NDI®

NDI® 5

An Ever-Expanding Universe of Networked Possibilities

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If you are in the business of video production, then you have likely read, heard, or thought about using Internet Protocol (IP) as an alternative to baseband video, but you are concerned it may be too complicated to implement and use.

Fear not.

IP video went mainstream some time ago. Just think about the streaming services you use at home. With respect to live production and post-production workflows, the challenge has been in how to achieve improved and reliable performance out of traditional IT practices and infrastructures. That challenge was met with the introduction of NDI®.

Welcome to the industry's most flexible, cost-effective, and widely accepted audio/video networking protocol for IP transmission and live production using standard LAN networking. NDI, which along with Vizrt and NewTek is a standalone brand within Vizrt Group, is now compatible with thousands of video products—from cameras to desktop editing systems, routers to audio mixers and much more—supporting a wide variety of applications and a myriad of video production workflows and distribution market verticals.

With such wide-ranging industry support, making connections to an IP network fast while finding a device within a networked infrastructure is easy. Combine that with full metadata support that is invisible to the user—represented as XML blocks that validate and store multiple lines of formatted descriptive text to power workflows—and you can easily leverage NDI 5's software-based efficiencies to automatically control and trigger devices like PTZ cameras, tally lights, graphics insertion, audio levels and more, on the network. These invaluable audio and video file descriptors help preserve visual quality, frame accuracy, and source synchronization to keep your productions looking and performing at their absolute best.

> NDI® is **designed to harness the massive creative potential of software and networks,** allowing anyone to work with video and have fun doing it.

NDI is a royalty-free software standard developed by NewTek to enable audio and video-compatible products to communicate, deliver, and receive high-definition video over a computer network in a high-quality, low-latency manner that is frame accurate and suitable for switching in a live production environment. It requires no special hardware of any kind, and it works with your existing software applications, computer platforms, and network infrastructure. NDI's lightweight, low overhead implementation makes it as simple as downloading an NDI Tool (at no charge), and then sitting back as you witness live video moving across your network.

Far from a nascent technology, since 2015, millions of video professionals have incorporated it into their workflows and now have the freedom to work in tandem with their preferred choice in technology and network topologies without having to change their already established workflows. For example, common audio networking technologies like Dante™ can easily co-exist on an NDI video-over-IP network with high-quality signal processing and few limitations.

According to Dr. Andrew Cross, Vizrt Group's President of Product Development and one of NDI's original developers, "NDI is designed to harness the massive creative potential of software and networks, allowing anyone to work with video and have fun doing it."

What NDI has given the industry is a reliable and de facto standard that gets everyone speaking the same networking language, greatly speeding up new product launches and system integration while ensuring that each device will be easily recognized on the network and simple to control remotely.

Free NDI® Tools Streamline Network Deployment

Complete with a new interface and intuitive guidance built in, NDI Tools is a suite of applications designed to introduce you to the world of IP. NDI makes it possible to connect to any device, in

any location, anywhere in the world and transmit live video to wherever you are. Indeed, with a single download, you gain the ability to integrate more source devices and applications into your workflow, insert more content into your shows, and expand video opportunities throughout your network. To make NDI even more accessible to new and experienced users alike, the free NDI Tools download has been reimagined for NDI 5, with a fresh interface and intuitive guidance built in.

And the best part is that this invaluable and continually expanding software toolkit is available as a free download (for both Macintosh and PC desktops, as well as Android and iOS) from the NDI Tools website.

Welcome To NDI® 5

The latest version of NDI, NDI 5, brings a wealth of new features that even seasoned NDI users will find surprisingly helpful for their everyday video productions. That is because the world's most widely adopted software-defined IP video standard now allows anyone to easily share live, high quality, low latency video with anyone else in real time, using billions of devices. Now you can easily build shows and share videos between them, for free. It has significantly furthered the current creative and technical infrastructure revolution now taking place in video storytelling.

As a scalable media transport mechanism, NDI 5 is designed to encourage all types of suppliers to integrate NDI into their applications and devices. As a result, NDI has achieved the widest support of any IP-based protocol for media by far. There are thousands of technology companies supporting NDI, and millions of users incorporating it into their workflows. Applications and devices ranging from gaming to corporate video to broadcast are readily available.

NDI 5 represents a quantum leap forward in live IP production workflows, and since NewTek products, like TriCaster integrated production systems—are natively IP-centric, they are ready to plug-and-play into your Internet-based network topology.

So, what can you do now with NDI that you couldn't do before when you combine NewTek production solutions with NDI 5?

1. Connect Your Studios, Not Just Your Devices

An exciting new part of the NDI Tool suite, NDI Bridge streamlines the remote production workflows of TriCaster-based productions by forming a secure bridge between any NDI network regardless of location. This has helped to redefine the concept of decentralized workflows, opening a wealth of new opportunities for cost-effective, live video production.

With NDI Bridge, users can securely share NDI sources between remote sites, anywhere in the world, using a simple and secure network setup. This allows live production teams to stay native in NDI, end-to-end, reducing complexity, cost, and latency across any distance. NDI Bridge delivers local convenience on a global scale as it handles all the complexity of remote sources, and still works with alpha channel, KVM, PTZs, tally, and much more.

With NDI® Bridge, **users can securely share NDI® sources between remote sites, anywhere in the world,** using a simple and secure network setup.

This remote networking capability allows you to eliminate the limitations of your local facility by connecting and controlling PTZ cameras—NewTek or otherwise—in remote locations. Not only do you get pristine video capture and display (as well as high quality audio), but also full control of the camera with tally and other important ancillary data at the receive site. You can also easily reverse the connection and run your TriCaster from the remote location through NDI KVM, allowing users to access the user interface of their NewTek live production system and take control from anywhere on your network. Even better, this is not only two-way, but multi-way. Multiple sites can share and work with each other's sources, whether they are next door or across an ocean.

2. Easily Access Remote Sources Over a Secure WAN Or Public Internet

The need to bring live sources into a production at the last minute with little time to establish secure and stable connections is one of the greatest headaches for anyone working in media production. NDI Remote means you can connect with any remote user to receive their video and audio over the public internet by simply sharing a link. This is ideal both to quickly add sources to live productions, or to receive video from any mobile device anywhere in the world into any video software application.

NDI Remote allows anyone with a URL to contribute live audio and video using an Internet-connected device, like a camera phone or a web browser, to another point anywhere in the world. This facilitates the live contribution of guests and reporters to a newscast or entertainment interview show.

3. Gain Better Network Connectivity

Another big step forward in NDI 5 is a new transport protocol at the core — Reliable UDP.

Reliable UDP is better at managing packet traffic and network congestion, avoiding packet loss and dropped frames. Also, you no longer need a complex network switch, an entry-level switch and NDI 5 networking works just fine. This makes it much easier for the end user to set up a network with no prior networking experience. It's literally plug and play.

4. Network Connectivity & Coexistence

Another critical point to understand in terms of secure and reliable network connectivity is that NDI 5 and other networking technologies, such as Dante, can be configured to coexist on the same network. On both the transfer and receive sides, the users should always be aware of the risk of mixing two different technologies using the same physical connection, but compared to what came before, this powerful combination works so much faster and more reliably than other solutions on the market today. Networked compatibility is the name of the game in successful and seamless audio and video production architectures.

NDI® Audio Direct lets users select, receive, and generate multichannel audio with **extremely high quality and near zero latency.**

5. Strengthen Your Network Connectivity

Network congestion control is perhaps the single most vital component for high performance and reliability across the hall or across the globe in real-world networks. NDI-native NewTek products, such as TriCaster and 3Play, benefit significantly from the Reliable UDP (RUDP) transport protocol, which optimizes network transport with state-of-the-art congestion control algorithms, bandwidth management, and high latency support.

RUDP is designed to move video and audio across a network. By adding standards based on UDP, NDI 5 works better on the network that you already have installed—including over WiFi and WAN. In fact, as part of NDI's mission to make video easier everywhere, RUDP transfer makes WAN and WiFi connections more resilient with less configuration required.

Management and control software adjustments are also enhanced, giving users the ability to direct NDI traffic to specific audio and video interfaces. And these helpful connectivity enhancements are available as soon as you download the free NDI 5 toolkit found within the NDI Developers' SDK.

6. Make Your Audio Sound Better and Travel More Securely

NDI Audio Direct is a set of audio plugins that allows virtually any audio software application to take advantage of NDI. NDI Audio Direct lets users select, receive, and generate multichannel audio with extremely high quality and near zero latency. The plugins are a major enabler for easy audio-over-IP and supports workflows both on premises and in virtual or cloud environments.

This means users can freely move audio around their production using NDI 5 networking. It provides seamless integration of NDI audio into software-based audio workflows, be they across a local network, in the cloud, or hybrid, setting your production free from the limitations of hardware audio mixers.

For example, NDI 5 allows you to connect your Digital Audio Workstation (DAW) to any TriCaster-based production. In this way you can leverage third-party audio plug-ins to sweeten your audio mix or pair-up with a control surface through a DAW for direct control of the program mix. And there is no external timing hardware or network clock required, saving you setup time and money.

7. Work With All Apple and Adobe Creative Cloud Products

For the first time, NDI 5 provides native support for macOS, iOS, tvOS and iPadOS devices. This speeds up the performance and production workflows of countless and unrelated vertical markets. An updated plug-in allows output for Final Cut Pro with real-time audio and video frame buffers. There is also improved support for Adobe Premiere and After Effects plugins, which now feature improved audio workflows.

In addition, NDI 5 offers an all-new Adobe Creative Cloud plugin that allows audio output both to the soundcard and the NDI output, enabling users to hear the very same audio as is going out to NDI, providing a full editor workflow.

For the first time, NDI® 5 provides native support for macOS, iOS, tvOS and iPadOS devices. **This speeds up the performance and production workflows of countless and unrelated vertical markets.**

8. Deploy IP-Based Synchronization (Genlock) for Multi-Camera, Remote and Virtual Set Production

Although NDI 5 does not support automatic synchronization of cameras and other audio devices on its own, users can manually synchronize two or more sources to keep the timing correct, assuming the product they are using supports this function. When working in virtual set and augmented reality environments, synchronization is critical. In this case users can use an NDI stream as a reference to synchronize all of the applications on the network.

This makes it as simple to work with as genlock was in the old composite video world. This synchronization capability can be accessed within the new advanced NDI 5 SDK.

9. Quickly Develop NDI® Applications for ARM Devices

NDI 5 is among a few networking technologies products that can support Advanced RISC Machine (ARM) devices. Within the NDI 5 advanced SDK, there are special software tools focused on ARM CPUs. It means that one could build an NDI-compatible encoder and decoder to benefit the display markets. Technology providers using traditional methods previously took years to implement modern technologies that lie within NDI 5.

Now a developer can take an inexpensive compute device and an HDMI plug-in box and it can decode NDI. There are many hardware devices that use ARM CPUs in the industry, like audio mixers and mobile phones. NDI 5's advanced SDK features can help developers support NDI for both audio and video. This lets developers get new products and applications to market faster and more efficiently than ever before.

10. See A Fast ROI

Compared to any other Audio/Video over IP technology NDI is extremely easy to implement, most times requiring only a single Ethernet cable to move streams of UHD material. The advantage of using a compressed protocol is becoming huge, particularly in that NDI can operate both locally and globally. NDI is more than a transport protocol. It is also a codec, a control path, a vehicle for metadata, a bi-directional communication avenue, a recording environment, a signal routing fabric, and an SDK.

And NDI is flexible. If your production company staffs four control rooms during the week, but ten at the weekend, employing NDI means a simple adjustment to the IP network switch can make those extra rooms available to remote production staff within minutes. Easy installation and increased productivity mean your company sees a return on investment in a very short time.

In addition, with NDI you save money by not having to purchase extra gateway or signal processing components. From a business perspective, we can look at stream per cable. With SMPTE 2110, you get one HD stream per cable over a 10 GB/s connection. With NDI you can run three UHD streams over a single 1 Gb/s stream (over one Ethernet cable). More streams equal increased revenue.

NDI® is the Right Choice for Your AV-over-IP Networked Environments

At its core, NDI moves video, audio, and data across any network—global, wireless, mobile, or local, between cameras, mobile devices, production equipment or desktop machines—and is now the most used standard to move content in the world.

Due to its flexible and open design the latest version of NDI continues to push the boundaries of video production over IP and now, with unmatched WAN and audio capabilities, NDI offers unprecedented integration and power to share and move video, audio, and metadata between devices anywhere around the world.

NDI® – Moving video. Moving the world.

Curious to know more? Please visit ndi.tv and newtek.com.