NewTek™

Connect Spark™ Pro

UHD NDI® Adapter

Operating Instructions

NDI®

Table of Contents

Section 1 QUICKSTART

This section explains how to connect and configure your NewTek Connect Spark™ Pro. It also explains how to update the device, and where you can find additional NDI® software to extend your workflow. After completing this short section, you'll be all set to begin using your new camera.

This document briefly describes how to prepare your new NewTek™ device for use. Please note that more detailed information is provided in the next chapter.

Step 1 – Downloads

1. Visit http://new.tk/NCSPInfo using the web browser of a computer and download the following:

    a. NewTek NDI® Tools pack
    b. Spark Pro™ User Manual.

2. Install NDI Tools on your computer.

Step 3 – Connect Spark Pro

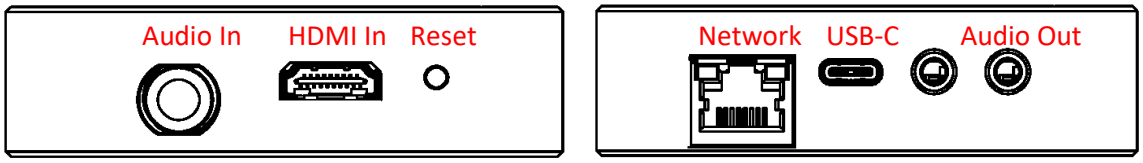


FIGURE 1-1

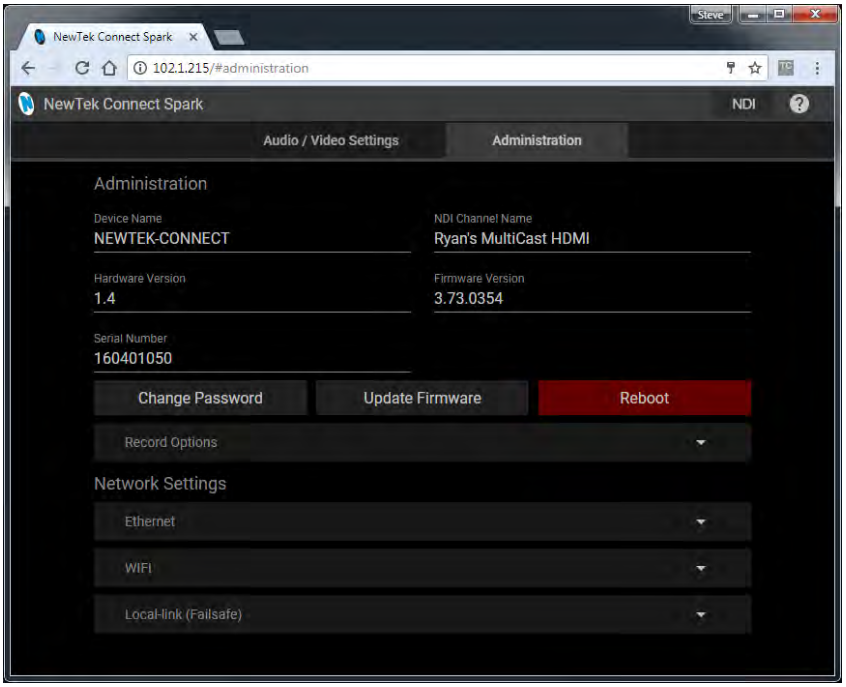
3. Connect Spark Pro to your local network router or switch with an Ethernet cable.
    a. If you connect a PoE (power over Ethernet) cable, the unit will power up.

4. Otherwise, supply power by connecting a suitable power adapter to Spark Pro's USB-C port, located beside the Ethernet connector. (If using a power adapter, please use one supplying 2.4 amps or better at 5V, and having a full-size USB-A output connector.

Step 4 – Access Spark's Webpage

5. Use the NewTek Studio Monitor application installed with your NDI® Tools pack to locate Spark Pro on the network as follows:
    a. Click the menu gadget at upper-left to view NDI sources.
    b. Use the menu to select your Spark Pro unit.
    c. Then click the gear icon at lower right when your mouse pointer is over Studio Monitor to open Spark's webpage in your web browser.

Note: Step 4, accessing the device webpage, varies slightly for OS X users. Please refer to Section 2.4 for details.



6. Log into the webpage using the default user name ("admin") and password (also "admin").

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

Step 5 – Update Spark Pro's 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:

7. Download and unzip the firmware update archive to extract the '.bin' file.

8. Click the Administration tab at the top of Spark Pro's webpage, and compare the Firmware Version *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.

9. Click the Update Firmware button, and click Choose File to show a file explorer.

10. Use the file explorer to locate the firmware .bin file, and follow the prompts to perform the update.

Spark will reboot during this process, which may take up to ten minutes. *Please be careful not to interrupt power to the device during the update process.*

11. Following a firmware update, we recommend performing a Factory Reset. The Reset button is located just right of the HDMI connector on Spark Pro's chassis.

    Normally, pressing this button simply restarts the device. However, during a brief period at the beginning of the restart process, the device lights flash white. Pressing Reset again during this period performs a full Factory Reset operation, restoring default settings. (Note: if you have previously set a manually configured IP address for the unit, you will need to reconfigure the IP settings again following a Factory Reset).

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 NDI Studio Monitor refreshes.

Conclusion

This completes the initial setup of your NewTek™ Spark Pro. You should see its output displayed on Studio Monitor. The sections that follow provide more in depth coverage of Spark's features and options.

Section 2 INTRODUCTION AND SETUP

This section, like the preceding one, explains how to connect and configure your NewTek Connect Spark™. The discussion in the chapter, however, is more leisurely and detailed, and you may find it helps answer any questions that have arisen thus far.

2.1 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 Connect Spark Pro™ unit 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 or capture card systems, your NewTek Connect Spark™ Pro unit leverages the ground-breaking benefits of 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 Spark Pro™.

2.2 GETTING READY

Your NewTek Connect Spark Pro 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 http://new.tk/NCSPinfo 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 Pro unit, but also makes it easy access to its settings.

2.3 MAKING CONNECTIONS

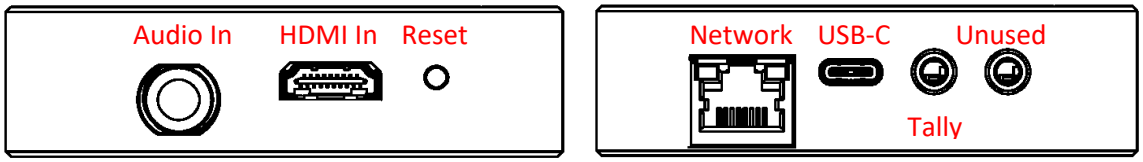


FIGURE 2-1

Initially, let's assume you will use a wired network connection to your Connect Spark Pro device.

NOTE: A hard-wired connection is required to configure your Spark Pro initially, even if you plan to use a wireless connection later on.

1. Supply *power supply* to the unit, either by

    a. connecting a suitable power adapter to Spark Pro's USB-C port, located beside the Ethernet connector.

    Note: Please use a 5V power adapter supplying 2.4 amps or more with a full-size USB-A output connector.

    b. or by connecting a 'Power over Ethernet' (PoE) cable to Spark Pro's network connector – see note below.

    Note: Spark Pro's PoE support conforms to the IEEE 802.3af-2003 specification.

    The unit boots as soon as power is supplied by one of the methods above. At this point, the NewTek logo will illuminate. (If this does not happen, check your connections and retry.)

2. If did not choose option b above (PoE), please continue to connect one end of a network cable to Spark Pro's RJ-45 Ethernet port.

3. Connect the other end of the cable to your network switch or router.

4. Optional steps:

    a. Connect an HDMI video cable from a suitable video source to Spark Pro'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 3 above, your NewTek Connect Spark Pro 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 Pro'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.

2.4 WEB CONFIGURATION

NewTek Connect Spark Pro 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 Spark Pro's settings – perhaps to configure login credentials, wireless network settings, update firmware, etc. Settings are made available by means of Spark Pro's configuration webpage, which you can access from any suitable device (i.e., one with a web browser) on the same network).

Note: As web browsers vary widely, 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.

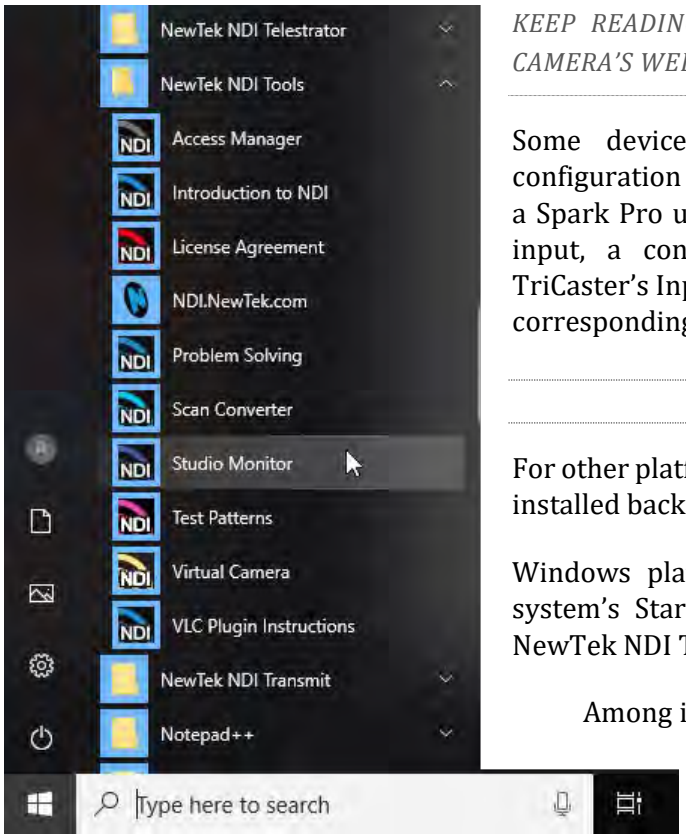


FIGURE 2-2

KEEP READING TO LEARN HOW TO ACCESS YOUR CAMERA'S WEBPAGE.

Some devices provide direct, easy access to Spark Pro's configuration webpage. For example, when you select output from a Spark Pro unit 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.

2.4.1 STUDIO MONITOR

For other platforms, you can use the Studio Monitor application you installed back in Section 2.2 in a similar manner.

Windows platform users can launch Studio Monitor from the system's Start menu (Figure 2-2), 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 PRO ON THE NETWORK – WINDOWS™

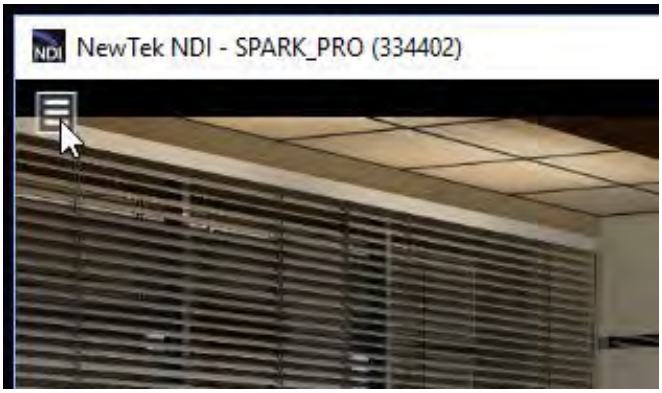


FIGURE 2-3

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 SPARK_PRO added to the menu. Roll the mouse pointer over this label to show the names for NDI output streams from any Spark Pro 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 Pro unit you wish to configure. In a few moments, its video output will appear in the Studio Monitor window.

3. For NDI sources that, like Spark Pro, 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 – Figure 2-4.

FIGURE 2-4

4. Click the gear to open the corresponding web page, popping up a request for you to enter login credentials (Figure 2-5).

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™.*

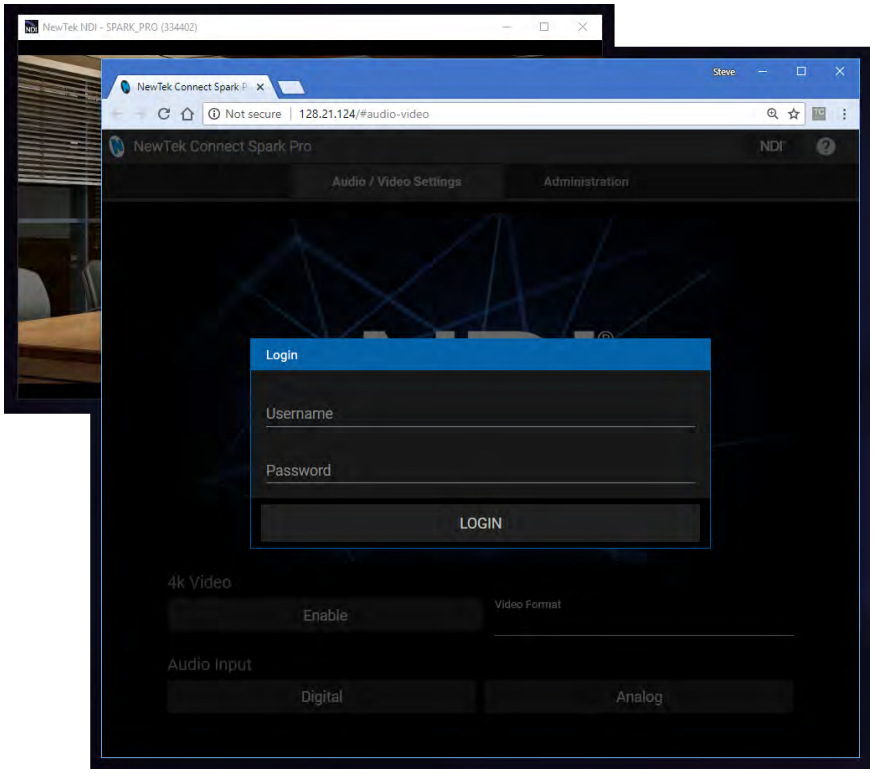


FIGURE 2-5

LOCATING SPARK PRO 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 SPARK_PRO.

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

FIGURE 2-6

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 Pro 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.

2.4.2 LOGGING IN

Note: See Section 2.5.1 for details of an alternative method to locate your Spark unit on the network should you have difficulty with the method detailed above.

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

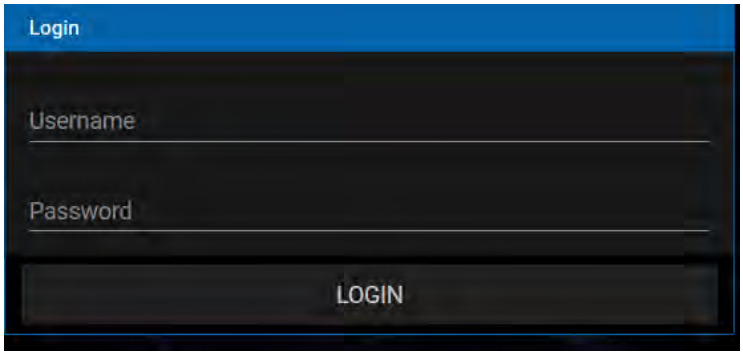


FIGURE 2-7

2.4.3 AUDIO/VIDEO SETTINGS

After logging in, Spark's options and controls are shown in your web browser (Figure 2-8).

Hint: The preview shown on the web page is not a full motion video monitor, but updates periodically to allow you to confirm the results of changes you make to various settings.

FIGURE 2-8

2.4.4 VIDEO FORMAT

The first tab shown on the Spark Pro web page is labeled *Audio/Video Settings*.

Video Format controls (Figure 2-9) allow you to enable the 4k Video option. Doing so effectively announces to connected HDMI video sources that Spark Pro can accept UHD video, potentially resulting in higher bandwidth usage for NDI output when required.

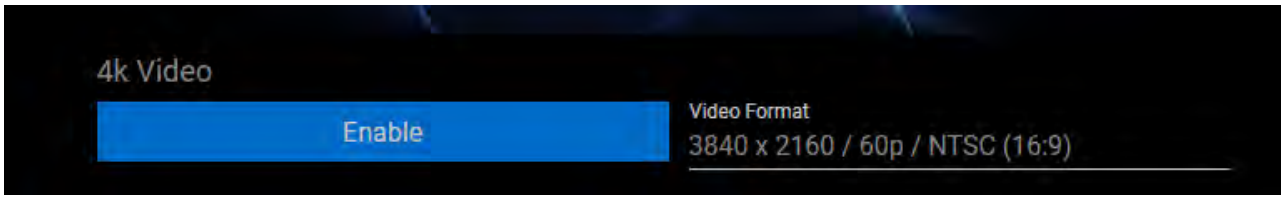


FIGURE 2-9

Depending on your network throughput capabilities and other traffic, and of course your production requirements, you may choose to leave this option off when it is not required.

Note: Multiple connections to UHD video can quickly saturate a gigabit network. Use the 4K option only when it is really needed. And if many 4K connections are required, consider using the Multicast setting (although this requires special care when configuring the network – see Section 2.5.1).

The current video format the device has negotiated with your source is displayed at right.

AUDIO INPUT

FIGURE 2-10

Just below, you will see the Audio Input group (Figure 2-10). It is comprised of two buttons, labeled Digital and Analog. These determine whether Spark Pro uses the embedded audio source (digital audio included with the HDMI video source) or analog audio supplied to Spark's 1/8" line level stereo input connector. Spark Pro's nominal audio level is +4dBu.

2.5 ADMINISTRATION

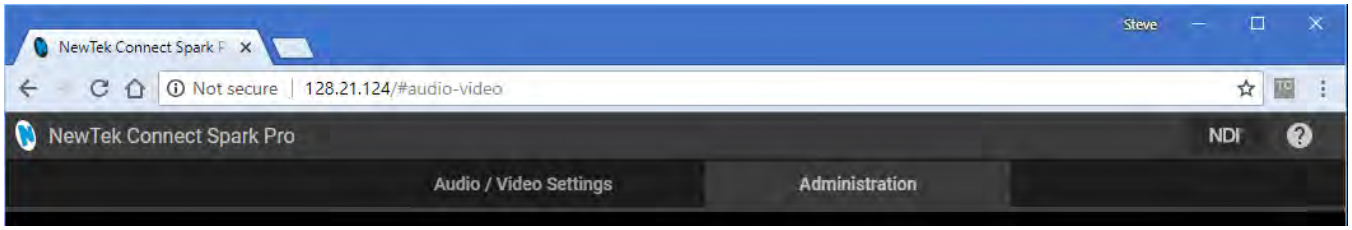


FIGURE 2-11

The second tab in the configuration web page is labeled Administration. Here you will find information and settings related to your Spark device, and its network connection.

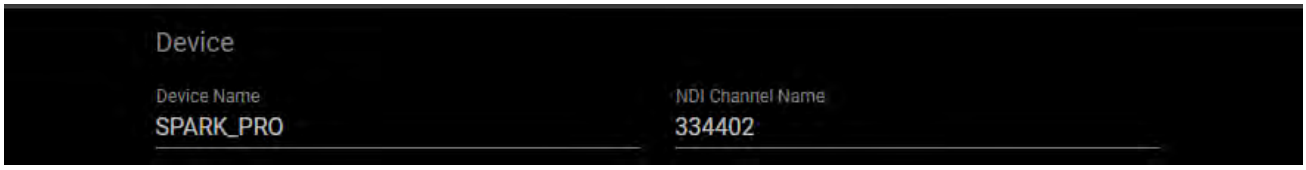


FIGURE 2-12

The uppermost section of this tab displays the Device Name and NDI Channel Name which 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.

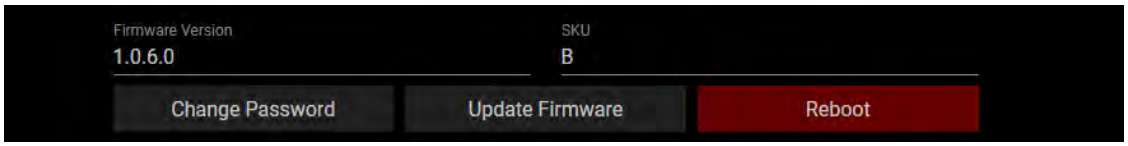


FIGURE 2-13

In this section, you will see the Firmware version currently installed on your Spark Pro displayed, along with the unit's SKU. Buttons just below allow you to actually update the installed firmware version, to modify the default network password, or to reboot the device (please see the hint re: browser history in Section 2.4).

Hint: Should you set a custom password and then forget it, you can reset the device to factory defaults using the Factory Reset process described in Section 1.

2.5.1 NETWORK SETTINGS

Controls in the Network Settings section will be 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 Spark Pro'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.

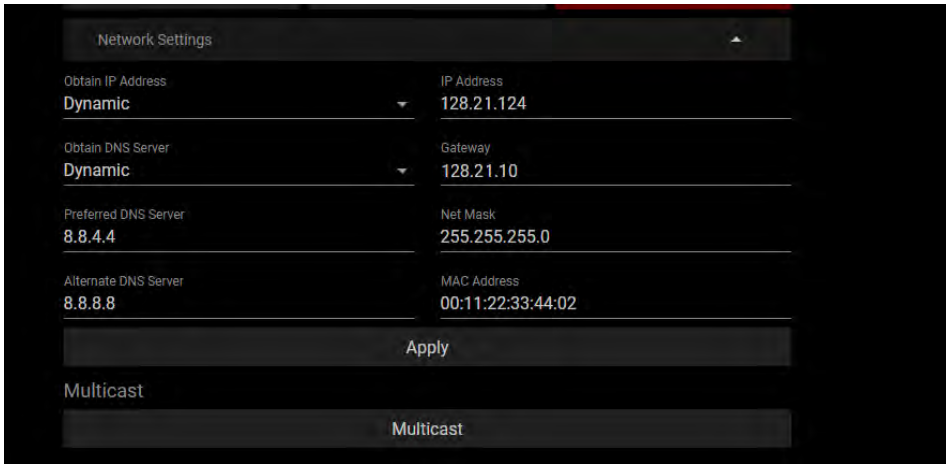


FIGURE 2-14

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 Pro on the network using its failsafe Local-Link (APIPA) feature.

In this scenario, temporarily set the network adapter of your computer to a static IP address in the APIPA address block (such as 169.254.0.254, with a netmask of 255.255.0.0) and connect the Spark Pro.

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

MULTICAST

Click Multicast to transmit video using multicast, rather than the default unicast method. ***Please take time to consider the following information before enabling multicast.***

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.

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 definitely not endear you to your colleagues.

By contrast, multicast connections do *not* add significantly to the bandwidth required as connections multiply. You might wonder why anyone would ever turn this option off – yet, it is off by default. Why?

This is because multicast requires more careful network configuration. While you might not notice any issues in a simple network setting; **a poorly configured multicast 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.

- We strongly recommend that all network switches be of the 'managed' type (see the sidebar above), and that you obtain assistance from IT professionals if you have multiple switches online.

2.6 TALLY

Your Spark Pro unit provides 'tally' notification from NDI devices supporting it. Specifically, two large LEDs, on red and the other green, will light up to tell you when video output from the device is visible on the Program output or Preview row of a video switcher, as illustrated by Figure 2-15.

FIGURE 2-15

2.6.1 EXTERNAL TALLY

The external Tally connector, located near the USB-C port on Spark Pro's chassis, allows you to send Program tally notification to external studio systems. This 1/8" connector uses the common 'contact closure' method to provide electrical tally indication, as follows:

- When Program tally is *not* active, measurement from tip to sleeve will be open.
- Otherwise, when Program tally *is* active, measurement from tip to sleeve will typically be between 75 and 90 ohms.

APPENDIX A: ABOUT NDI®

NDI is much more than simply 'video over IP'. As you begin using it, you'll increasingly discover its many advantages. Soon you'll realize you never want to go back to simple 'point A to point B' methods of video transport.

This section provides a brief overview of NDI and the power it delivers to unleash your creativity and provide newfound production efficiency.

We live in a world in which virtually every computer system in the world is potentially connected to every other. Likewise, our countless mobile devices are connected too. These devices have high quality screens, fast processors and cameras. It is no surprise, then, that efficient, economical, non-linear video transfer in IP space is augmenting and even superseding traditional linear connection methods (SDI, HDMI, etc.) and systems.

NewTek NDI® (Network Device Interface) makes it easy to share high-quality video over a local Ethernet network. However, the NDI vision is vastly exciting than any mere 'cable upgrade'. Production systems using IP to integrate data, video, and audio are transforming live video production in ways that would have seemed miraculous just a few years ago. You can think of NDI as turning your network into a 'video internet'.

2.7 A 'VIDEO INTERNET'

Like a webpage, each NDI source is instantly available to many viewers and devices. Wherever your network extends – throughout your office, broadcast studio, hospital, campus (etc.) – NDI is ready for immediate display, capture, replay, production, and more. NDI operates bi-directionally over a local area network, and supports many ultra-low latency, ultra-high quality video streams on shared connections. It is resolution and framerate independent, and natively supports tally, metadata, access management, and more.

NDI's superb performance over standard 1Gbit/s networks makes it possible to transition facilities to an incredibly versatile IP video production pipeline without negating existing investments in SDI infrastructure, or costly new high-speed network installations. (NDI|HX is a related high-efficiency NDI mode expressly designed to facilitate wifi and long distance connections).

2.8 NDI BENEFITS

The NDI concept is simple: You supply a video source, and send it to your network as an NDI stream by means of your NewTek Connect Spark Pro™. At that point, anyone else on that network can see it and work with it just as if it was a locally connected to their system (unless you deliberately limit access).

In this brave new world of IP video, you hardly need to think about capture cards, SDI, HDMI connections, a/v formats, etc. You also enjoy freedom from dependency on distribution amps, video matrix routers, and the like. There are many hundreds of software and hardware systems with native NDI input and output support – both commercial and open source. Now you can supply your video to these without running bulky cables over long distances.

More than simply replacing a cable, though, NDI enables multiple applications to access the same sources at the same time. For example, you might simultaneously send high-quality, low latency video to your video mixer system, while also streaming it and capturing it elsewhere on your network. For a deeper introduction to the world of NDI, download and install the free NewTek NDI Tools pack from www.NDI.NewTek.com, which includes a Getting Started with NDI guide.

2.9 NDI VIRTUAL INPUT

If you installed the NDI Tools for Windows™, you were given the opportunity to install NewTek NDI Virtual Input at the same time. This is a very useful application that allows you to make a designated NDI source available on the local as a proxy 'webcam'.

In turn, this means that you can quickly and flexibly assign NDI sources from your network to supply video to applications like Skype™, Google + Hangouts™, GoToMeeting™, and many more.

Hint: At the time of installation, you will be asked whether you would like to Virtual Input to be launched automatically when you boot the system. In most situations you may want to choose this option.

When running, NDI Virtual Input adds a small icon to the Windows task tray (Figure 2-16).

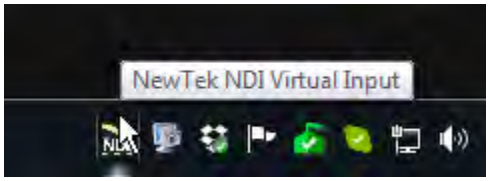


FIGURE 2-16

Configuring (and using) Virtual Input is very easy:

- Simply right-click the icon to select an NDI source from your network.

- The Settings menu item allows you mute or adjust audio levels, or select a Low Bandwidth mode, as you might do to make optimal use of your network when a lower resolution image will suffice.

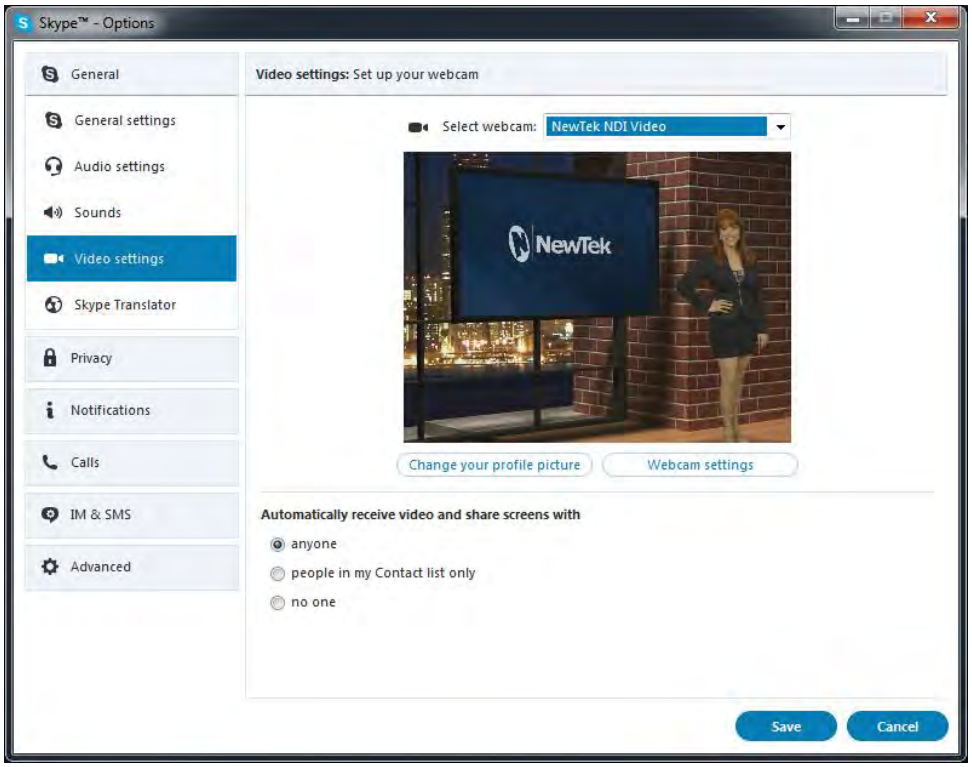


FIGURE 2-17

- Afterward, you will see an entry named NewTek NDI Video (or Audio) listed along with any other qualified sources available to applications like Skype™, etc.