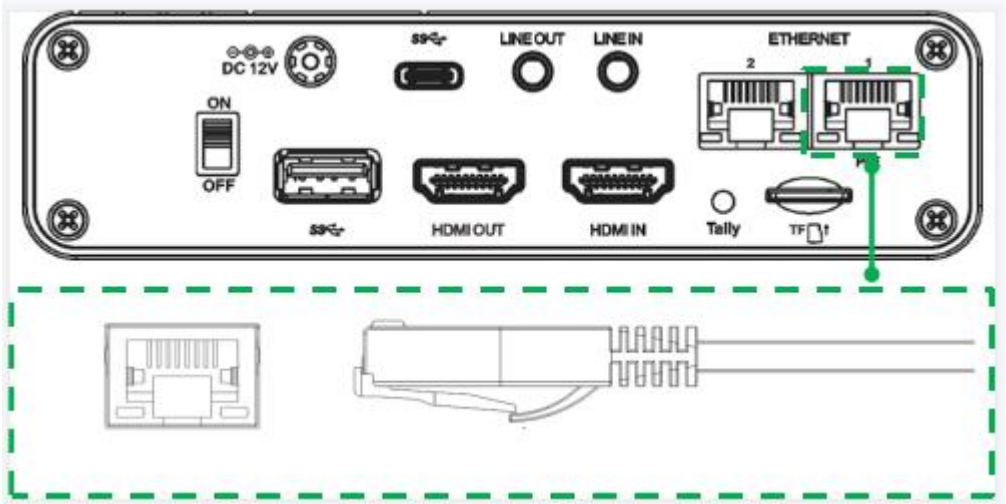
4.1 Connect Video Signal



Connect an HDMI video cable from a suitable video source to N60's input connector.
The HDMI output is connected to the display device via an HDMI cable.

4.2 Connect Network

Connect the network cable to Ethernet of the device. The other end of the network cable is connected to your network switch. You can also connect directly to the network port of your computer.



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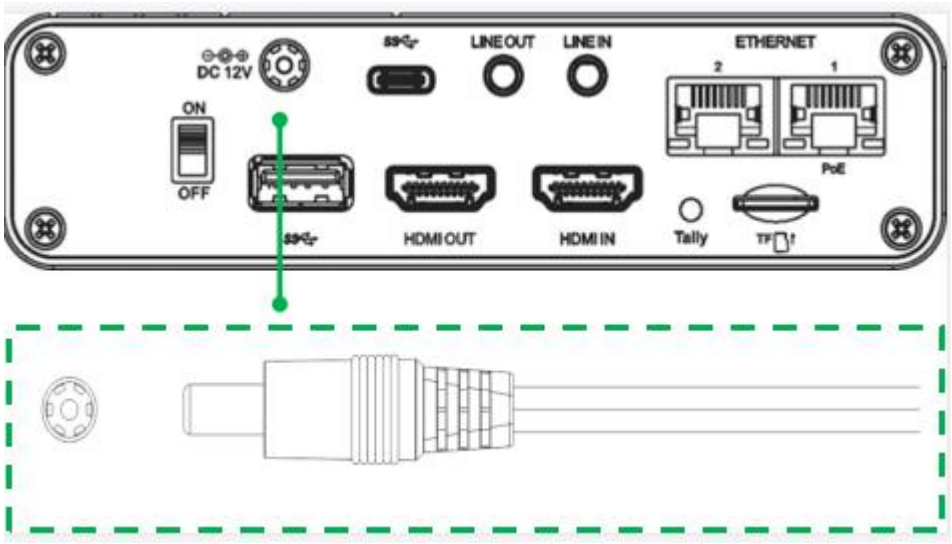
4.3 Connect Power Supply

After connecting the power adapter (DC 12V/2A), the power light will be on and device starts working. (If you use PoE for power supply, there is no need to connect the adapter).



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5 LCD Screen and scroll wheel

N60 provides a color LCD screen and a scroll wheel on the front panel. It can view the device status and obtain configuration parameters, and operates the recording operations and IP address configuration. At the same time, LCD screen can work as a Tally.

5.1 Scroll wheel

Rotating the scroll wheel knob to switch the display module. Press the wheel to "OK", and you can enter the current display module to check the working mode as well as the current status, and to restart the device.

- Rotate counterclockwise to previous page
- Rotate clockwise to next page
- Press to confirm

5.2 LCD Screen

5.2.1 Working mode

The first page of the LCD screen shows the current working mode (Encoder/Decoder) of the N60.

A. Encoding mode

“HDMI IN” On, indicates HDMI video source working successfully. Current stream of Full NDI and NDI|HX shown on the screen. indicates current number of NDI connections. Below image shows encoding mode:

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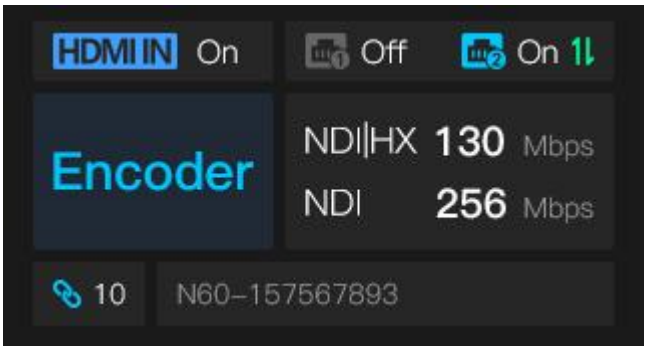
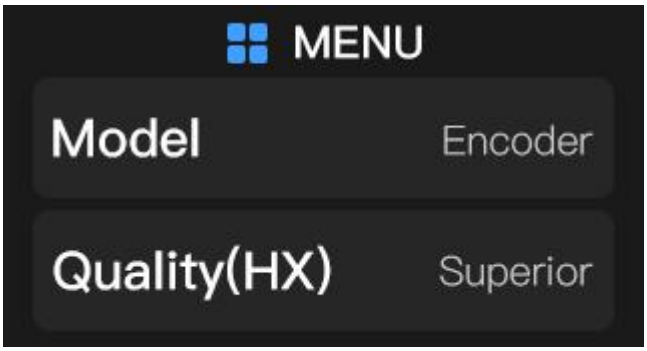
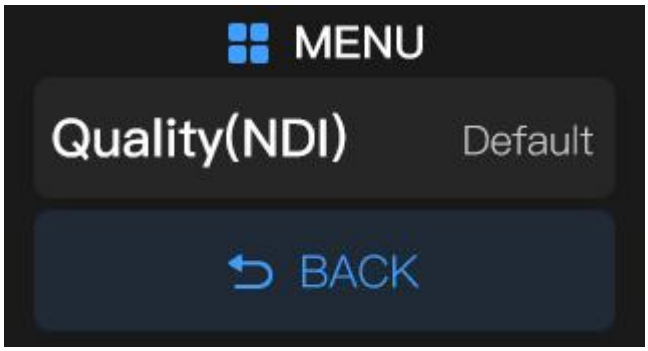


Press the scroll wheel to enter the sub menu, and modify the working mode through choose Model to enter the setting. You can switch from encoding to decoding, and modifying the encoding quality.

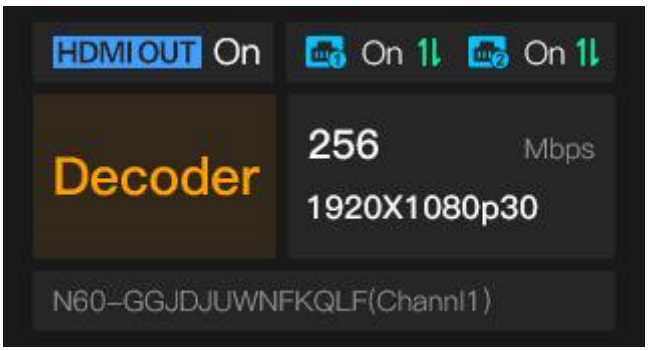


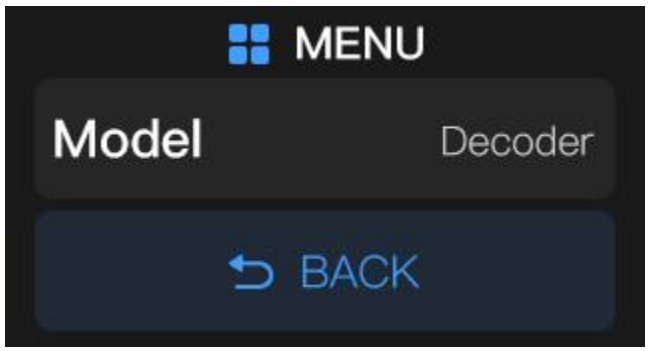


Quality (HX): Encoding quality of NDI|HX
Quality (NDI): Encoding quality of Full NDI

There are 5 levels of encoding quality, which are:
Superior: Encoding quality is “Excellent”
High: Encoding quality is “Good”
Default: Encoding quality is “Default”
Low: Encoding quality is “Average”
Poor: Encoding quality is “Poor”.

B. Decoding mode
Decoder, indicates the current status is decoding mode. “HDMI OUT” On, indicates the HDMI output video source. The output resolution and NDI stream is shown on the screen. Please take below picture for reference.





Press the scroll wheel to enter the sub menu, and modify the working mode that switching from the Decoder (decoding mode) to the Encoder (encoding mode).

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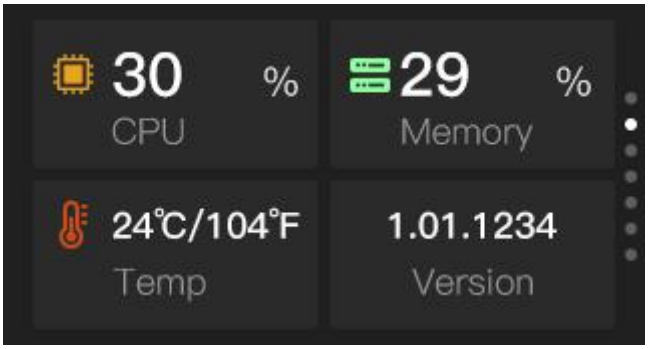
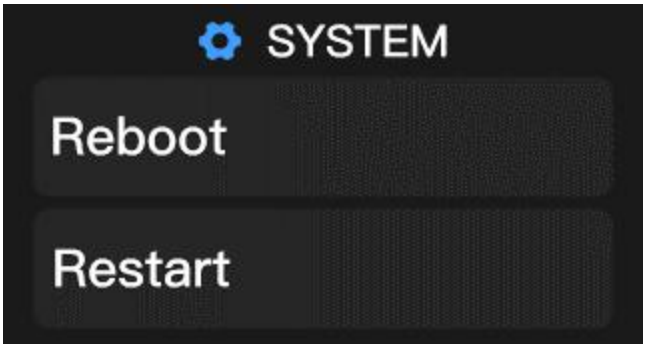
5.2.2 Device status

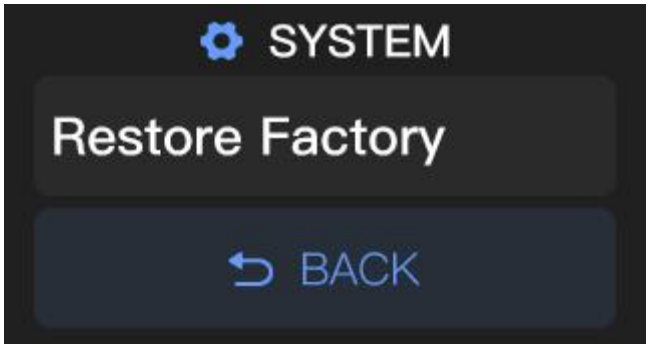
The second page of the LCD screen shows: the current working status of N60, CPU usage, memory usage, current temperature of the device, the current version of the device.



CPU：CPU usage;
Memory：Memory usage;
Temp：Current CPU temperature;
Version：Firmware version currently running on the device.

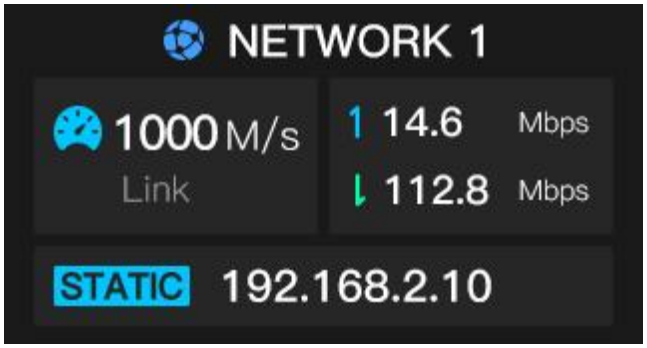
Press to enter the module, quickly reset the device, restart, and restore the factory settings, then select BACK and press the scroll wheel to exit.
Restart：Quick reset
Reboot：Restart the device
Restore Factory: Restore the factory setting

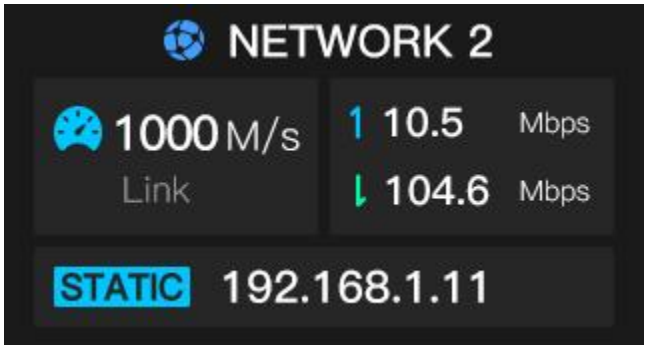




5.2.3 Network status

The third page and forth page of LCD screen show that the network status of the device.





NETWORK 1/ NETWORK 2: Interface data of Port1/Port2
LINK: Network port bandwidth (Gigabit). The arrows show uplink rate and downlink rate

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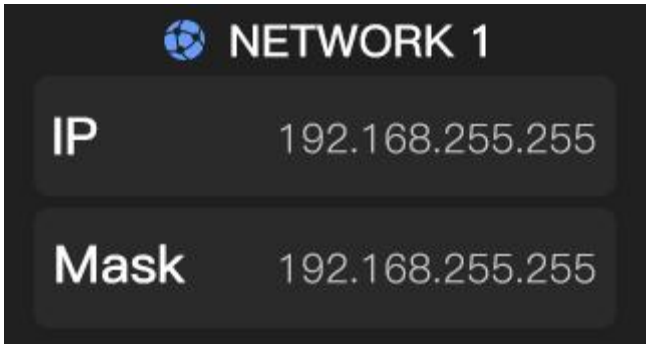
STATIC: Static IP address

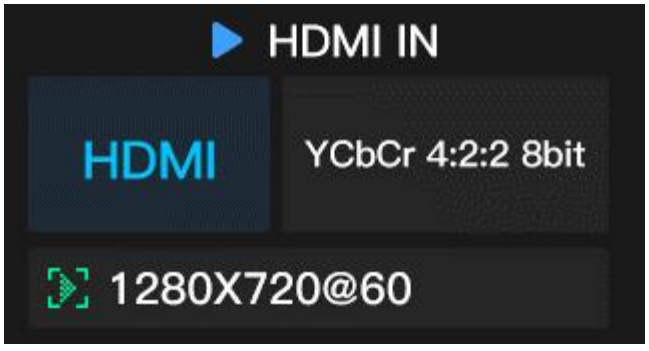
Press to view the information of NETWORK1, and supports Network configuration and DHCP on and off.



If it is necessary to modify the IP address manually, please select IP, Mask, Gateway to modify individually. Scroll up and down by rotating the wheel to adjust the number of the IP address. After setting, press the rotating wheel and select “OK” to save it, as shown in the following figure:

5.2.4 Video information

The fifth page of the LCD screen shows: HDMI IN/OUT resolution and color space information. If N60 is in encoding mode, then it shows HDMI IN.



HDMI IN: HDMI input
HDMI OUT: HDMI output
YCbCr: Color space data
Resolution: HDMI IN/OUT resolution

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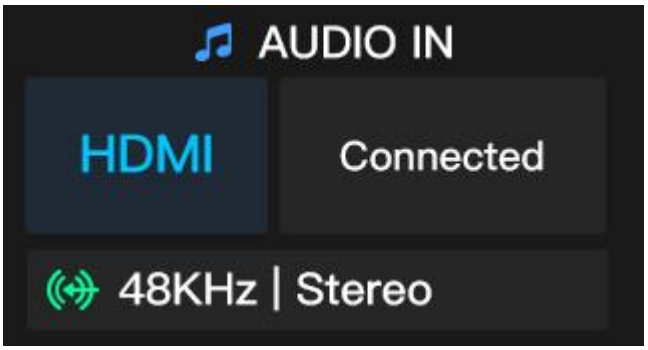
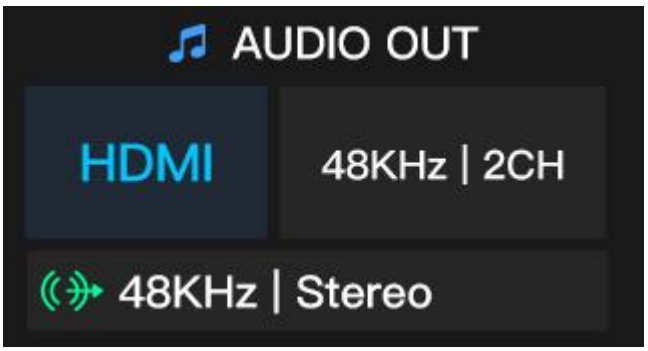
5.2.5 Audio information

The sixth page of the LCD screen shows: audio input information. You can view the sampling rate of the current audio input.
AUDIO IN, indicates that the current audio is HDMI input and Connected.



48KHz|Stereo: Stereo Sampling Rate | Stereo.
AUDIO OUT， indicates that the current audio is in the HDMI output, and displays the current output sampling rate and number of channels.



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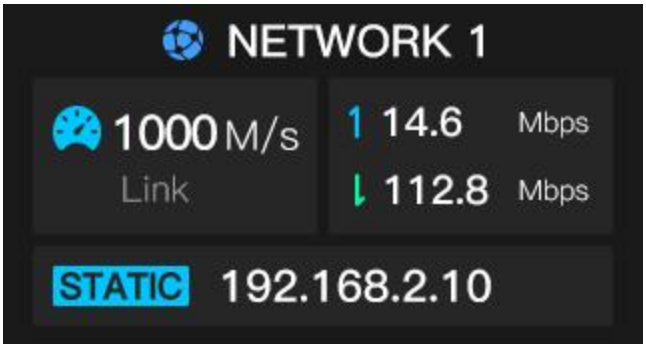
6 Login and Network Configuration

6.1 Login to the Device via Ethernet

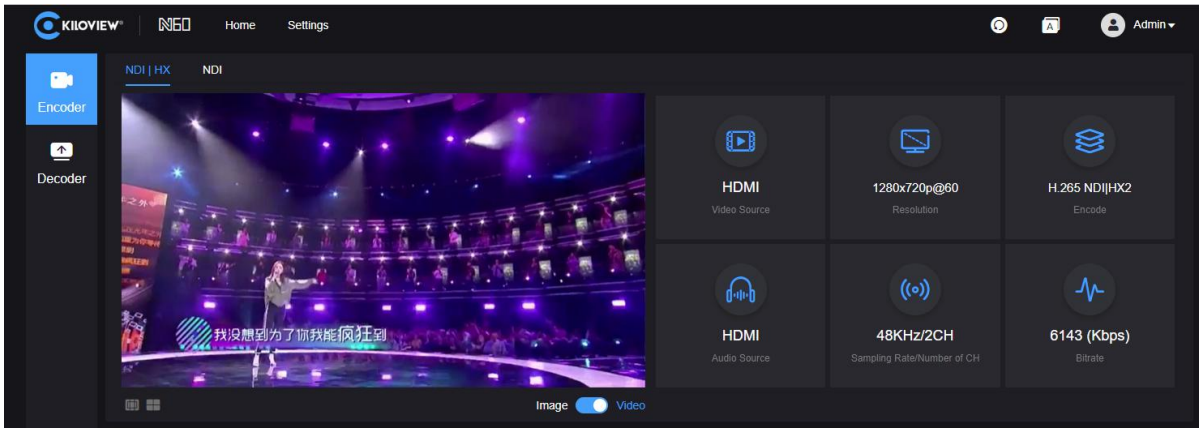
First connect the Ethernet port of the NDI encoder and the computer to the same switch. After powered on, you can turn the wheel knob to switch the screen to view the network port you are currently connected to, such as "ETHERNET 1" (NETWORK 1) or "ETHERNET 2" (NETWORK 2). IP address can be also shown on the page.



Open the WEB browser, directly input the IP address to login. The default username and password are admin/admin.

⚠ **Note: Due to the browser compatibility issues, it is recommended to use Chrome or Firefox. For the first login after restoring the factory settings, you will need to agree to the "EULA" that pops up. Otherwise, the NDI stream service cannot be used normally.**

After login, the encoding and function parameters can be set on the encoder management web page. The page is shown as below:



6.2 Network Settings

Connect the network cable to the Ethernet port and configure with an IP address. The IP address of the network port is obtained by DHCP by default, which will automatically get a full IP address, gateway and DNS based on this LAN.
The N60 has two Gigabit network ports, of which Network 1 supports POE. Here take Network 1 as an example.
Click "Network" to check the configuration of the Ethernet.

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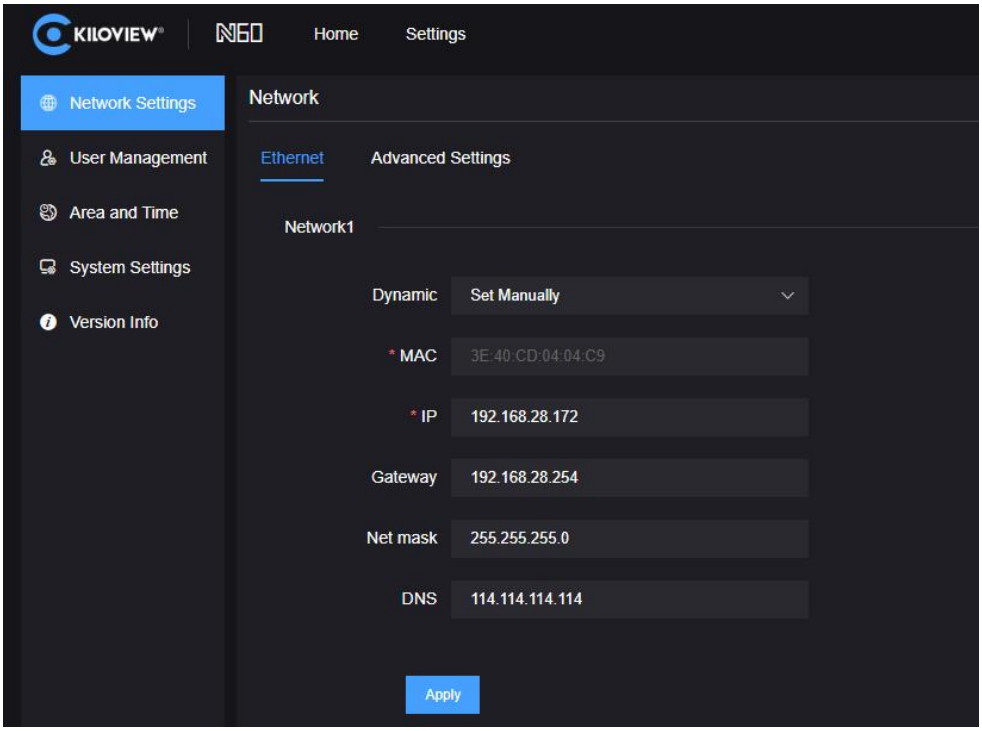

There are two ways to get the address, one is DHCP, and the other is manual. By DHCP to automatically obtain IP, you must first ensure that the router or switch has enabled the DHCP service. the N60 will obtain a dynamic IP address assigned by the router or switch (with DHCP service enabled).

To set the IP manually, you need to enter a fixed IP to the device, and this IP address will not change if the device is not restored to factory settings.

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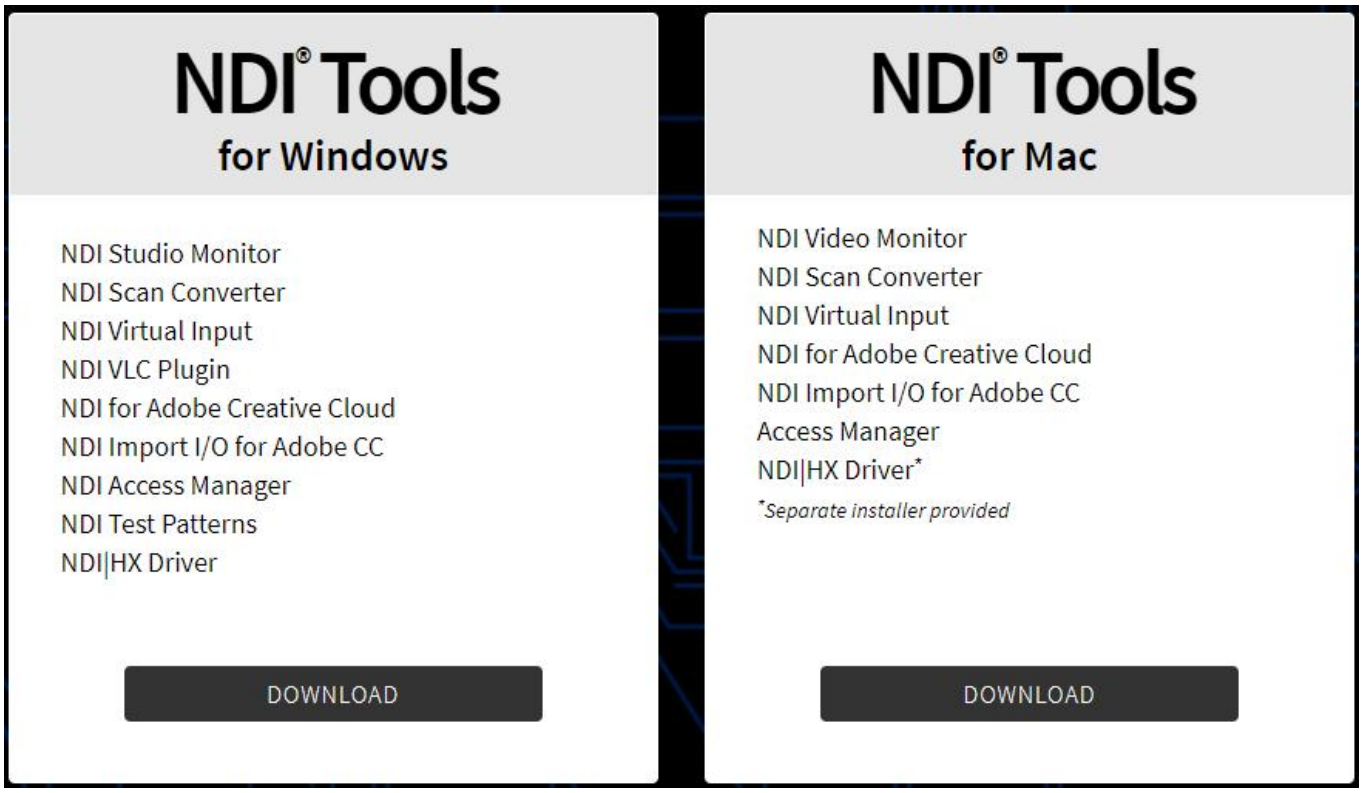
7 NDI discovery and monitoring

N60 is a professional video encoding/decoding device for NDI video production, which can encode HDMI video sources into NDI streams for transmission over Ethernet or decode NDI streams for output to any compatible system, device or software in the network.

7.1 NDI Tools Installation

Download and install the NDI Tools from NEWTEK website:
(https://www.newtek.com/ndi/tools/#)



7.2 Discovery and Connection

When the device is connected to the network, On the PC side, other NDI-enabled tools of the same subnet can discover the NDI streams automatically. Currently, there are many NDI-enabled software. The following is an example that how to automatically discover and pull NDI streams using NewTek Studio Monitor and vMix.

Open NewTek's Studio Monitor and click the icon in the upper left corner (or right click) to display a list of devices that have been discovered. The list of devices is followed by a list of all NDI streams found in the network with different devices and channels, and you can pull and play the selected video streams.

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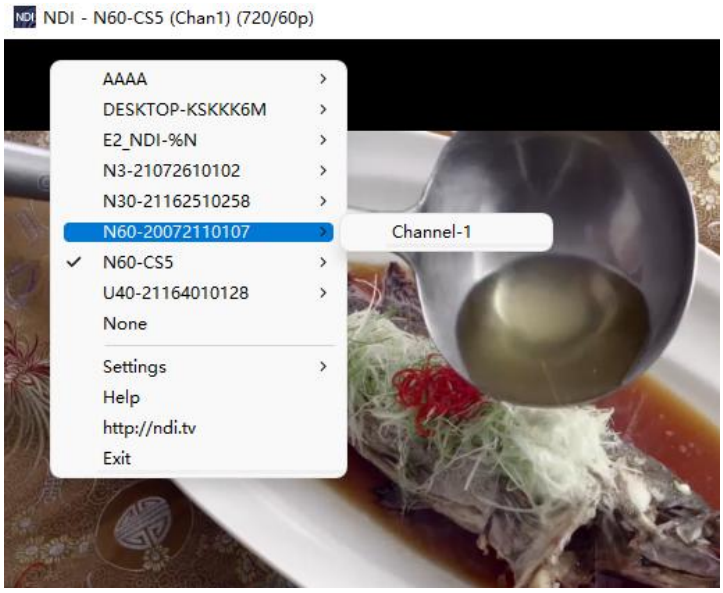
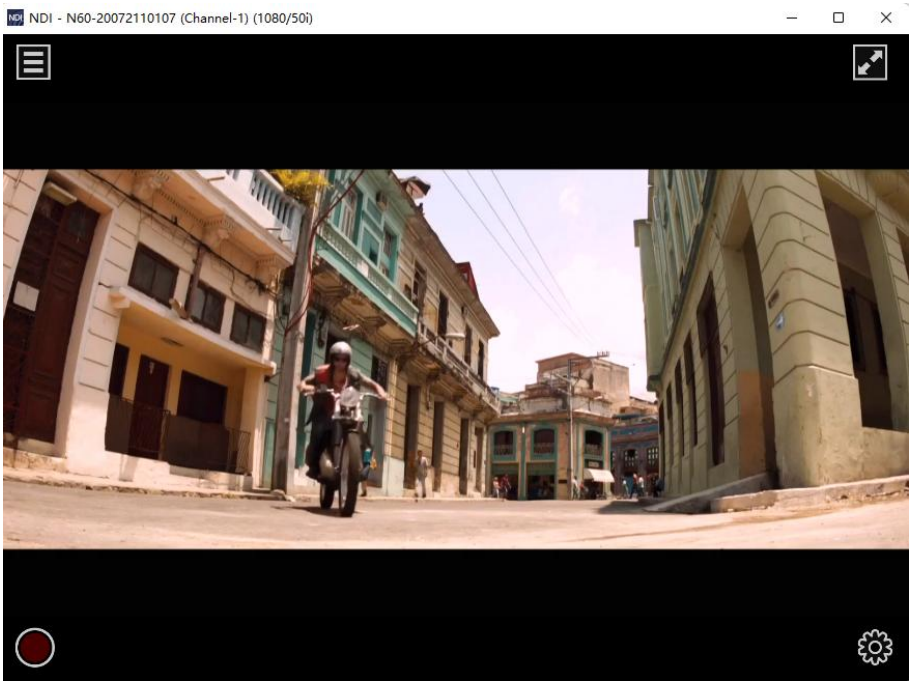


Open the Monitor and play NDI videos, click at the bottom right corner of the player to open the WEB page of the NDI device directly, which is convenient for managing the NDI device directly.



Open vMix, click "Add input" at the bottom left corner, select "more" to display various sources that can be added, click "NDI/Desktop capture" to display the list of NDI sources. Depending on the device name and channel name, you can select the device you want to add and click "OK" to add the selected NDI source to the vMix source list.

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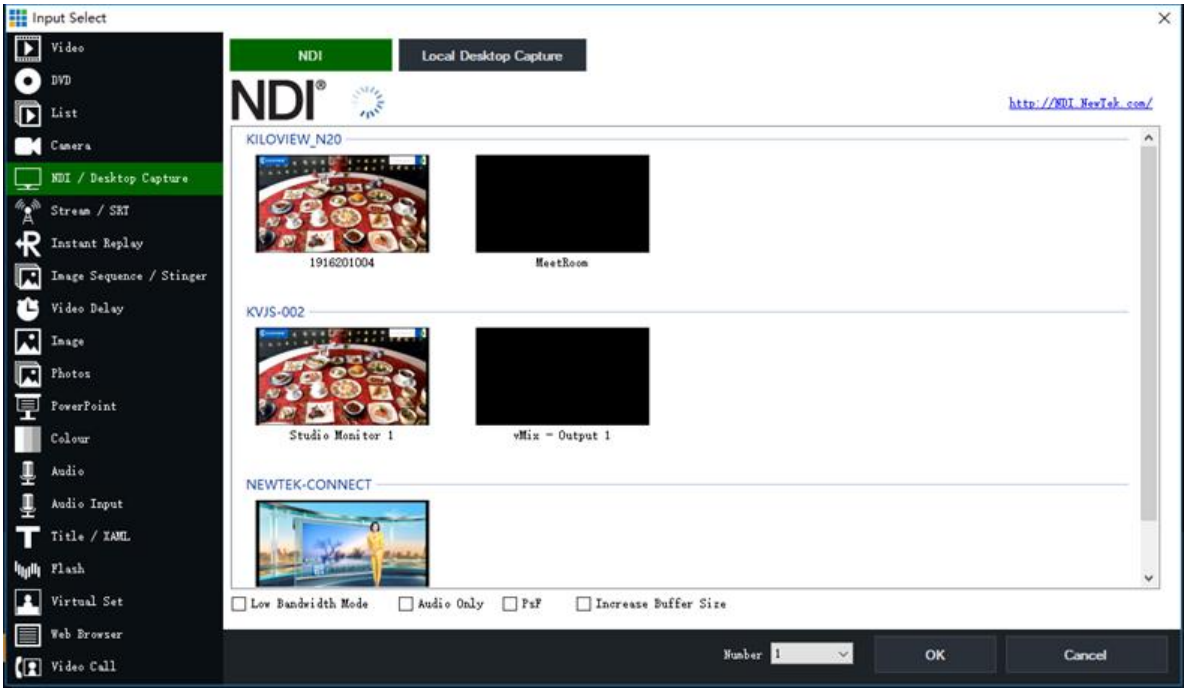

⚠ **Note: NDI discovery is Multicast-based, so the device and other NDI devices should be within the same subnet, and the device is configured with the same subnet IP address and they can communicate with each other automatically, otherwise it may not be able to automatically discover NDI streams.**

7.3 NDI Encoding Bitrate

Full NDI encoding transmission requires high bit rate, the device needs to be connected to a Gigabit network, and the device at the pulling end also needs a Gigabit network, otherwise it will cause lag or abnormal. The below list shows the reference bitrate for different resolution.

Resolution	Output bandwidth
4KP60	250Mbps
1080P60	125Mbps
1080i60	100Mbps
720P60	90Mbps

8 Encoder Configuration

8.1 NDI Configuration

N60 is a professional video encoding/decoding device for NDI video production, which can encode HDMI video sources into NDI streams for transmission over Ethernet or decode NDI streams for output to any compatible system, device or software in the network.

It supports both Full NDI and NDI|HX. Change the encoding parameters of the device by clicking

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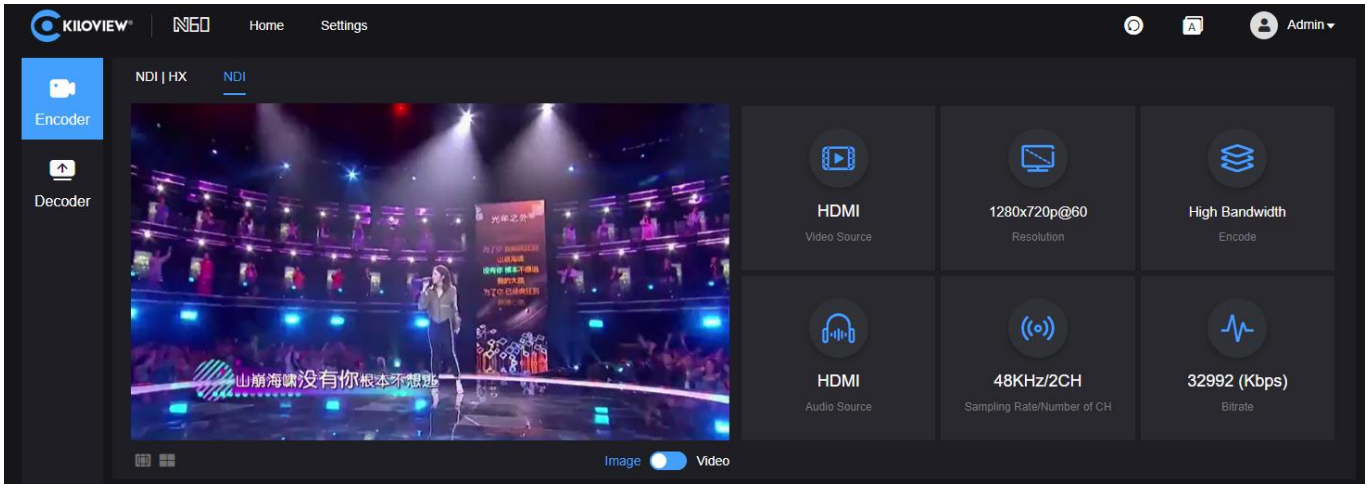
“NDI” and “NDI|HX”.

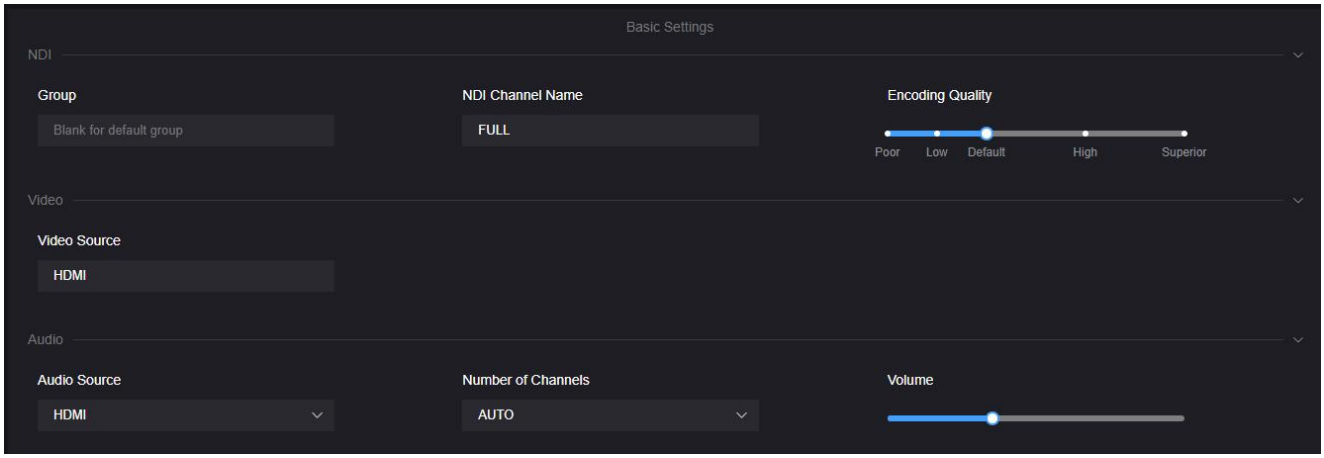
8.2 Status Column



- Video source: Input signal.
- Resolution: Input video source resolution.
- Encode: The encoding protocols. High Bandwidth (Full NDI) and H.264 NDI|HX (HX supports multiple versions and configurable in the video encoding).
- Sampling rate: The audio sample rate of the input source.
- Number of CH: The number of audio channels.
- Bitrate: Real-time encoding code bitrate.

8.3 Basic Settings

NDI is a protocol developed by NewTek which is used for video-over-IP transmission in LAN with features of high quality and low latency. Configure NDI parameters in “Basic settings”.



- Group: The group name can be the combination of characters and numbers. Multiple group names are allowed to be configured, with commas separating the group names, and the default group name is “public”. If you do not want other devices in the network to find it, please set a specified group name, and other devices can be found with the specified group name.
- NDI channel name: When multiple NDI sources in the same network, change the channel name of the device to distinguish different devices.
- Encoding quality: When decreasing or increasing the encoding quality, the encoding image quality and the encoding bitrate are adjusted as well.

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- Encode: Support H.264 and H.265, and NDI|HX support NDI|HX2 and NDI|HX3, you can choose different versions with actual use.
- Color space: N60 supports setting the color space of NDI|HX encoding, with a maximum supported color space: YCbCr: 4:2:2 10bit.
- Audio source: HDMI embedded audio or analog input audio selectable, the default is HDMI embedded audio.
- Volume: Gain adjustment of the input analog audio or HDMI embedded audio.

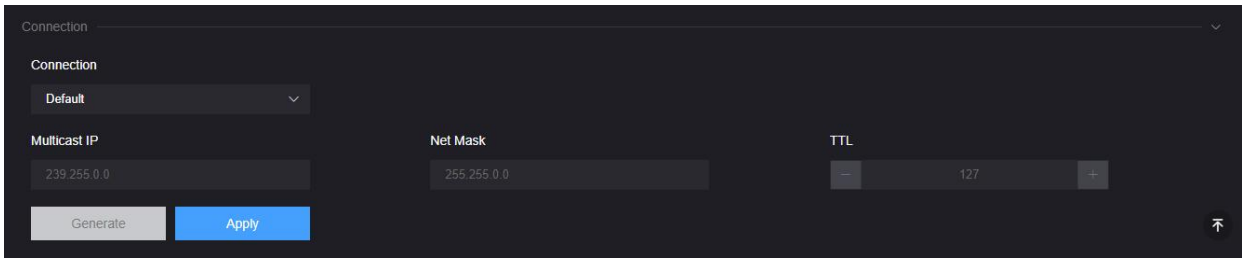
Note:

1. No need to save the configurations after changing the device group, device name and channel name, click any other location on the page for the parameters to take effect.

2. For the color space, N60 only supports changing the color space of NDI|HX encoding, not for Full NDI color space. When the video resolution is 4K P50/60, the color space of Full NDI encoding is YCbCr:4:2:0 8bit; and when the video resolution is lower than 4K P50, it is YCbCr:4:2:2 8bit.

8.4 NDI Connection

NDI supports multiple connection modes, the default is RUDP.
Default: connection by RUDP.
RUDP Disallowed: connection by TCP multicast.
Multi-UDP Disallowed: connection by TCP unicast.
Multicast: Connection by UDP multicast.
Users can change the NDI connection mode with actual use.
For example: choose “Multicast”, NDI transmission will transmit audio and video in multicast mode. Click “Generate”, a multicast IP will be generated randomly, or you can configure it manually and click “Apply” to take effect.



Note: Due to the high bandwidth of Full NDI, if you choose “multicast”, please pay attention to the influence on other devices in the network.

9 Decoder Configuration

Click “Decoder” to switch to decoding configurations, or switch to the decoding mode on the LCD screen.
Before switching to decoding mode, please check the Ethernet IP address and log in the WEB page with the address.

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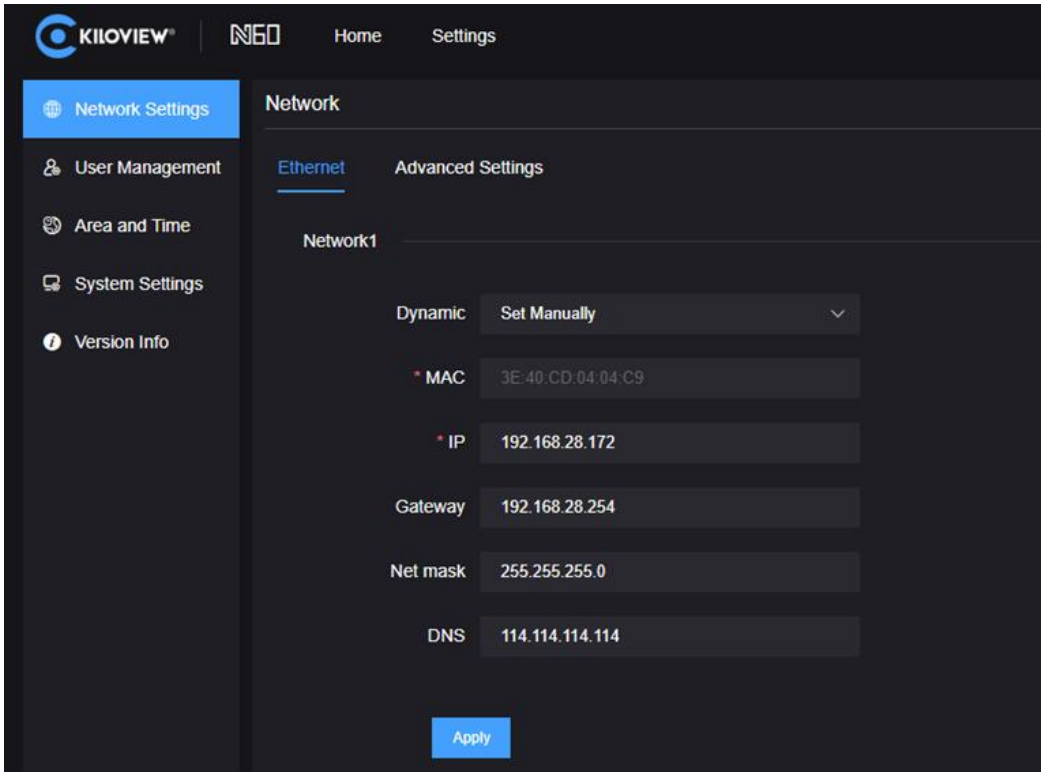
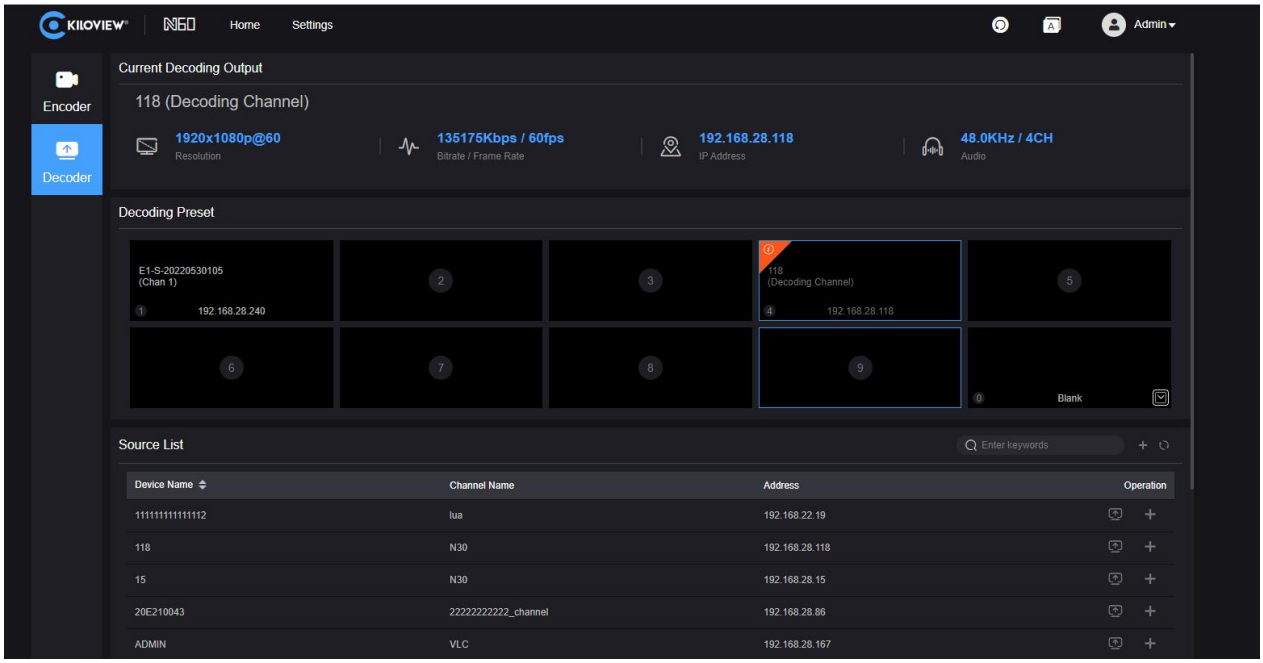


Note: Encoding and decoding function of the device cannot be performed simultaneously. When switching to the decoder, the encoding function will be stopped. Use Studio Monitor to connect the NDI stream and click the gear button in the lower right corner to go to the WEB page.



9.1 Discovery of NDI sources

The N60 can discover NDI sources on the same LAN autocratically and display them in the source list. Click to update the network NDI sources in real time.

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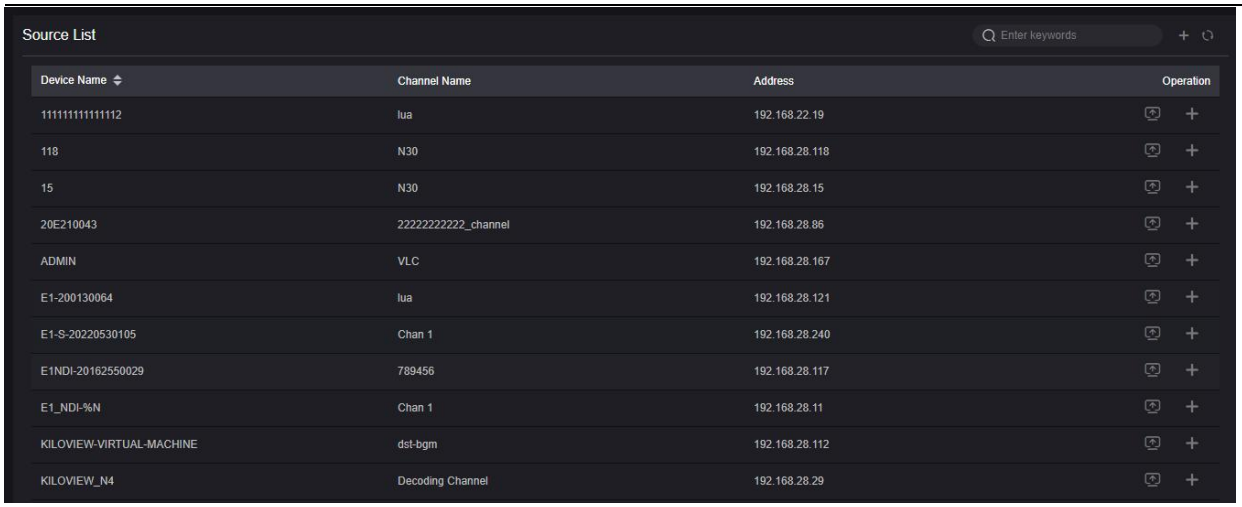
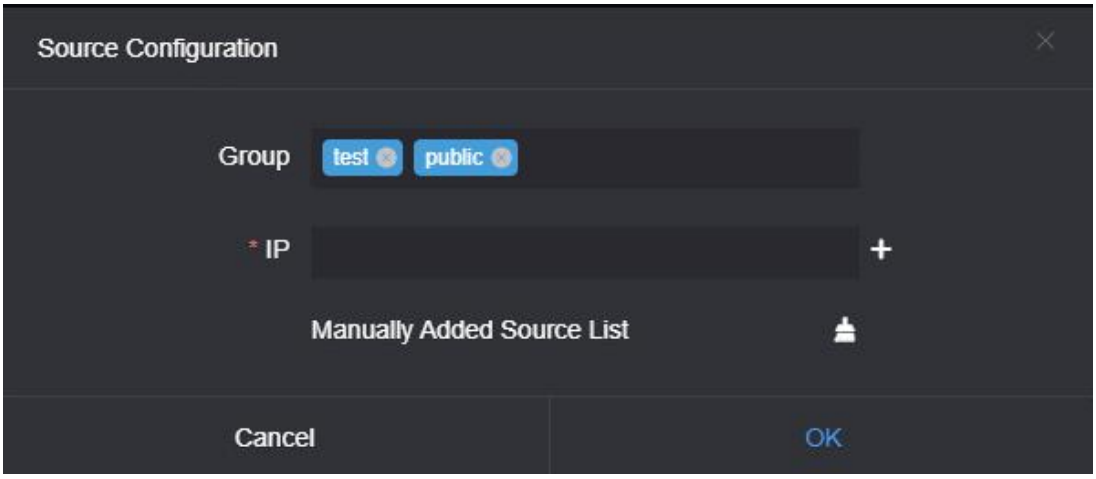


Click to add NDI video sources from different groups or different network segments in the same LAN.

If you want to search for devices with different group names in the same subnet, filling in the specified group name after “Group” (e.g. kiloview), click the “Enter” button, two group names will be displayed in the "Group" box. Then click the "OK" (no need to fill in the IP address) and the device will search for the NDI source of both group names at the same time. (You are allowed to add multiple group names to search).



When you need to search for NDI sources across network segments, if the group name is non-public group, you need to fill in the specified group name first, then fill in the specified IP address in the "IP", and then click "OK".

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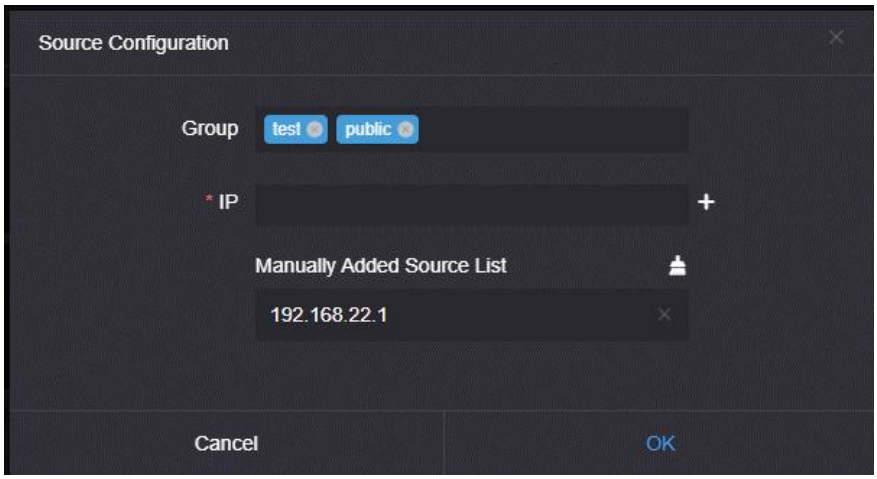
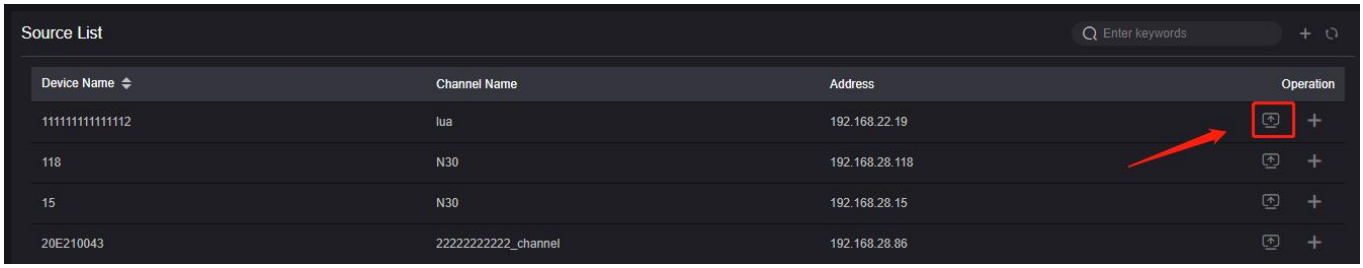


9.2 Decoding Output

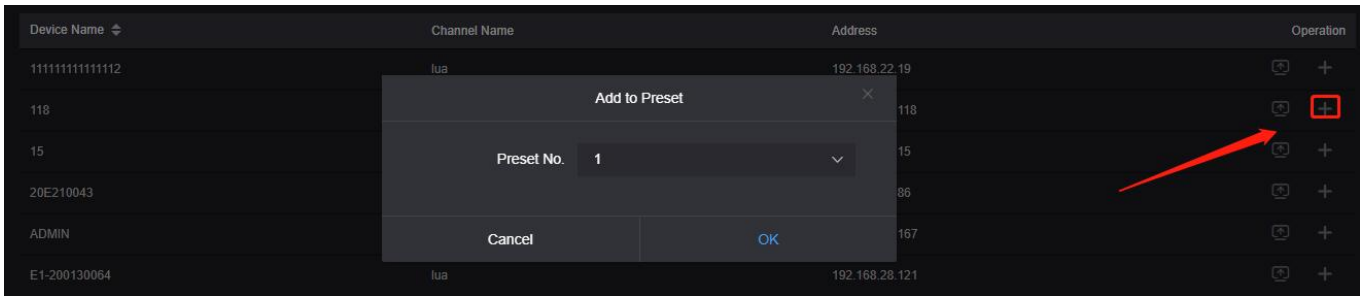
Click next to the NDI source to decode and output the video source directly.



9.3 Decoding Preset

N60 supports up to add 9 preset decoding windows, click the NDI source and the device starts decoding the video.

Click next to the NDI source to add the source to a different decoding preset window.



After adding the NDI sources to different preset windows, clicking the preset window and the N60 will immediately start decoding the NDI source, and finish the switching between different NDI sources.

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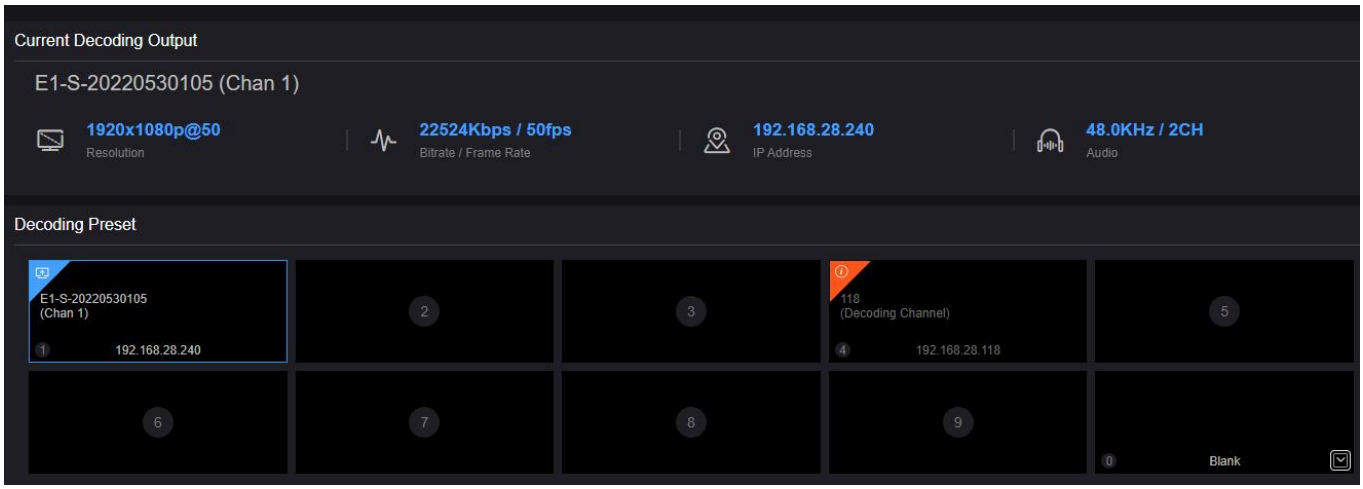
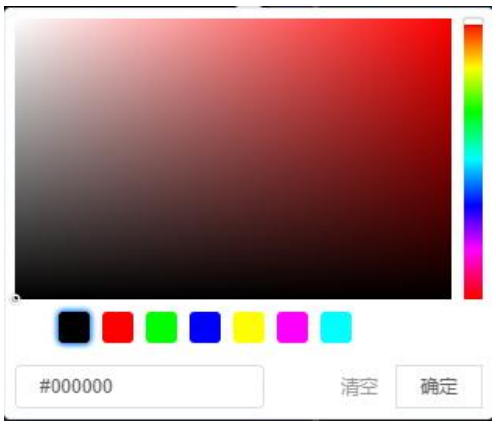


By clicking different NDI sources to switch the decoding output. In the upper right corner of the preset window, click to delete the added source.

There is a blank output window in decoding preset, if switching to a source without video output, the device will output the preset color. It can also be used for testing the output to the monitor by choosing a different color.



9.4 Decoding parameter configuration

“Current decoding output” displays the current decoding NDI source name, channel name, resolution/frame rate, audio parameters, source IP address, real time bit rate and frame rate and so on.

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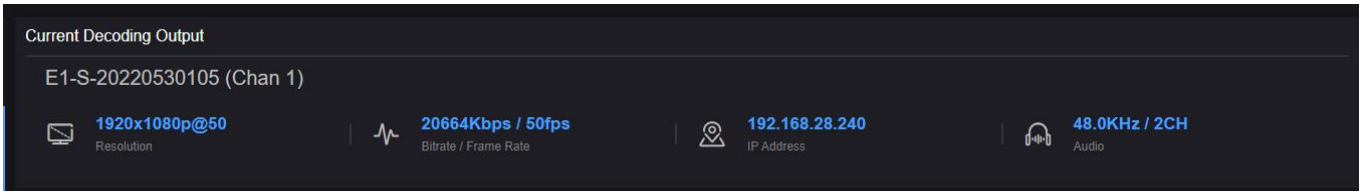
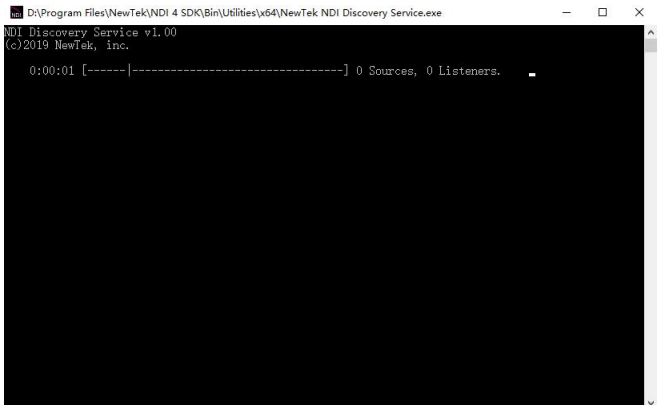


9.5 Discovery service

NDI discovery server can replace NDI auto-discovery with a server, where NDI sources are centrally registered to the server, and the receiver end obtains NDI source from the server. Through this, the device can also send the output video stream to the receiving end of the cross-network segment.

First, download and install the NDI SDK on a Windows computer at the receiving end. After installation, run Bin\Utilities\x64\NDI Discovery Service.exe.



The NDI encoder configures the IP address of the receiving end in the discovery server, and the NDI will be registered to the server. It is recommended that the receiver address be configured as a static IP address to prevent the loss of NDI connections due to IP reassignment.

⚠**Note: When the function is enabled, the mDNS auto discovery function is invalid. The stream of the encoder can only be sent to the specified server, and the receiver end must register to the same discovery server to pull the NDI stream.**

---

1) Receive with Kiloview FULL NDI decoder

Switch the FULL NDI device to decoding mode, click "discover server", and "Enable" it. Fill in the server address with the same registered address of the NDI encoder. Click "OK", all NDI sources registered to the discovery server can be found by scanning the list.

2) Receive with computer-based software

Install NDI tools at the receiving end and open “NDI Access Manager”. Click to enter "advanced", cancel "Multicast Sending Enabled" function, select "Use Discovery Server", and set the "Server IP" address the same to your computer that enables the discovery server function. After

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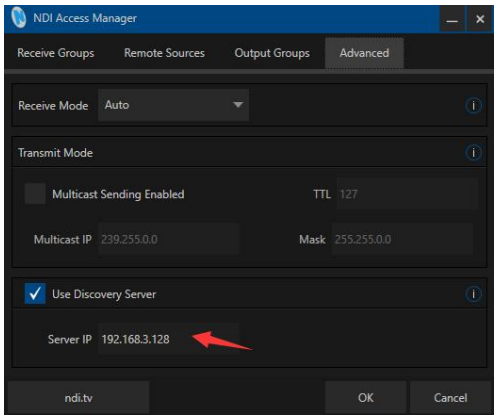
configured, the receiving end can discover the NDI stream registered with the server (such as Vmix, Studio Monitor).



The decoding output switching can also be controlled via keypad, firstly connect the keypad via USB.

Secondly press【NumLock】 on the keypad, if the light is on, you can operate to decode and switch. Press 1-9 to select the corresponding preset decoding sources, and 0 is blank.

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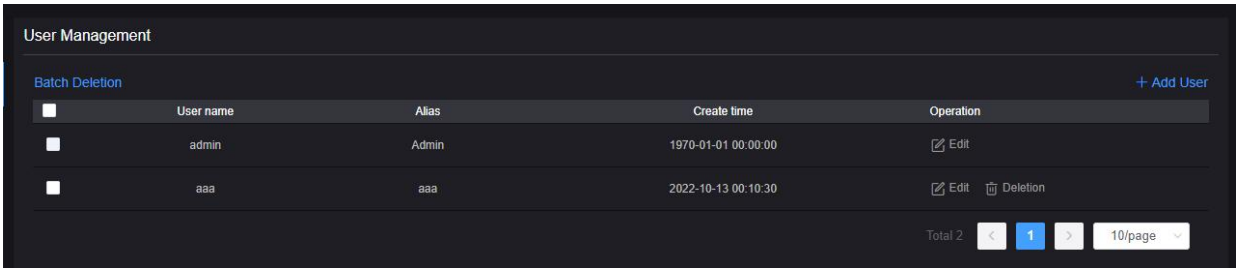
10 System Settings

10.1 User Management

To add and delete users, change user passwords, etc.



10.2 Reboot

"Reboot" is used to restart the device software, which means to reboot the device and it will last about 1 minute.

10.3 Restore

If the device cannot work normally after modified the parameters or forgot IP configuration, please restore factory settings.

Two Easy Methods:
1) If you can login to webpage, click "Settings>System settings>Restore factory settings" on the webpage.
2) LCD screen: Enter the second page of the device by rotating the wheel, select "Restore Factory" and press the wheel to restore the factory settings.

10.4 Firmware Upgrade

Our product will be constantly improved, so we will continue to upgrade the device with functions and bug fixes. New functions or bug fixes are supported by firmware upgrading, so please contact our technical support for the upgrade firmware if needed.

Click “System Setup” and “Firmware update” to enter the firmware upgrade page. After uploading the firmware, click "Firmware Update" to upgrade. The entire upgrade process will last for 2-3 minutes (depends on the firmware size and network conditions). The device will automatically restart, don’t power off during the upgrade process, otherwise the upgrade may fail and the device will be abnormal. If you need help, please contact our technical support to complete the upgrade.

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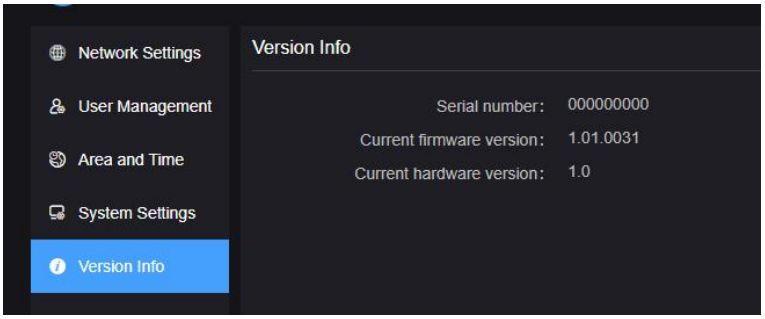
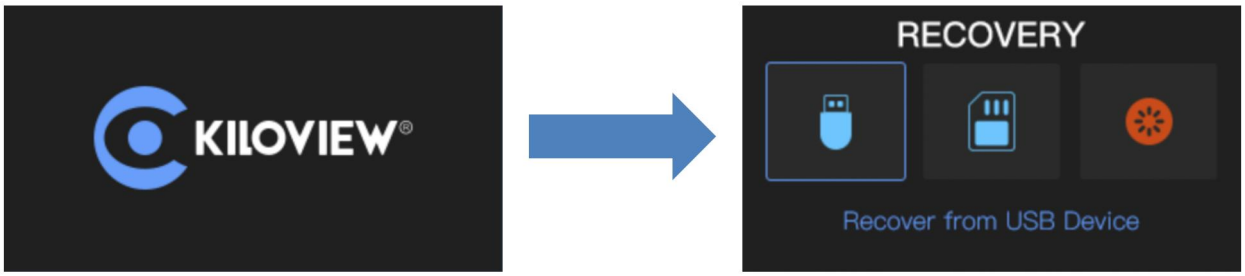
After upgrading, click at the upper right corner of the WEB page to confirm whether the current software version and the latest upgrade firmware are the same, to make ensure the device upgrading is successful.



10.5 Upgrade device firmware in recovery mode

If you cannot access the N60 web page with the method described in 9.2, please use the Recovery mode to upgrade the firmware as following.

Step 1: Prepare a USB flash drive or SD card, copy the firmware file downloaded from Kiloview website to the USB flash drive/SD card.
Step 2: Insert the USB flash drive or SD card into the N60, after the device turned on (about 2s), wait for
the Kiloview logo to appear on the screen, long press and hold the scroll wheel for more than 10s until the device enters recovery mode.



Step 3: Select "Recover from USB Device" or "Recover from SD Card" by turning the scroll wheel, press the wheel to confirm the selection to start the upgrade.

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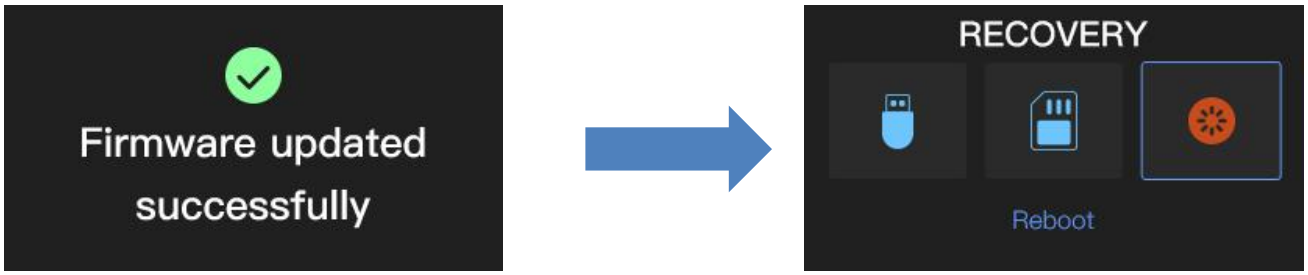
Step 4: During the upgrading, it will prompt with "Updating! Please keep the power on." (Please do not power off).

Step 5: When the N60 screen displays "Firmware updated successfully", the N60 has completed the firmware upgrade. At this time, any operation of the scroll wheel will help you return to “RECOVERY”, please select “Reboot” to restart the device.



Note

- “Press and hold the scroll wheel for more than 10s to enter recovery mode” is only available when the device is ON.
- Upgrade firmware is available only in the root folder.
- If the firmware cannot be found, the pop-up window will show "No firmware found", please operate the scroll wheel to return to the selection screen.
- During the firmware upgrading, any operation is invalid.
- If the firmware upgrade fails, it will prompt "Failed to update the firmware", please contact technical support for help.

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Thank you for reading!

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