NewTek™

Connect Spark™

NDI®-HX Adapter

Operating Instructions

NDI® | HX

Revised – June 4, 2018

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Section 1 QUICKSTART

This section explains how to connect and configure your NewTek Connect Spark™. 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 device.

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 – Download Updates

1. Visit http://new.tk/NCSInfo using the web browser of a computer and download the following:
    a. NDI|HX Driver
    b. Spark Firmware for your unit (SDI or HDMI)
    c. Spark User Manual.

Step 2 – Install the NDI|HX Driver

2. Install the NDI|HX Driver on your computer or other device you want to use to configure your unit (and other systems you intend to send Spark's output to via the network).

Step 3 – Connect Spark

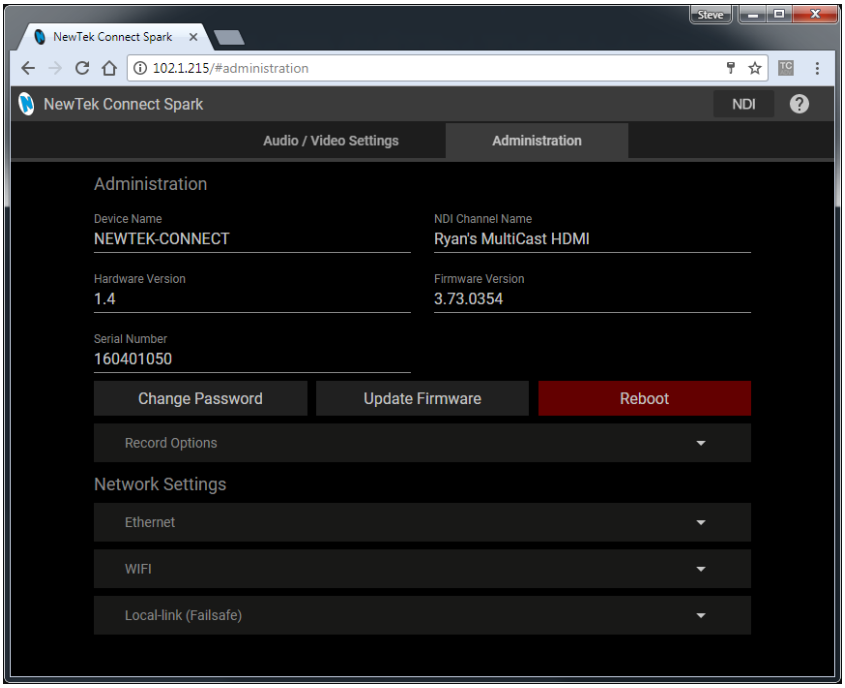
Important Note: Do not turn your Spark on prior to connecting it to your network. Spark will automatically fail over to a static IP address if it cannot obtain an IP address from your DHCP server. If this does inadvertently happen, you can either perform a factory reset to re-enable DHCP (see step 12 below) and continue, or refer to the heading Local-Link (Failsafe) in Section 2.5.1.

3. Connect Spark to your local network router or switch with an Ethernet cable.
4. Connect the power adapter to Spark, and plug it in to an A/C receptacle.
5. Turn Spark on using the switch on the rear of the chassis.

Step 4 – Access Spark's Webpage

6. Use the NewTek Studio Monitor application installed with your NDI®|HX driver to locate Spark on the network as follows:
    a. Click the menu gadget at upper-left to view NDI sources.
    b. Select your Spark.
    c. Then click the gear icon at lower right when your mouse pointer is over Studio Monitor to view Spark's webpage.

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



7. 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's Firmware

We encourage you to keep the firmware on your NewTek™ device up to date. The latest firmware may contain bug-fixes, provide improved performance, or even enable new features. The update process is not complicated – simply follow the steps listed below:

8. Unzip the firmware archive (SparkSDIFirmware.zip or SparkHDMIFirmware.zip) you downloaded earlier to extract the '.bin' file.
9. Click the Administration tab at the top of Spark'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.
10. Click the Update Firmware button, and click Choose File to show a file explorer.
11. 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 a minute or more. Please be careful not to interrupt power to the device during the update process.

12. Following a firmware update, we recommend performing a Factory Reset. The recessed Reset button is located just right of the Power switch on Spark's chassis. Insert the end of a paper clip (or other suitable instrument) and depress the button for 5 seconds; the row of LEDs near the power connector flashes to indicate success. (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 updates or Factory Reset. Also, please note that it can take up to a minute or so before the NDI channel name shown in NDI Studio Monitor refreshes.

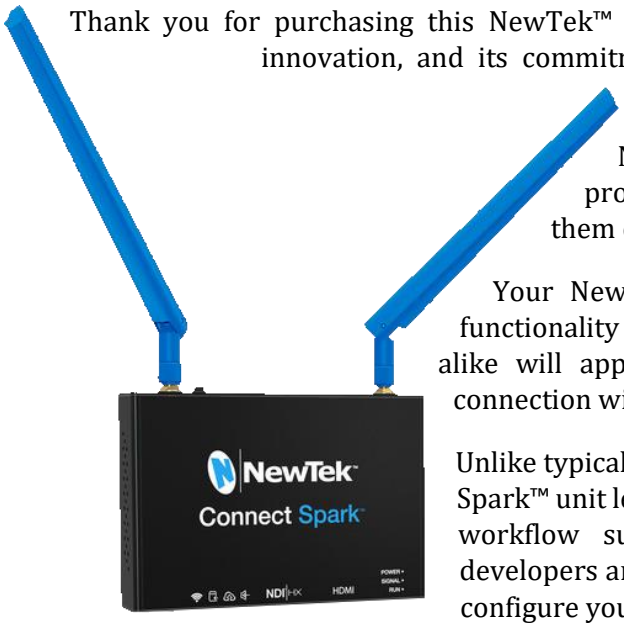
Conclusion

This completes the initial setup of your NewTek™ Spark. 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, and we are confident you will find them exceptionally powerful and versatile.

Your NewTek Connect Spark™ 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™ unit leverages the ground-breaking benefits of the 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 product.

2.2 GETTING READY

Your NewTek Connect Spark™ device uses the NDI|HX™ protocol for audio/video transmission, and more. . Your first step will be to install NDI|HX™ drivers as appropriate for your computer platform or device:

1. Navigate to http://new.tk/NCSInfo in your web browser, and follow the relevant directions to download and install NDI|HX drivers for your computer platform.

NOTE: The NDI|HX driver will also install NewTek's NDI Studio Monitor, which will not only display the output of your Spark unit, but provide easy access to its settings.

2. Optional – for Microsoft Windows® users, downloading and installing the NewTek NDI Tools pack, available at no cost from https://www.newtek.com/ndi/tools/, will provide a very useful array of practical NDI learning tools and utilities.

NOTE: The End User License Agreement under which you use the NDI|HX driver specifies that "you may use up to five (5), and no more than five, copies on separate machines at one time."

2.3 MAKING CONNECTIONS

FIGURE 2-1

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

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

1. Connect the *power supply* line cord to an A/C power outlet, and insert the round power plug into the 12V input located at left on the a/v connection panel (Figure 2-1).

2. Push the power plug into the 12V socket until it is firmly seated, then use the knurled locking nut to secure the connection – preventing accidental disconnection.

3. Connect one end of a network cable to Spark's RJ-45 Ethernet port. Connect the other end of the cable to your network switch or router, or a computer's Ethernet port.

4. Optional steps:

    a. Connect an HDMI or SDI video cable (as appropriate for your NewTek Connect Spark model) from a suitable video source to the corresponding connector marked IN.

    b. Connect an analog audio source to the 1/8" (3.5mm) audio IN jack

5. Slide the power switch, located at right on the opposite side of the unit, all the way to the right.

At this point, the red *POWER LED* will illuminate, and the unit will quickly boot. (If this does not happen, check your connections and retry.) After a few moments, the *SIGNAL* LED will glow a steady green, indicating successful network connection.

Hint: A flashing green RUN light indicates that the video encoder is operating.

If you connected a source in step 4 above, your NewTek Connect Spark 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 manage Spark's settings and operate its 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 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's settings – perhaps to configure login credentials, wireless network settings, etc. These 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: 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.

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

Some devices provide direct, easy access to Spark's configuration webpage. For example, when you select its NDI output as the source for a NewTek TriCaster® input, a convenient "Configure" button is shown. Simply click it to open Spark's 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.

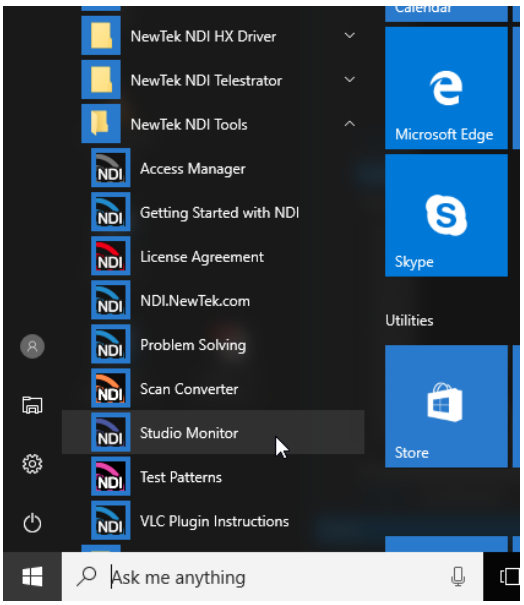


FIGURE 2-2

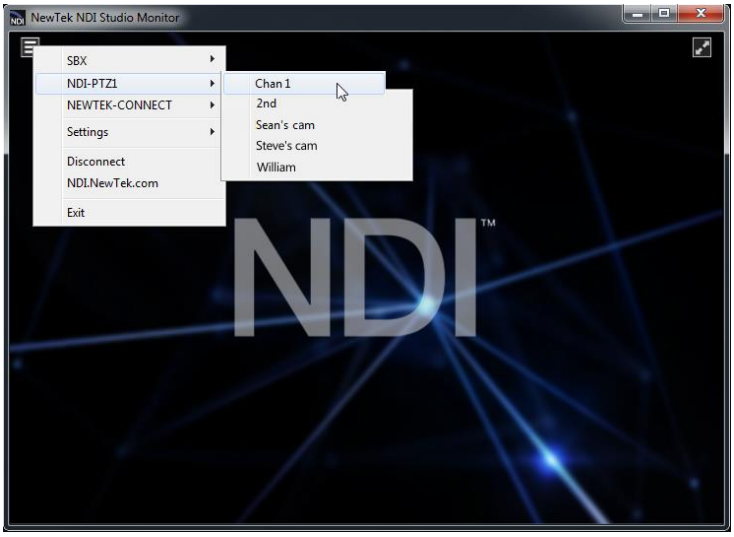


FIGURE 2-3

Windows platform users can launch Studio Monitor from the Start menu or App list (Figure 2-2), where it will appear in the NewTek NDIHX Driver folder. Among its capabilities, Studio Monitor (see Figure 2-3, showing the Windows version of the application) can detect and display NDI sources available on your network.

OS X users will also find a new Studio Monitor application available to them after installing the NDI|HX driver for their platform (Figure 2-6).

LOCATING YOUR SPARK ON THE NETWORK – WINDOWS™

1. Having launched Studio Monitor, 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 NEWTEK-CONNECT added to the menu. Rolling the mouse pointer over this label shows the individual names for the NDI output channels of any Spark units detected on the network.

   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 2-4 shows output from a Spark that has no video source connected.)

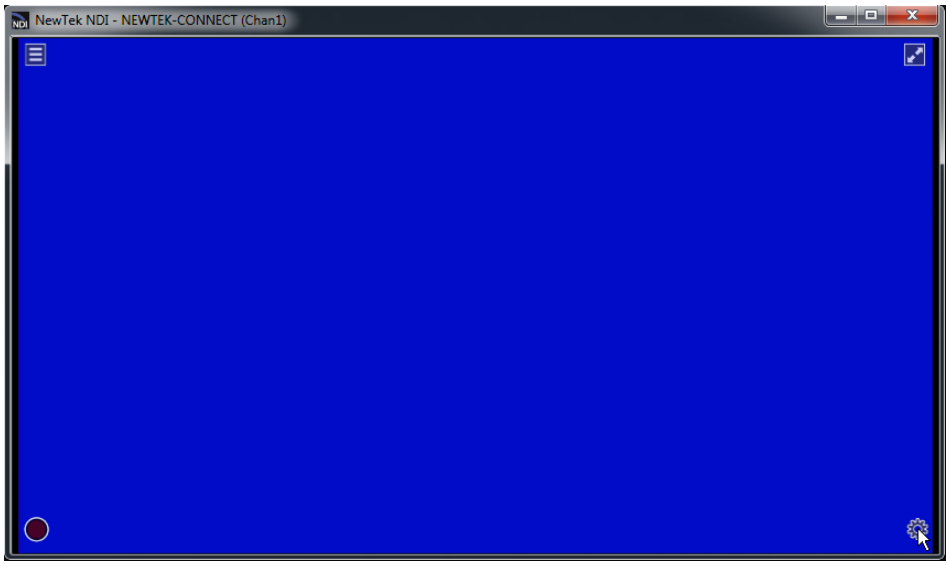


FIGURE 2-4

3. For NDI sources that supply a configuration web page, a small configuration (gear) icon appears at lower right when you roll the mouse pointer over the Studio Monitor window – Figure 2-5.

FIGURE 2-5

4. Click the gear to open the corresponding web page, popping up a request for you to enter login credentials (Figure 2-7).

Note: *The Microsoft Edge™ web browser is not fully supported at this time. On Windows platforms, please another modern web browser or Internet Explorer™. Also, see Section 2.5.1 for details of another way to locate your Spark unit on the network if you have difficulty with the method detailed above.*

LOCATING YOUR SPARK ON THE NETWORK – OS X™

FIGURE 2-6

The process is very similar for OS X users.

1. Having launched the Studio Monitor application, use the File menu to locate a new main entry named NEWTEK-CONNECT. Rolling the mouse pointer over this label shows the individual names for the NDI output channels of any Spark units detected on the network.

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.

2. The Studio 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 User Name "admin" and the default Password - also "admin".

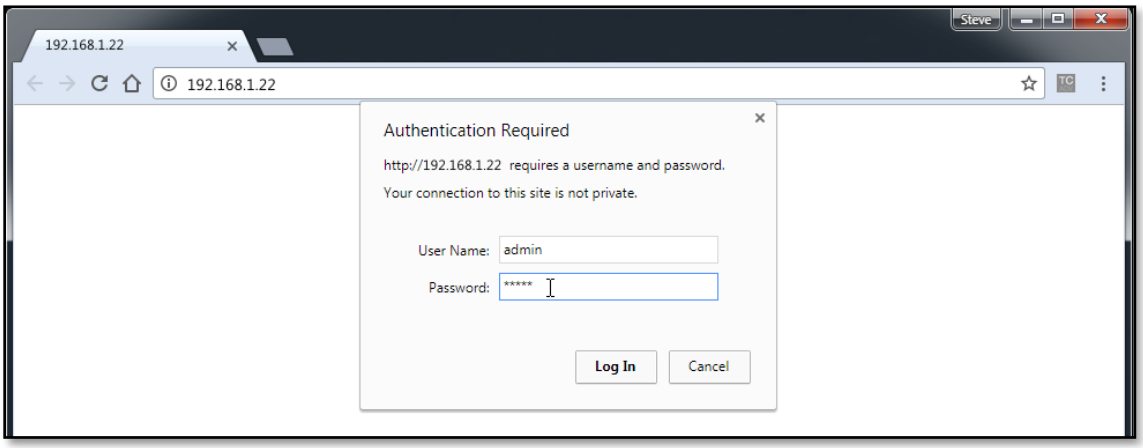


FIGURE 2-7

2.4.3 AUDIO/VIDEO SETTINGS

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

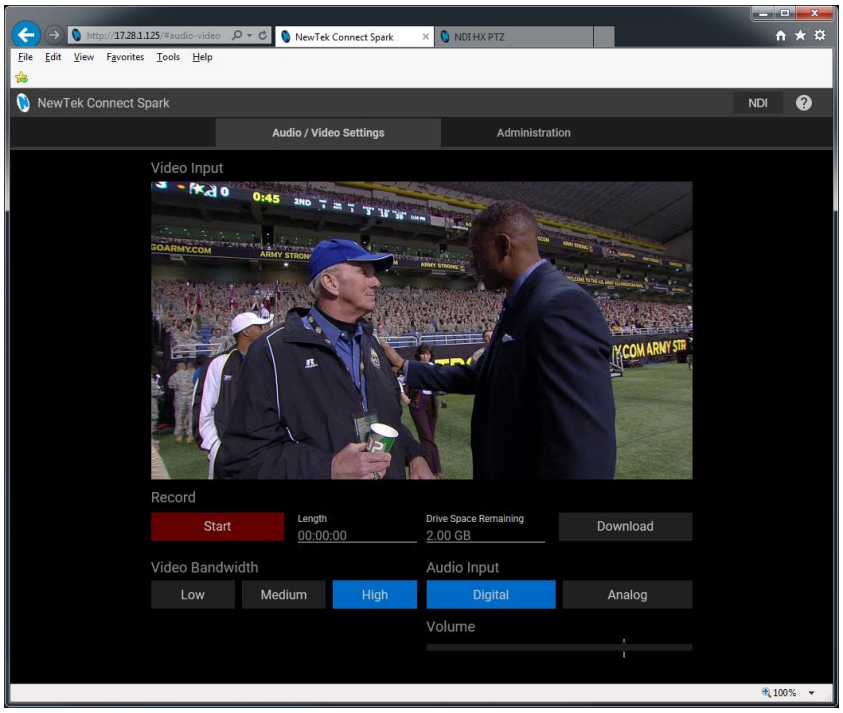


FIGURE 2-8

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.

2.4.4 VIDEO BANDWIDTH

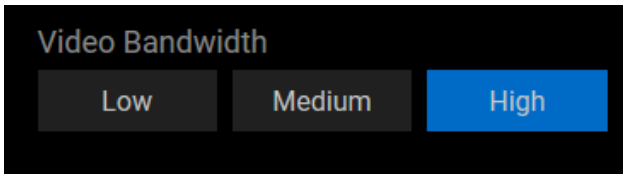


FIGURE 2-9

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

Video Bandwidth controls (Figure 2-9) allow you to select between the default High bandwidth output, recommended for wired network connections, or Medium or Low reduced bandwidth options which, depending on your network throughput capabilities and other traffic, may work better for you (as for example on lower speed wireless networks).

2.4.5 AUDIO INPUT

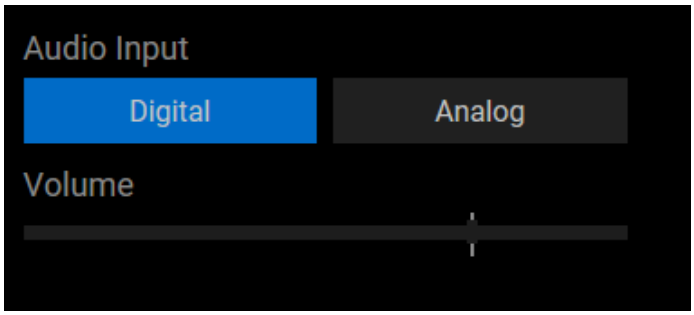


FIGURE 2-10

Nearby, you will see the Audio Input group (Figure 2-10), with buttons labeled Digital and Analog along with the Volume slider. These controls determine whether Spark's audio source is embedded (digital) audio included with the SDI or HDMI video source connected, or analog audio supplied to Spark's 1/8" line level stereo input connector. In the latter case, the Volume control can be used to modulate the sound level.

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.

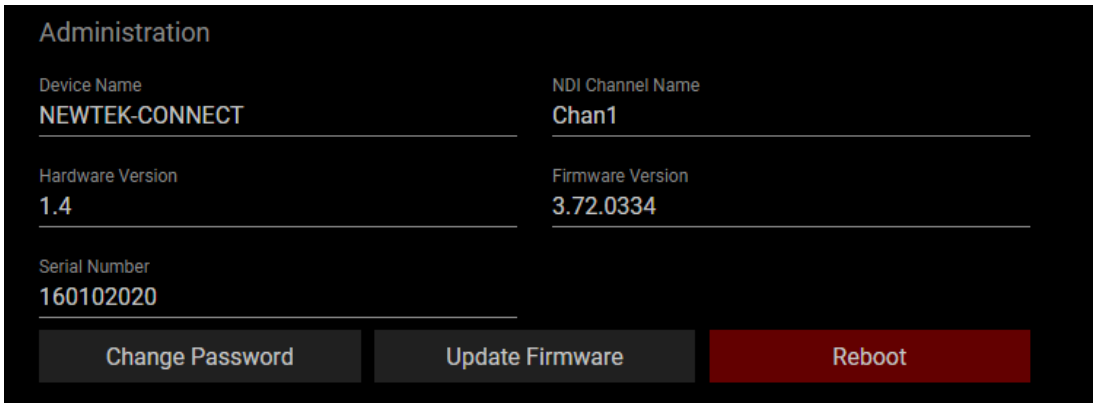


FIGURE 2-12

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 make identify the output of specific Spark units to other NDI-enabled devices and systems connected downstream.

In this section, you will also see the Hardware and Firmware versions of your Spark displayed, along with its unique serial number. 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 button on Spark's body. The button is located just right of the Power switch. As it is recessed to prevent accidental operation, insert the end of a paper clip (or other suitable instrument) and press the button for 5 seconds to reset the device (the row of LEDs near the power connector flashes to indicate success).

2.5.1 NETWORK SETTINGS

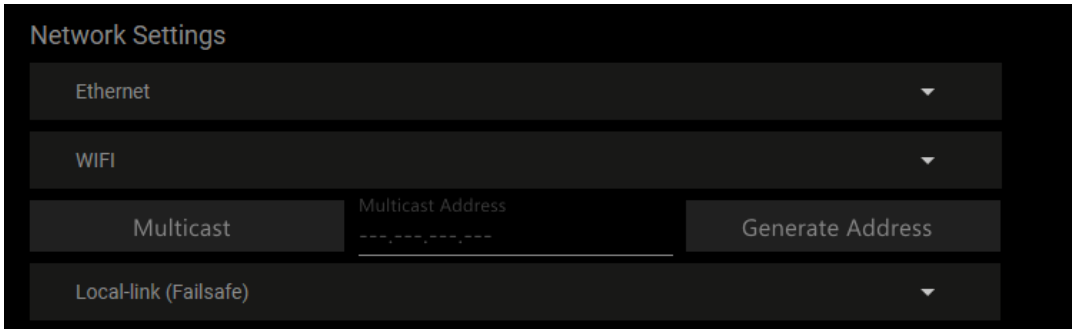


FIGURE 2-13

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.

Note: Wifi connections can produce very acceptable results, but performance issues may arise when many devices are connected. The radio in a wifi router can only listen to one device at a time, forcing other devices to wait and retry repeatedly. This problem worsens as more transmitters are added. Too, the portion of the radio spectrum you are using may be serving numerous wireless networks in the same vicinity.

A dedicated network helps minimize problems, as does careful channel selection – but a wired connection is always preferable in mission-critical settings.

Typically, your network will be configured to automatically supply IP addresses to devices you connect to it by means of a DHCP server. Your Spark'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 Spark, change the IP Address setting to Manual.

NOTE: Should Spark's default IP Address setting (Dynamic) fail to provide a usable IP address within a minute or two – as when an active DHCP server is not found on the network – Spark will automatically switch to Manual mode and attempt to connect using a static IP address. In this context, please read the section entitled "Local-Link (Failsafe)" for additional information.

MULTICAST

Click Multicast (Figure 2-14) 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.

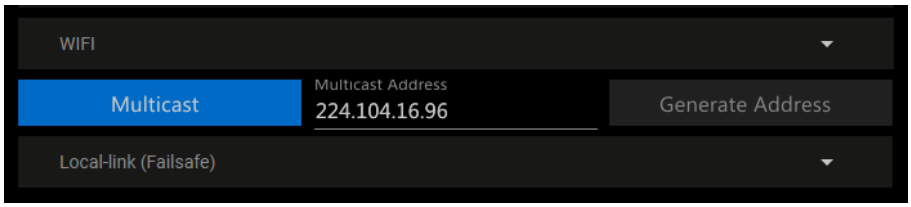


FIGURE 2-14

To update the address to another random value, click Generate Address. *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?

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").

Managed vs. Unmanaged

An un-managed (a.k.a., 'dumb') network switch will cause a multicast stream to revert to unicast. This can have 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 parts of the network with unnecessary traffic. It can even slow down the rest of the network, as upstream devices are forced to wait for responses from the over-saturated devices.

The net result of such a poor setup can be likened to a self-inflicted denial of service attack.

LOCAL-LINK (FAILSAFE)

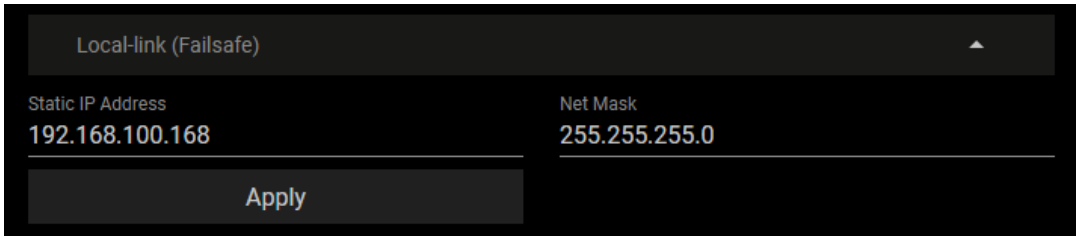


FIGURE 2-15

Spark's Local-Link feature provides a convenient supplemental method of connecting to the device, should problems be encountered that prevent connecting by other means, or for other reasons. It may help to think of this as a failsafe connection method.

The Static IP Address entered in this section defaults to 192.168.100.168, and is always active. That is, even when a different static address is operative in the main Ethernet control group, or DHCP is supplying the primary IP address automatically, the Local-Link address will also work – even simultaneously.

That is to say that, if you connect a computer on the same domain (192.168.100.#) and with a matching net mask entry to the device in a peer-to-peer configuration, you will be able to access Spark's web page by entering 192.168.100.168 into the browser's address bar. You can then to modify your Spark password, or make other network configuration changes as desired.

Hint: It is not difficult to temporarily re-assign a computer to the Local Link network domain and make a direct, peer-to-peer connection to Spark using an Ethernet cable; but if you are not familiar with the procedures involved, you may wish to obtain the assistance of a network technician.

2.6 TALLY

Your Spark unit provides 'tally' notification from NDI devices supporting it. Specifically, 4 LEDs located above and right relative to the power connector 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 2-16.

FIGURE 2-16

This section explains how to configure and use NewTek Connect Spark's native recording capabilities, and also briefly discusses alternative approaches and their merits.

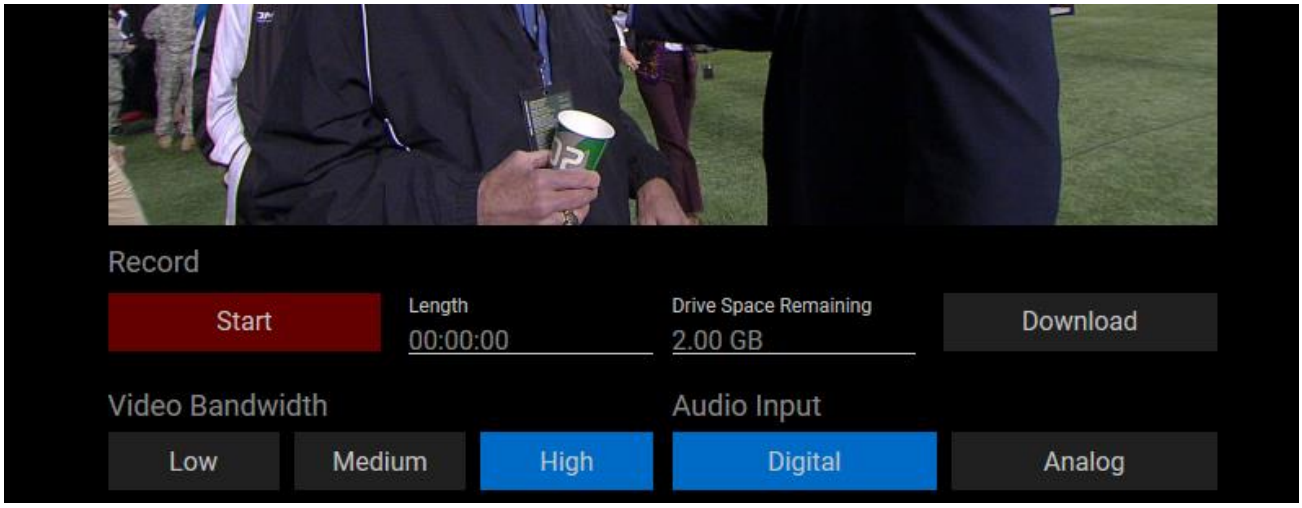


FIGURE 3-1

The Record control group is situated immediately beneath the preview pane in the Audio/Video tab of Spark's web page (Figure 3-1).

The length of the file currently being recorded is shown at right, as is remaining drive capacity (more on drives momentarily).

You can use these features to capture audio and video in TS (Transport Stream) format to a memory card, such as an SD card inserted into the card slot provided on Spark.

Alternatively, you might use a USB 'thumb drive' inserted in one of the Spark's two USB slots, or virtually any other USB-connected storage volume.

Local recording can be started, stopped, and downloaded using buttons provided immediately below the preview monitor.

Recording Alternatives

Since Spark's native recording is handled on the unit itself, no second device needs to be connected. And, capture can be controlled by virtually any device on the network with a web browser.

Studio Monitor for Windows™ also provides convenient integrated recording. As it captures directly to a folder on the host device, this can eliminate a download step.

NewTek IsoCorder™ (available from www.newtek.com/ndi at no cost) offers yet another possibility, one that captures NDI sources in Quicktime® format. And the IsoCorder Pro™ version can capture as many as 16 NDI channels at once.

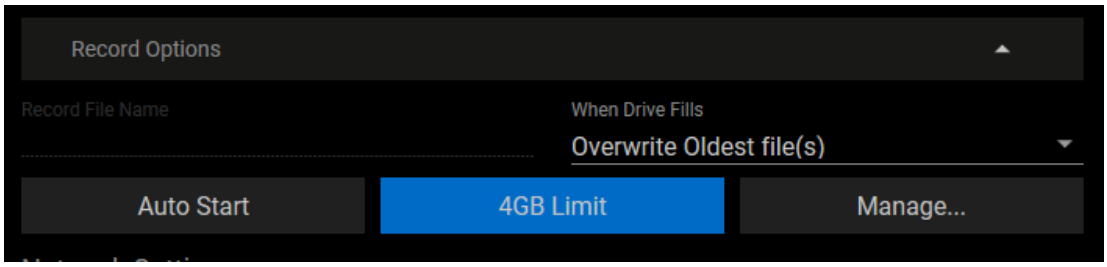


FIGURE 3-2

Additional record options are provided in the Record Options group on the Administration page.

By default, recording begins immediately on insertion or connection of suitable storage media. This feature can be turned on or off using the Auto Start button.

Hint: When multiple storage volumes are detected, Spark records to the one with the most free space available.

As the most common memory cards on the market are prepared using the FAT32 file system, which limits files to a maximum of 4GB), Spark defaults to automatically splitting captured files at 4GB. This option can be disabled by turning off the 4GB Limit button. NOTE that Spark supports SD, SDHC, SDXC, MMC and eMMC card types.

Hint: Please do not use storage media formatted using the NTFS file system for local capture.

Similarly, you can choose to automatically overwrite the oldest files when the storage volume capacity is reached, or you can change the When Drive Fills setting to stop recording instead.

The Manage button opens a popup pane that provides additional Download and Delete options for files on the connected storage media.

Select a drive to manage at the top of this pane, and use the buttons in the panel's footer to download or delete files you select in the list above.

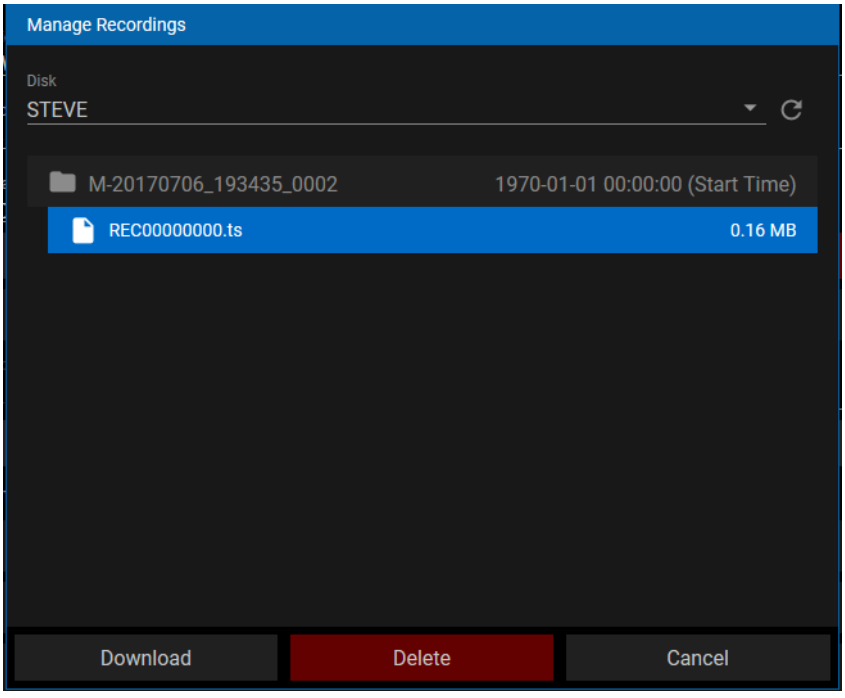


FIGURE 3-3

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.

NDI® | HX

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'.

3.2 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 high-efficiency NDI mode expressly designed to facilitate wifi and long distance connections.

3.3 NDI BENEFITS

The NDI concept is simple: You supply a video source – in this case, either an HDMI or SDI a/v source – and send it to your network as an NDI stream by means of your NewTek Connect Spark™. 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.

3.4 NDI VIRTUAL INPUT

If you installed the NDI|HX driver 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 3-2).

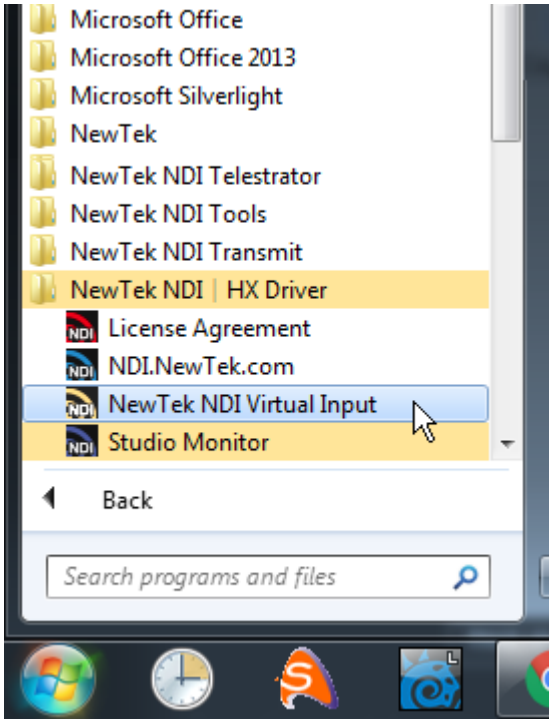


FIGURE 1-1

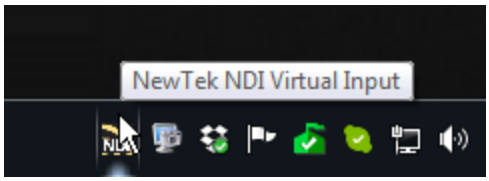


FIGURE 3-2

Configuring (and using) Virtual Input is very easy:

- Simply right-click the icon to select an NDI source from your network (Virtual Input requires that at least one NDI|HX source must be detected on the network for this to work).
- 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.

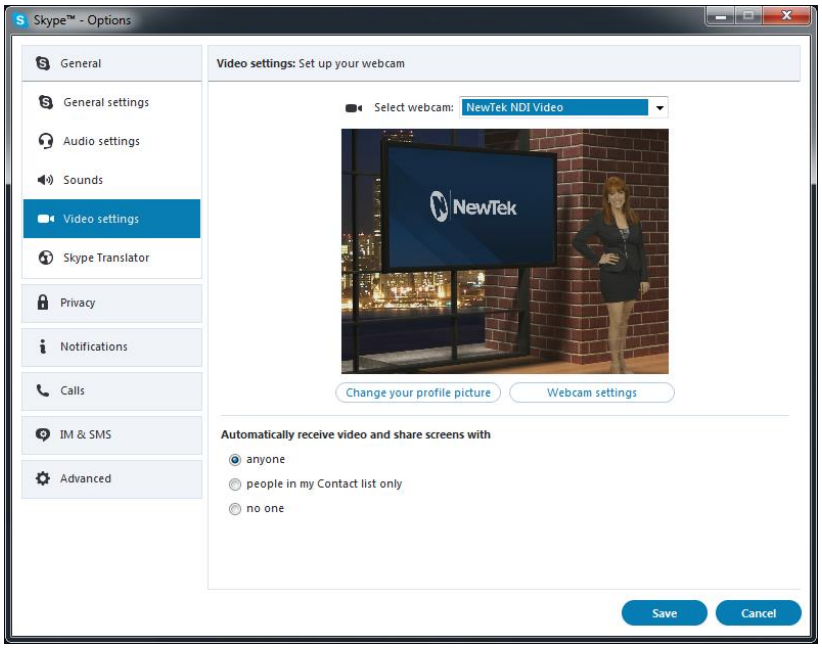


FIGURE 3

- 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.

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a. In order to make or receive Skype calls to be processed using TalkShow and its software, you will need Skype Client Software from Skype™, a Microsoft™ company. You will be directed to create your own Skype™ user account(s) and your use of the Skype client software thereunder will be governed by the standard Skype™ Terms of Use. NewTek is not responsible for that license nor a party to it and you agree to be bound by it and comply with the Skype™ Broadcast Terms of Use as found at:

http://www.skype.com/en/legal/broadcast/.

b. NewTek is solely responsible for the TalkShow product.

c. You agree that NewTek may share certain information about the use and performance of the TalkShow system with Skype™ and Microsoft

d. As with other software licensed elsewhere in this License, your license of the TalkShow software is limited to the object code only, and all othe provisions of this license apply, including those in paragraph two.

e. You are further prohibited from any transfer, assignment, or sublicensing of the TalkShow software.

Limited Hardware Warranty

This limited warranty covers only the hardware portion of the Product and extends to the original purchaser only. Software with the Product, installed or uninstalled, is licensed to you, not sold, under the separate license agreement, above, that has its own limited warranty terms.

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For certain purchasers in Australia of certain of our Products governed by the Australian Consumer Law, the following applies:

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This Limited Hardware Warranty will be construed under the laws of the State of Texas, USA, except for that body of law dealing with conflicts of law. If any provision shall be held by a court of competent jurisdiction to be contrary to law that provision will be enforced to the maximum extent permissible and the remaining provisions of this Limited Warranty will remain in full force and effect.

CREDITS

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