NewTek™

NewTek Spark Plus™ IO

3G-SDI & HDMI

NDI® Encoder/Decoder

Operating Instructions

NDI®

Revised – April 27, 2020

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Section 1 INTRODUCTION AND SETUP

This guide explains how to connect power, sources and audio-visual sources to your NewTek Spark Plus IO. It also explains how to update, and where you can find additional NDI® software to extend your workflow. After completing this section, you'll be ready to begin using your device.

1.1 OVERVIEW

Thank you for purchasing this NewTek™ product. NewTek is extremely proud of its record of innovation, and its commitment to excellence in design, manufacture, and superb product support.

NewTek provides some of the most advanced live production tools available anywhere, and we are confident you will find them exceptionally powerful and versatile. Your NewTek input module delivers a huge amount of functionality in a compact package. Prosumers and video professionals alike will appreciate the convenience and flexibility it provides in connection with both video production and capture.

Unlike typical encoders and capture card systems, your NewTek Spark Plus™ IO leverages NewTek's NDI-based IP workflow, supported by leading video software and hardware developers around the globe. This manual will assist you to install and configure your new device. First let's go over product highlights from both models:

Spark Plus™ IO 3G-SDI

FIGURE 1

Spark Plus IO 3G-SDI not only converts 3G-SDI Video to NDI® (Encoding) but also converts NDI to 3G-SDI (Decoding). It supports up to 1080/60 video input (Encoder) or up to 1080/60 video output (Decoder).

It features an 3G-SDI input and 3G-SDI loop through for view on the monitor while NDI streaming, or 3G-SDI output while decoding. It also includes 3G-SDI video input/output with embedded audio - Figure 1.

Spark Plus™ IO HDMI

FIGURE 2

Spark Plus IO HMDI converts 4K UHD HDMI Video to NDI® (Encoding) and converts NDI to 4K UHD HDMI (Decoding). It supports up to UHD 4K/60 video input (Encoder) or up to 4K/60 video output (Decoder).

It features an HDMI input and HDMI loop through for view on the monitor while NDI streaming, or HDMI output while decoding. It also includes HDMI video input/output with embedded audio - Figure 2.

Included in Spark Plus IO 3G-SDI and Spark Plus IO HDMI

- Bi-directional conversion
- Built-in tally light
- 3.55mm audio input
- 1GbE port with PoE support
- Threaded screw camera mount
- DC 5V-18V power supply

1.2 GETTING READY

Your NewTek Spark Plus™ uses the NDI® protocol for audio/video transmission, and more. Your first step will be to install a few NDI utilities appropriate for your computer platform or device:

1. Navigate to https://www.ndi.tv/tools/ in your web browser, and follow directions to download and install the NewTek NDI Tools pack, available at no cost.

NDI Tools provides a very valuable array of practical NDI learning tools and utilities, including NewTek's NDI Studio Monitor, which will not only locate and display the network video output from your Spark Plus unit, but also makes it easy access to its settings.

1.3 MAKING CONNECTIONS

Spark Plus IO 3G-SDI Back Panel

1. 1GbE port with PoE Support
2. SDI Input
3. SDI Output
4. 3.5mm Audio
5. USB-C

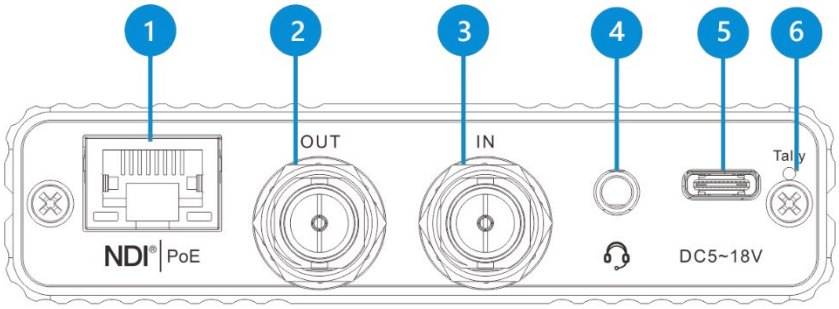


FIGURE 3

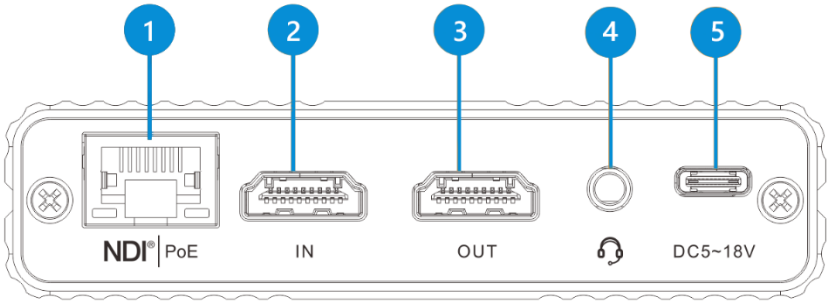


FIGURE 4

Spark Plus IO HDMI Back Panel

1. 1GbE port with PoE Support
2. HDMI Output
3. HDMI Input
4. 3.5mm Audio
5. USB-C
6. Tally

Spark Plus IO Front Panel

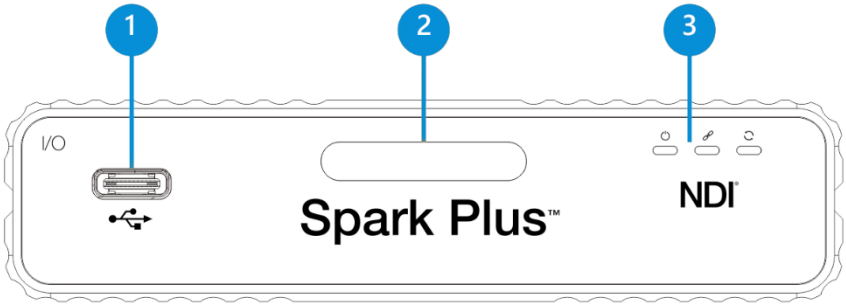


FIGURE 5

1. Type-C Extension
2. Tally
3. Status Indicator

1. Supply *power supply* to the unit, by connecting the supplied power adapter to Spark's USB-C port, located beside the audio input connector. The unit boots as soon as power is supplied. At this point, the 3 small LED Status Indicator lights will illuminate. (If this does not happen, check your connections and retry.)
2. Continue to connect one end of a network cable to Spark's RJ-45 Ethernet port.
3. Connect the other end of the cable to your network switch or router.
4. Optional steps:

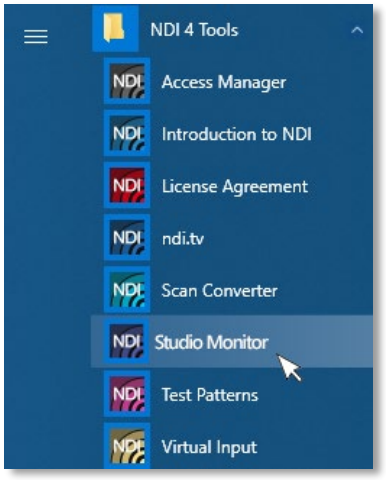


FIGURE 6

a. Connect an HDMI video cable from a suitable video source to Spark's HDMI input connector.

b. If you wish, connect an analog audio source to the 6.35mm stereo audio input.

If you connected a video source in step 4 above, your Spark Plus is already sending NDI audio and video to your local network. We'll talk about how to access and use it soon, but first let's discuss how to access Spark's settings and features.

Hint: In 'mission' critical installations, it is wise to use an uninterruptable power supply (UPS). Likewise, consider A/C "power conditioning", especially in situations where local power is unreliable or 'noisy'. Surge protection is especially important in some locales. Power conditioners can reduce wear on power supplies and other electronics, and provide a further measure of protection from surges, spikes, lightning and high voltage

Spark Plus is very easy to use. In many installations, all you need to do is supply power, connect a video source and your network, and you're ready to go.

Sometimes, though, you will want to access your input module's local settings, perhaps to configure login credentials, update firmware, etc.

Settings are made available by means of Spark's configuration webpage, which you can access from any suitable device (i.e., one with a web browser) on the same network.

Note: You may occasionally find it necessary to delete cached files (sometimes referred to as the browser's "history") before the display refreshes to properly show some recent change. This can happen, for example, after a firmware update.

Some devices provide direct, easy access to Spark's configuration webpage.

For example, when you select output from a Spark as the source for a NewTek TriCaster® switcher input, a convenient "Device Webpage" button is shown in TriCaster's Input Configuration panel. Simply click this to open the corresponding web control page.

1.3.2 STUDIO MONITOR

For other platforms, you can use the Studio Monitor application you installed back in Section 1.2 in a similar manner.

Windows platform users can launch Studio Monitor from the system's Start menu (Figure 7), where it will appear in the NewTek NDI® Tools folder. Among its capabilities, Studio Monitor (Windows) can detect and display NDI sources available on your network.

OS X users will also find a similar NDI Video Monitor application available to them after installing the NewTek NDI Tools pack for their preferred platform.

LOCATING SPARK PLUS ON THE NETWORK – WINDOWS

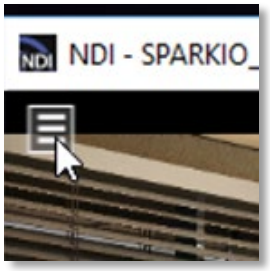


FIGURE 7

1. Launch Studio Monitor and click the small menu ('hamburger') gadget at upper left to open the application menu.

   Among other things, this menu displays all NDI sources detected on your network.

2. Shortly, you should see a new main entry named NDI_SPARKIO added to the menu. Roll the mouse pointer over this label to show the channel names for NDI output streams from any Spark Plus units detected.

Hint: Detection of newly connected NDI sources can take a few moments; in network settings with a great number of NDI sources available, a complete refresh of the source list can take a minute or even more.

When the sub-menu lists multiple NDI channels with the same name, the device IP addresses are shown to further identify them. (NDI users seldom need to bother with mundane matters such as IP addresses. ☺)

Select the newly listed channel for the Spark unit you wish to configure. In a few moments, its video output will appear in the Studio Monitor window.

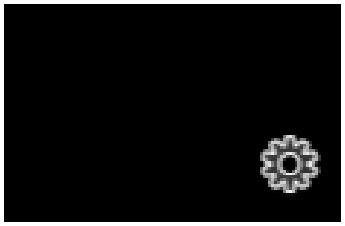


FIGURE 8

3. For NDI sources that, like Spark Plus, host a configuration web page, a small configuration (gear) icon appears at lower right when you the mouse pointer is over the Studio Monitor window –

4. Click the gear to open the corresponding web page, popping up a request for you to enter login credentials (Figure 8).

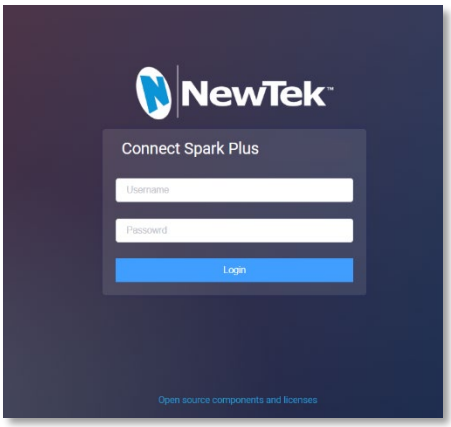


FIGURE 9

Note: The Microsoft Edge web browser is not fully supported at this time.
On Windows platforms, please use another modern web browser or Internet Explorer.

LOCATING SPARK PLUS ON THE NETWORK – OS X

The process is very similar for OS X users.

1. Having launched the Video Monitor application, use the File menu at the top of the Desktop to locate a new main entry named SPARKIO_3G_SDI (unit serial number) orSPARKIO_4K_HDMI (unit serial number).

2. Rolling the mouse pointer over this label shows the individual names for the NDI output channels of any Spark Plus units detected on the network.

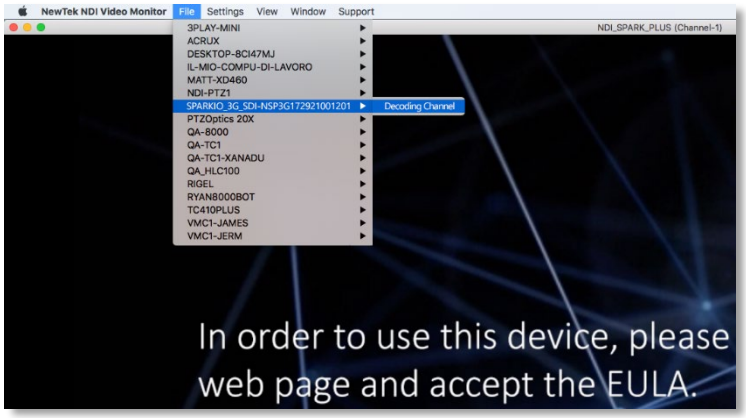


FIGURE 10

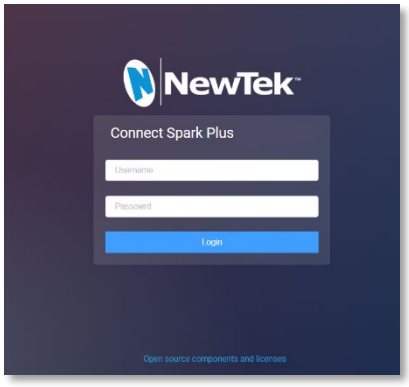
Hint: Detection of newly connected NDI sources can take a few moments; in network settings with a great number of NDI sources available, a complete refresh of the source list can take a minute or even more.

When the sub-menu lists two or more NDI channels with the same name, the source device IP address is shown to further identify them. (Otherwise, NDI users seldom need to bother with mundane matters such as IP addresses. ☺)

Select the newly listed channel for the Spark unit you wish to configure. In a few moments, its video output will appear in the Studio Monitor window.

3. The Video Monitor Settings menu shows an option near the bottom that lets you open the Device Webpage in your system web browser. Select this item and continue as follows.

1.3.3 LOGGING IN



Enter the Username "admin" and the default Password - also "admin".

FIGURE 11

1.3.4 AUDIO/VIDEO SETTINGS

At this point, the Spark Plus encoder configuration webpage will be displayed (Figure 12).

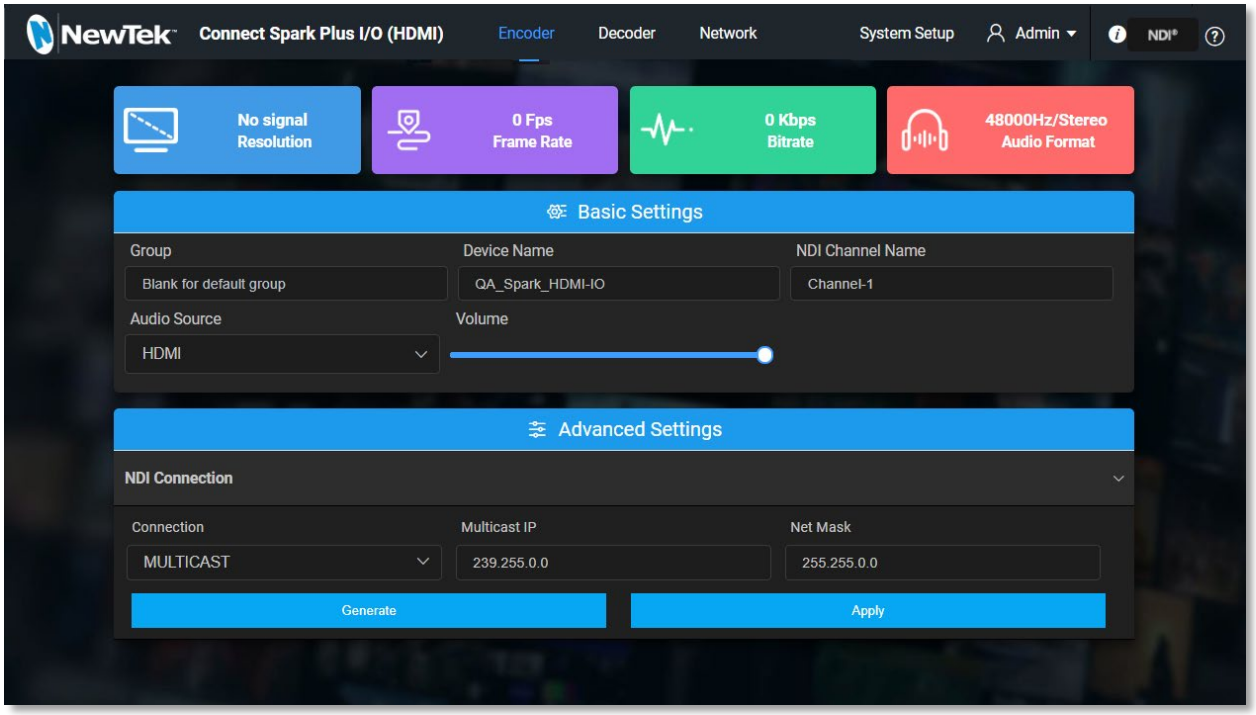


FIGURE 12

Update Your Firmware

We encourage you to keep the firmware on your NewTek device up to date. Firmware updates may contain bug-fixes, provide improved performance, or even enable new features.

The update process is not complicated – simply follow the steps listed below:

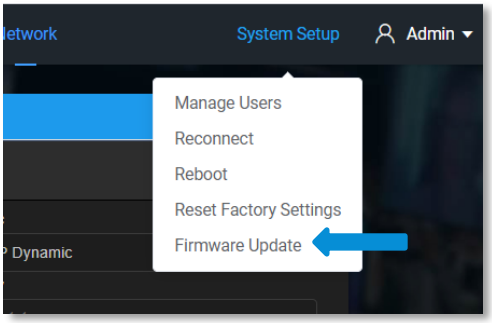


FIGURE 13

1. Download and unzip the most recent firmware update archive to extract the '.bin' file.
2. Click the *System Setup* tab at the top of Spark's webpage (Figure 13) and compare the *Firmware Update* shown to the number in the filename of the firmware version you downloaded. If the download has a higher revision number, continue below to perform the update.
3. Click the *Update Firmware* button and click *Choose File* to show a file explorer.
4. Use the file explorer to locate the firmware .bin file and follow the prompts to perform the update.

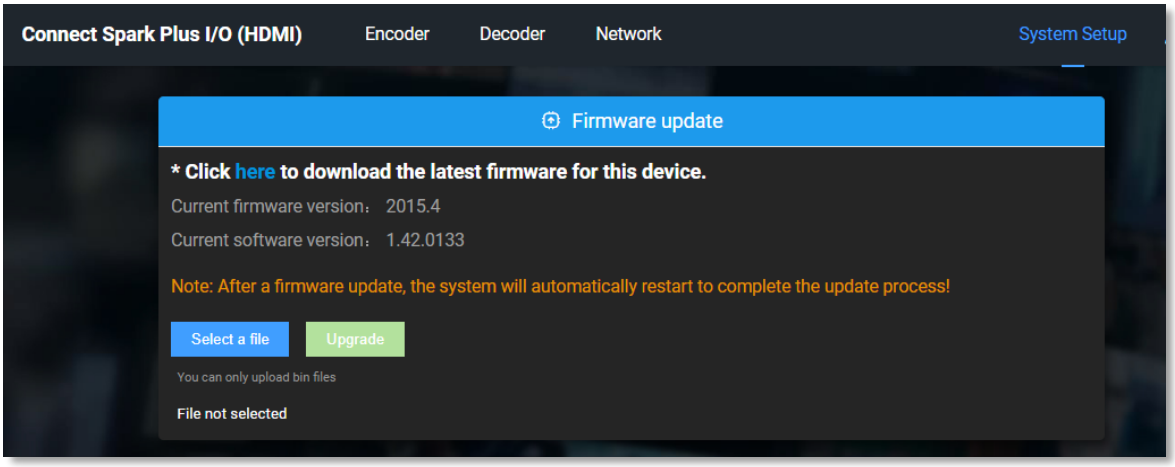


FIGURE 14

Spark will reboot during this process, which can take up a few moments. *Please be careful not to interrupt power to the device during the update process.*

5. Following a firmware update, we recommend performing a *Restore* operation. A *Reset buttonhole* is located on the underside of the device, or you can use the *Restore* function from the web page.

   Hint: On some web browsers, you may occasionally need to clear the browser's cache (history) to see the result of a firmware update or Factory Reset. Also, please note that it can take a minute or two before the NDI channel name shown in Studio Monitor refreshes.

   The IP address of the device can change as a result of a *Restore* operation. You may need to use Studio Monitor to locate the device on the network and log in again afterward.
   Also, if you have previously set a manually configured IP address for the unit, you will need to reconfigure the IP settings again following a *Restore* operation.

Hint: Should you set a custom password and then forget it; you can reset the device to factory defaults using the Factory Reset process. (Figure 15)

1.3.5 UTILITIES

Reset, *Reboot* and *Restore* buttons are in the pull-down menu under *System Setup* tab at top of webpage.

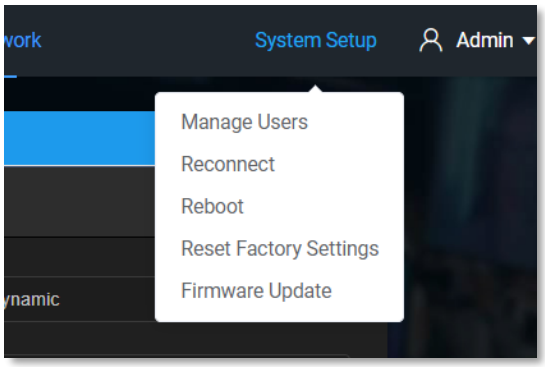


FIGURE 15

- **Reconnect** – breaks and re-establishes the connection between the source and NDI-enabled devises and systems.
- **Reboot –** restarts the device (a 'warm' reboot)
- **Reset Factory Settings –** has the same effect as pressing the recessed *Reset* pin near the RJ-45 NDI connector on the back of the device for a few seconds. This resets all settings to their as-shipped default states. (On selection, the tally LEDs on the front of the unit progressively cycle to off, then on again a short while later after defaults have been restored and the unit has rebooted.)
- **Firmware Update** - may contain bug-fixes, provide improved performance, or even enable new features.

1.3.6 DEVICE DETAILS

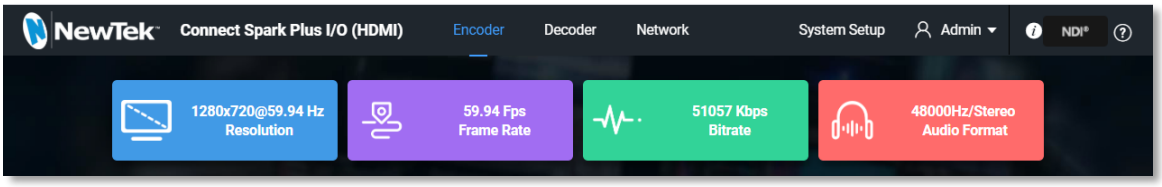


FIGURE 16

The uppermost section of the web page (under device name) shows Audio/Video format details, the current bitrate and the unit's serial number. These values are automatically detected and are not editable.

1.3.7 DEVICE AND CHANNEL NAME

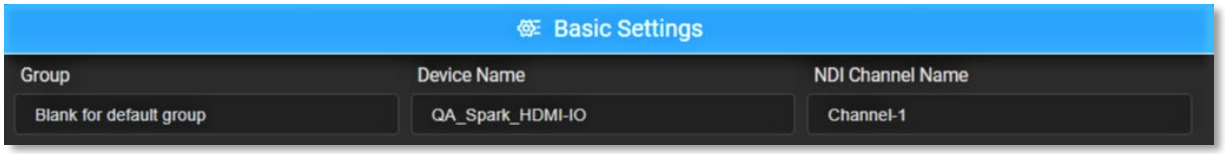


FIGURE 17

Just beneath, under the heading Basic Settings, you will find Device Name and NDI Channel Name boxes. The entries here determine how your Spark device is identified on your NDI network. These names are editable, allowing you a convenient way to identify the output of specific Spark units to downstream NDI-enabled devices and systems.

Hint: The default name includes the unit serial number, which is also provided on a sticker on the chassis to help you identify a specific device.

1.3.8 AUDIO

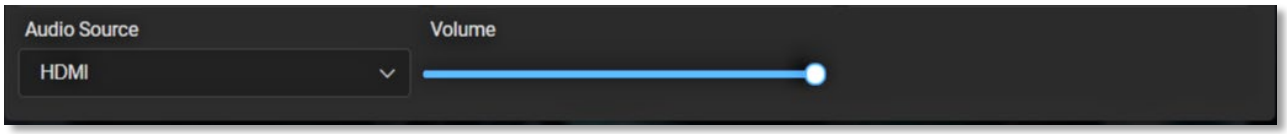


FIGURE 18

Just below, you will see the *Audio Source* menu (Figure 18). It offers two options, labeled *Mic In* and *HDMI*. These determine whether Spark Plus IO uses the embedded audio source (digital audio included with an HDMI video source) or analog audio supplied to its 1/8" line level stereo input connector. The nearby volume control governs the audio output level. The device's nominal audio level is +4dBu.

1.4 NETWORK SETTINGS

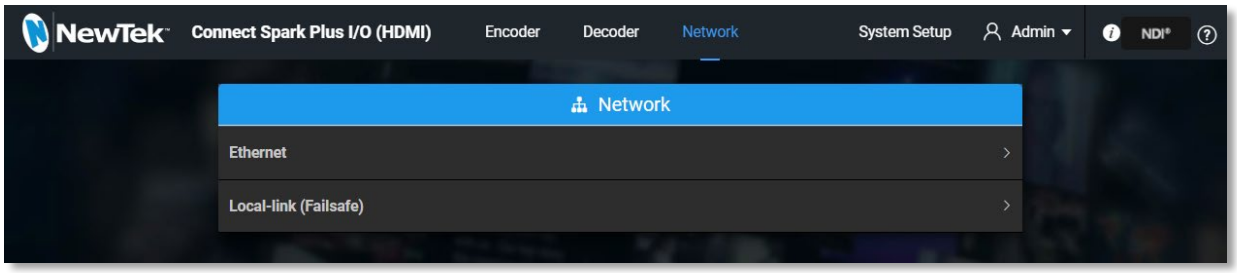


FIGURE 19

On the top panel of the webpage you will find the *Network* heading, which is host to *NDI Connection*, *Ethernet*, and *Local–Link* settings NDI Connection.

1.4.1 NDI CONNECTION

If choosing multicast mode, NDI transmission will be executed in multicast mode. Click *Generate*, a multicast IP will be generated randomly, or you can configure it manually and click *Apply* to take effect. (Figure 20)

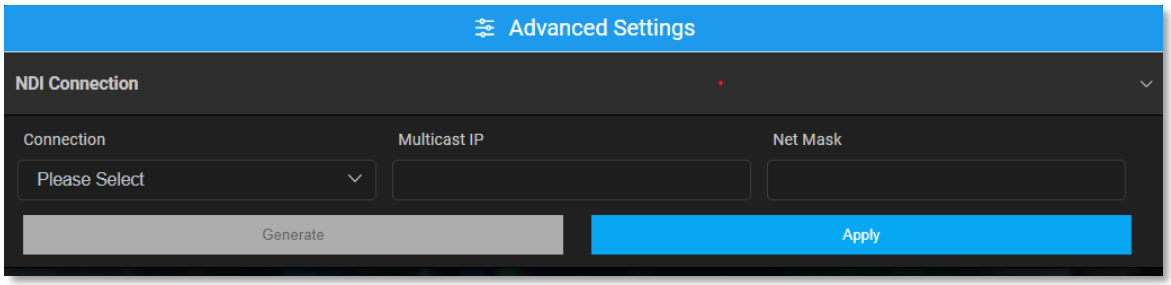


FIGURE 20

Although it serves no useful purpose when connecting directly to dedicated NDI inputs, this option may be helpful in some more sophisticated environments. Select *Multicast* to transmit video using multicast, rather than the default unicast method. A suitable multicast address is generated, but you can edit the result manually if you need to. To update the address to another random value, click *Generate*. *Please take time to consider the following information before enabling this feature.*

MULTICAST OR UNICAST?

Multicast can seem like a bandwidth-saving miracle. Unlike NDI's default mode (unicast), multicast does not require a unique stream from the source to each receiver. When using unicast, each connection to the sender reduces the bandwidth available by a similar amount.

By contrast, multicast connections do *not* add significantly to the bandwidth required as connections multiply. You could be forgiven for wondering why anyone would ever turn this option off - yet, it is off by default. Why?

Managed vs. Unmanaged

An un-managed (a.k.a., 'dumb') network switch will broadcast a multicast stream to all devices on the network, with potentially very serious ramifications.

For example, even though a device broadcasts a multicast stream, the un-managed switch will pass *unicast* packets to downstream switches and clients. This can flood the network with unnecessary traffic and slow it down as upstream devices are forced to wait for responses from the over-saturated devices.

The result of a poor setup can fairly be likened to a self-inflicted Denial of Service attack and will not endear you to your colleagues.

This is because multicast requires more careful network configuration. While you might not notice any issues in a simple network setting; a poorly configured environment can have serious impact on more complex networks.

- Specifically, it is essential that IGMP snooping be enabled for each switch on the network. This lets the device listen to traffic between other hosts, switches and routers, and identify receiving ports using various IP multicast streams.

- In addition, we strongly recommend that all network switches be of the 'managed' type (see the sidebar "Managed vs. Un-managed").

1.4.2 ETHERNET

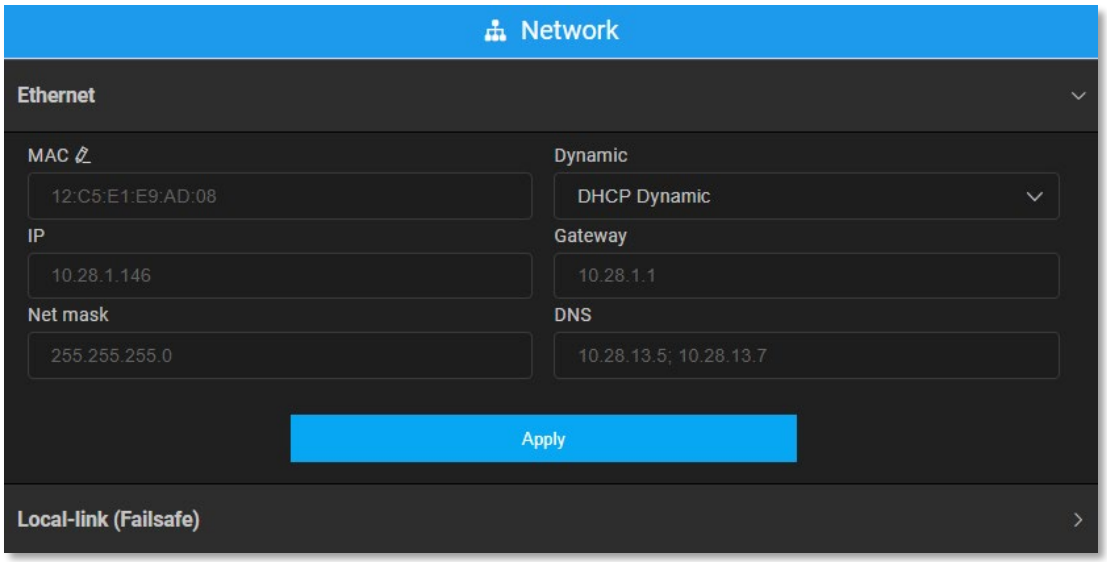


FIGURE 21

Controls in this section will be quite familiar to anyone who has connected a computer or mobile device to a network and require little explanation.

Typically, networks are configured to automatically supply IP addresses to devices you connect to it by means of a DHCP server. Your device's IP Address resolution method is set to *Dynamic* by default, to take advantage of this scheme. To assign a static IP address to your unit, change the IP Address setting to *Manual*.

1.4.3 LOCAL-LINK (FAILSAFE)

If Spark's default IP Address setting (Dynamic) should ever fail to provide a usable IP address within a minute or two – as when an active DHCP server is not found on the network – you can locate your Spark Plus on the network using its failsafe Local-Link feature.

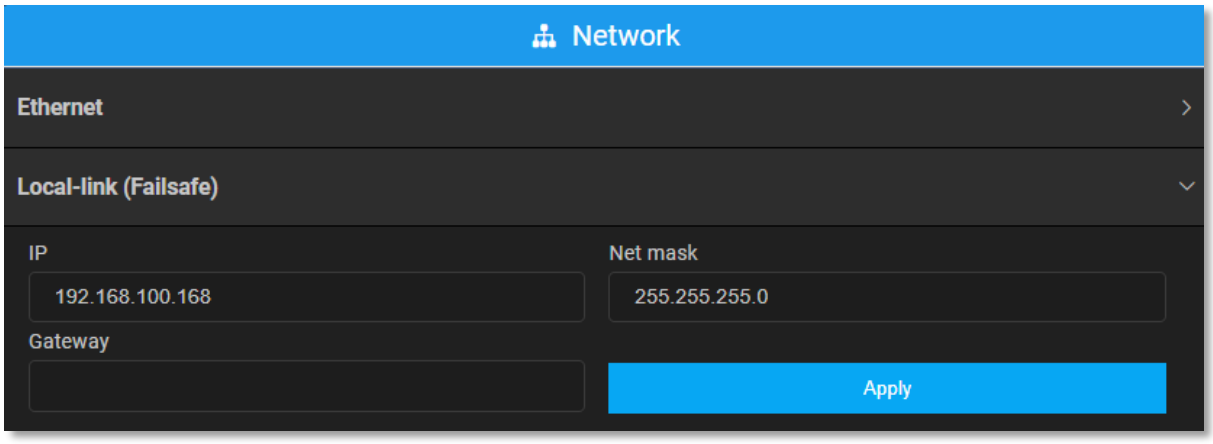


FIGURE 22

In this scenario, temporarily set the network adapter of your computer to a static IP address such as 192.168.100.1, with a netmask of 255.255.0.0 and connect the Spark Plus.

Then run Studio Monitor on the computer, as described earlier to locate the unit. This will allow you to use Spark's web page to set a suitable static IP of your choosing, following which you can restore the computer's normal network configuration settings.

1.4.4 NDI DECODING CONFIGURATION

Before using decoding function, please check the Ethernet IP address and log into the webpage for management with this address, and then switch to decoding function.

Note: Encoding and decoding functions of the device cannot be carried out simultaneously. If the devise is switched to decoding function, encoding function will be stopped. You will receive a pop-up reminder before moving forward.

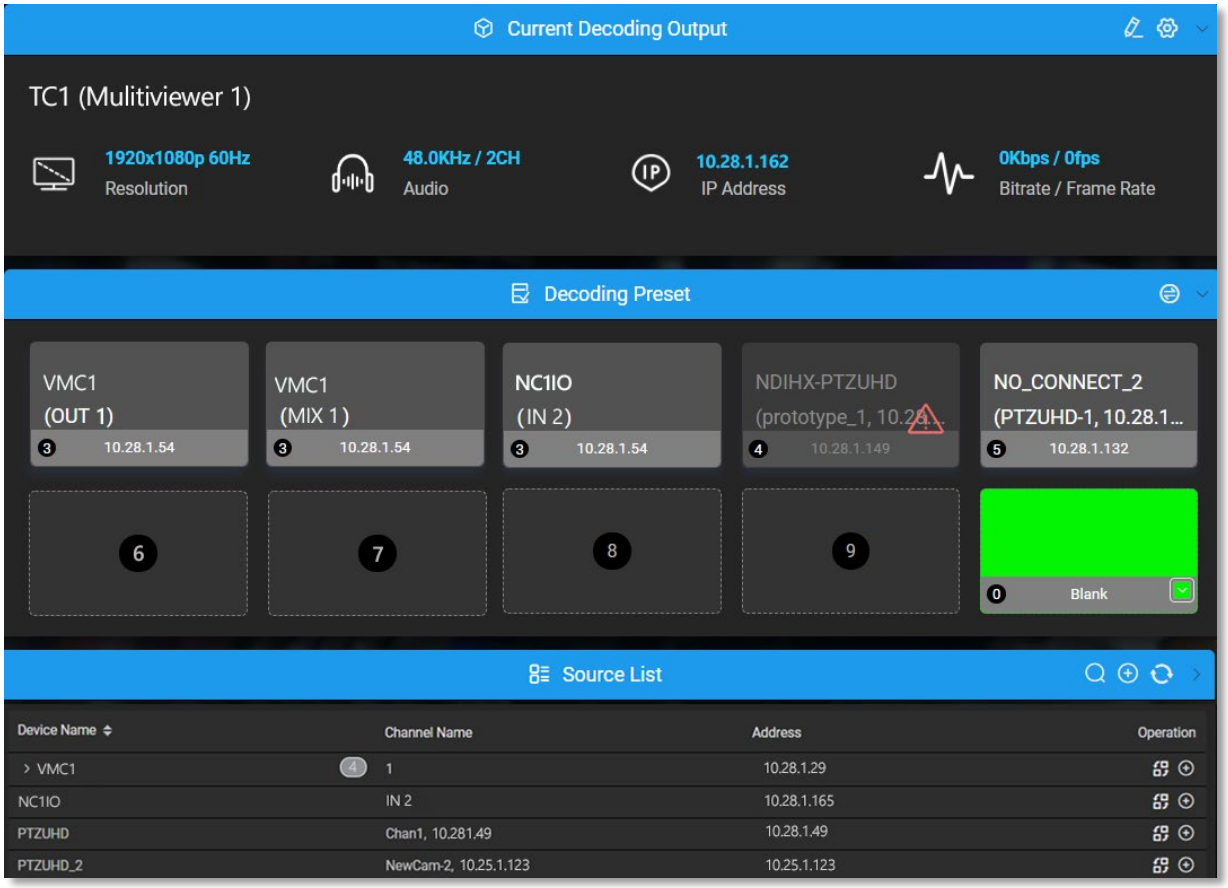


FIGURE 23

DISCOVER NDI SOURCE

In the same subnet, NDI® sources can be displayed in the source list through automatic discovery.

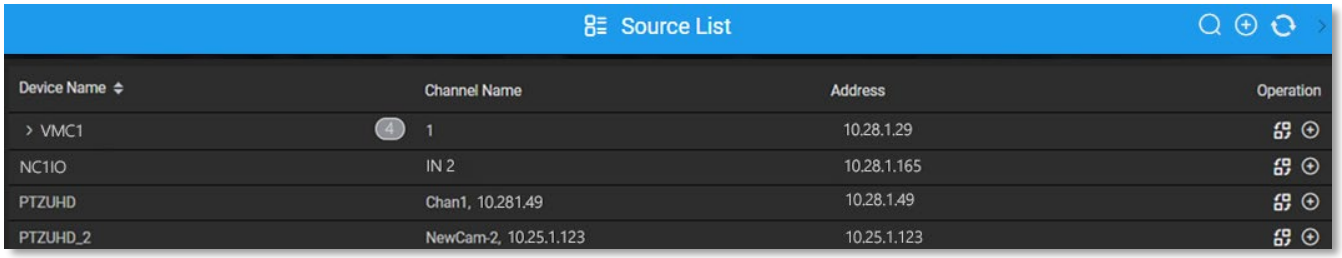


FIGURE 24

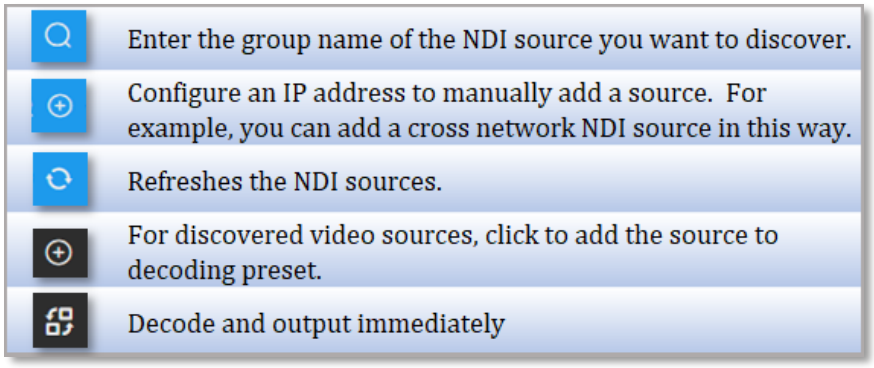


FIGURE 25

1.4.5 OUTPUT OF NDI DECODING

Under *Source List*, you can add up to nine preset decoding sources. By clicking on the NDI source, the device will start to decode the corresponding NDI source, and can be switched and decoded by clicking other NDI sources.

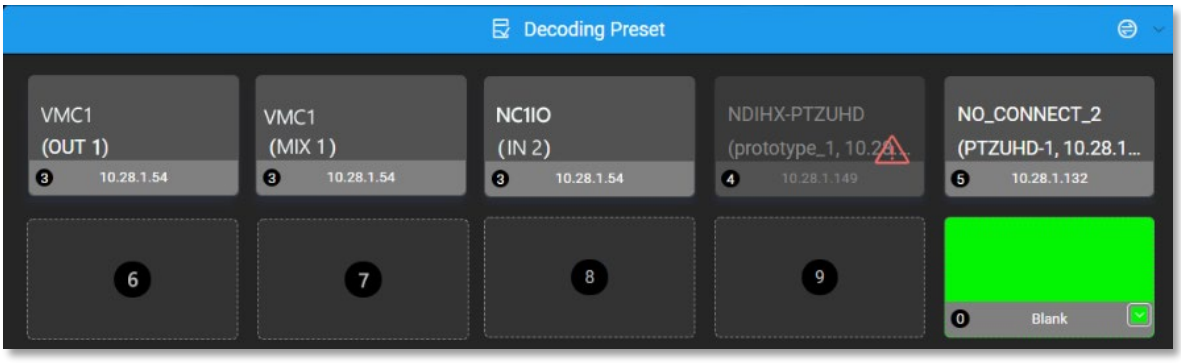


FIGURE 26

In the *Decoding Preset* section, there is a blank output box, if switching without video output, the device will output the set color. It can also be used for testing the output to the mointor by choosing a different color.

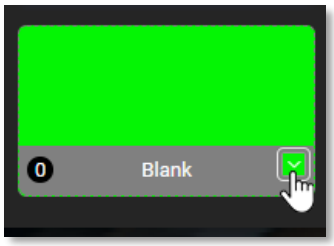
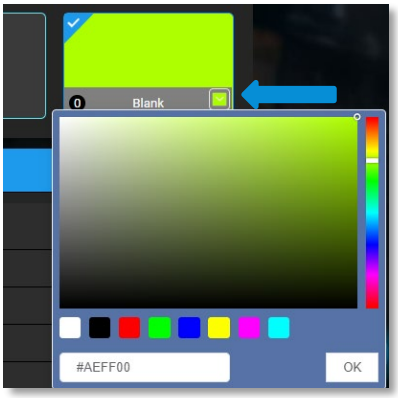


FIGURE 27



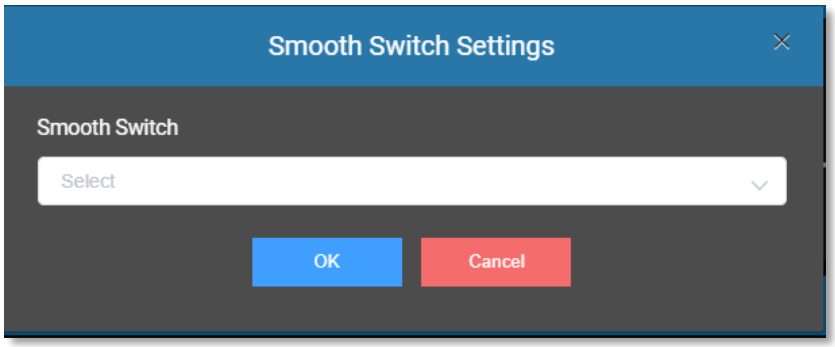


FIGURE 28

To the right of the *Decoding Preset* header, this button is for setting parameters for a smooth switch. For example, a video or slow transmission can be set to have a longer smooth time - Figure 28.

1.4.6 DECODING PARAMETER SETTINGS

Current Decoding Output will display the information of the current decoding NDI source name, channel name, resolution/refresh rate, audio parameters, source IP address, real time bit rate and frame rate.

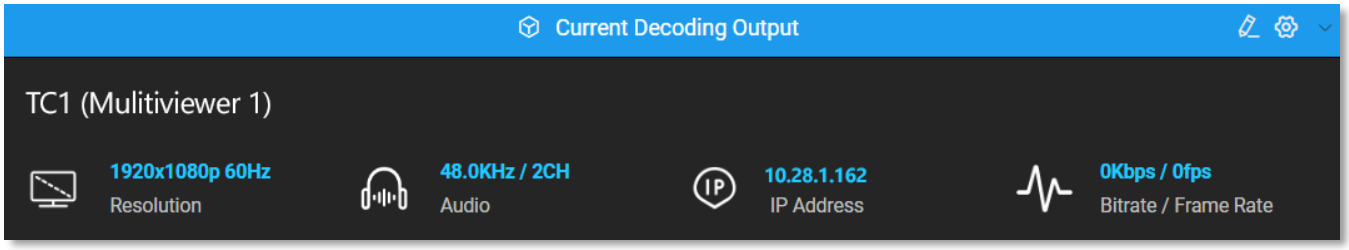


FIGURE 29

NOTE: If the current decoding source is disconnected, a red warning notice will be displayed on the upper-right corner, showing the device offline.

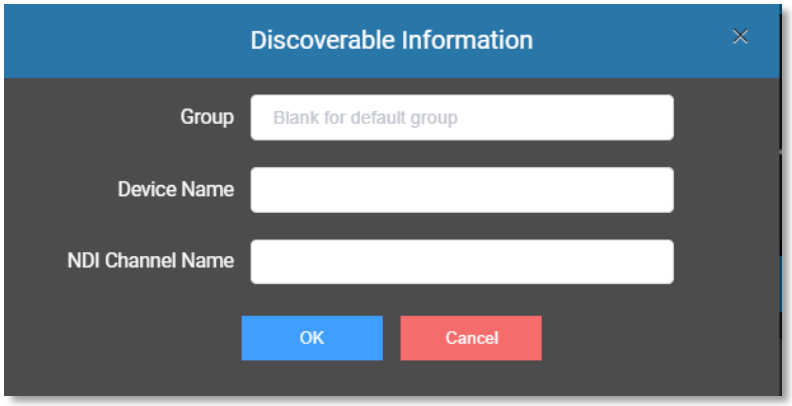


FIGURE 30

By clicking the pencil button, you will be able to find *Discoverable Information* by group, device name and NDI channel name.

The gear button allows output parameters to be configured. The resolution of the decoding output will be the same as that of the source. Frame rate and audio sample rate can be set accordingly.

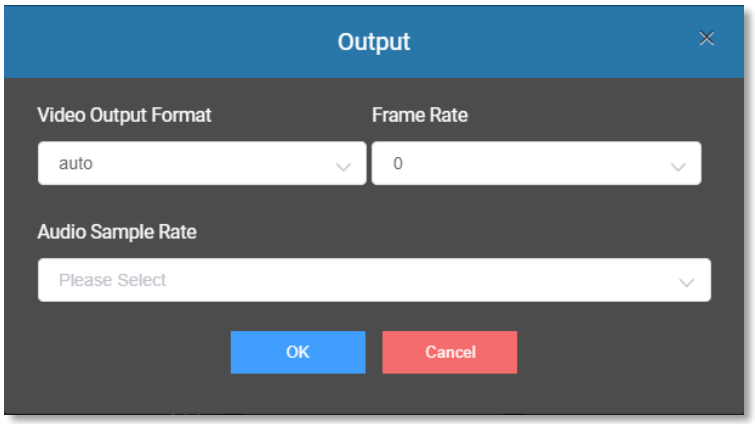


FIGURE 31

1.5 TALLY

Your Spark Plus unit provides 'tally' notification from NDI devices supporting it. Specifically, a row of LEDs will light up in red or green to tell you when video output from the device is visible on the Program output or Preview row of a video switcher respectively, as illustrated above.

CREDITS AND TRADEMARKS

CREDITS

Engineering: Andrew Cross, Alvaro Suarez, Brian Brice, Cary Tetrick, Charles Steinkuehler, Dan Fletcher, Heidi Kyle, James Killian, Jarrod Davis, Jeremy Wiseman, John Perkins, Karen Zipper, Kevin Rouviere, Kirk Morger, Mahdi Mohajer, Matt Gorner, Menghua Wang, Michael Joiner, Michael Watkins, Mike Murphy, Nancy Sanchez, Nathan Kovner, Naveen Jayakumar, Ryan Cooper, Ryan Hansberger, Shawn Wisniewski, Steve Bowie, Troy Stevenson

TRADEMARKS

NewTek, NewTek VMC, NewTek VMC1, NewTek VMC1 IN, NewTek VMC1 OUT, NewTek NC1, NewTek NC1 IN, NewTek NC1 I/O, NewTek NC1 I/O IP, TriCaster, TriCaster TC1, TriCaster Advanced Edition, TriCaster XD, TriCaster 8000, TriCaster TCXD8000, TCXD8000, TriCaster 860, TriCaster TCXD860, TCXD860, TriCaster 460, TriCaster TCXD460, TCXD460, TriCaster 410, TriCaster TCXD410, TCXD410, TriCaster Mini SDI, TriCaster Mini, TriCaster TC Mini, TriCaster 40, TriCaster TCXD40, TCXD40, TriCaster 855, TriCaster TCXD855, TCXD855, TriCaster 455, TriCaster TCXD455, TCXD455, TriCaster EXTREME, TriCaster 850 EXTREME, TriCaster TCXD850 EXTREME, TCXD850 EXTREME, TriCaster 450 EXTREME, TriCaster TCXD450 EXTREME, TCXD450 EXTREME, TriCaster 850, TriCaster TCXD850, TCXD850, TriCaster 450, TriCaster TCXD450, TCXD450, TriCaster 300, TriCaster TCXD300, TCXD300, TriCaster PRO, TriCaster STUDIO, TriCaster BROADCAST, TriCaster DUO, MediaDS, MDS1, 3PLAY, 3Play, 3Play 3P1, 3Play 4800, 3PXD4800, 3Play 440, 3PXD440, 3Play Mini, 3Play 820, 3PXD820, 3Play 425, 3PXD425 3Play 330, 3PXD330, TalkShow, TalkShow VS 4000, TalkShow VS100, Network Device Interface, NDI, NewTek Connect, NewTek Spark, NewTek Connect Spark, NewTek Connect Spark Plus, NewTek Spark Pro, NewTek Spark Plus IO 3G-SDI, NewTek Spark Plus IO HMDI, NewTek IsoCorder, ProTek, ProTek Care, ProTek Elite, iVGA, SpeedEDIT, IsoCorder, LiveText, LiveGraphics Creator, LiveGraphics, Live Story Creator, DataLink, LiveSet, LiveGraphics, TriCaster Virtual Set Editor, Virtual Set Editor Advanced Edition, TriCaster VSE, TriCaster VSE Advanced Edition, LiveMatte, TimeWarp, VT, VT[3], VT[4], V[T5], Video Toaster, Toaster, Inspire 3D, 3D Arsenal, Aura, LightWave, LightWave 3D and LightWave CORE are trademarks, service marks, and registered trademarks of NewTek. All other brand names, product names, or trademarks belong to their respective holders.

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