



# THE ROADMAP TO LIVE IP VIDEO


Presented by NewTek in Partnership With TV Technology and Digital Video

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# THE ROADMAP TO LIVE IP VIDEO: YOUR GUIDE TO MAKING THE DECISION TO GO IP

The path along the transition to an IP video workflow is littered with confusing, and sometimes conflicting, mile markers.

- Which standards direction to take?
- Which compression route to drive?
- Which manufacturer alliance to follow?

With an abundance of equipment vendors, software developers, and trade organizations disseminating so many competing messages, it's easy to let all the flashing signals throw you off course.

This guide will help you plot a route, navigate the roadblocks, and plan avenues around the many areas that are still under construction.

All you need to start is a good hard look at why you're on this journey to begin with.

# A FORK IN THE ROAD

For many video professionals, making the move to video over IP is no longer a question of if, but how.

“How do we get there most effectively, painlessly, and profitably?”

As the broadcast industry has begun the process of replacing tried-and-true baseband, three clear transition paths have developed: total migration, bridge to IP, and distinct islands of workflows.

- 1. Migrate:** replace SDI infrastructures with high-bandwidth, standards-based hardware and networking for uncompressed video transport that mimics SDI.
- 2. Bridge:** purchase hybrid hardware that marries “old” SDI and “new” IP connections in the same system and can handle compressed and uncompressed video.
- 3. Island:** build specific production tasks using IP that don’t disrupt baseband operations; then add others or scale when proven.

Is one of these three routes the best way for your facility to move forward?

Or will your transition take a new path?

## MIGRATION

A simplified way of looking at migrating to the standards emerging today is that they take workflows broadcasters already have, and make them compatible with IP technology—viewing IP as a replacement for a more traditional video transport like SDI.

Choosing this route involves a certain degree of commitment—and patience. First, the inevitable “standards wars” have taken over the conversation. This makes it difficult for facility owners to adopt, because doing so seemingly eliminates half of the equipment options available to them.

At the same time, customers feel locked in; they’re reluctant to invest in case the technology they pick ultimately fails to be universally adopted. Choosing sides puts facilities at the mercy of specific equipment, rather than freeing them from dependency on it—which should be one of the allures of IP to begin with.

What’s more, given the most ideal (and expensive) conditions—extraordinarily high bandwidth that matches SDI speeds; centralized traffic management that routes video streams directionally from their sources; hardware adapters to convert production device signals—you could even replicate your baseband workflow. In other words... you’d hardly notice a difference.

Consider this: would you replace a horse and buggy with a sports car and still drive only 4 miles per hour on the open road? Probably not. So why would you use a networked environment the same way you use point-to-point cable?

## TAKING SIDES

Several proposed (and frequently, opposing) IP standards and formats are contending for leadership, the characteristics and distinctions of which are widely documented and debated across the industry. Examples include:

CODECS	PROTOCOLS	CONSORTIUMS
TICO	SMPTE 2022 (-6)	AIMS
AVC-I	ASPEN	TICO ALLIANCE
JPEG 2000	AVB	ASPEN COMMUNITY

## BRIDGE

Investing in a hybrid SDI-IP system can prolong the useful life of your baseband equipment, while incorporating standard IT in tandem. Hybrid solutions bridge from current gear to IP by integrating both sets of specs and connections in the same hardware. Like a full IP migration, they typically support one of the two primary manufacturers’ consortiums for uncompressed IP transport—AIMS or ASPEN—and for production, one of the major families of competing compression schemes, TICO, AVC-I, or JPEG 2000. Bridging to an IP workflow can help facilities realize the price-performance promises of IT components, while getting a head start on technology leadership—and of course extend the ROI from their legacy equipment. The biggest consideration to taking the bridge approach is making a standards decision and hoping it prevails in the long run.

## ISLAND

Most producers don’t want to freeze today’s workflow in time and ensure it’s future-proofed to remain that way for a long, long time. That’s what replacing SDI with IP would do, or merely marrying IP into the equipment to extend SDI’s lifespan.

An island approach—or simply adding a single process, suite, or “kit” that’s IP-enabled—can give you a walled garden of testing, perfecting, and ultimately scaling the IP workflow of your own design. Its greatest advantage is that you can experiment non-disruptively with a proof-of-concept process, choosing just the equipment and formats that work for you, and only build to scale once you’ve projected out the kind of bandwidth, wiring, and formats you’d like to work with.

Even production islands need to interface back with the mainland, though, so at some point in the process a conversion, transfer, or brute force will have to be plied to tie back into the larger workflow.

# INTERCONNECT

Lately, however, a fourth path has emerged, one that can facilitate the island workflow or stand on its own—and in fact, take any of the paths toward IP to a new level of capability. This fourth option is an interconnected production workflow using the NewTek™ NDI™ (Network Device Interface) protocol.

In the interconnected IP approach, connecting any NDI-enabled device to a GigE switch turns a LAN into a live production network. Without incremental investments in new production equipment or high-speed Ethernet, NDI can use existing gear and common devices as IP video sources to switch live, frame-accurately, in a real-time environment.

Of course, accessing production devices and mixing them for live production over the network is pretty much the price of admission for any IP video solution. Doing these things frame-accurately on a standard GigE network, and having any device that comes online recognizable by the system as a source, are what puts NDI on a separate path.

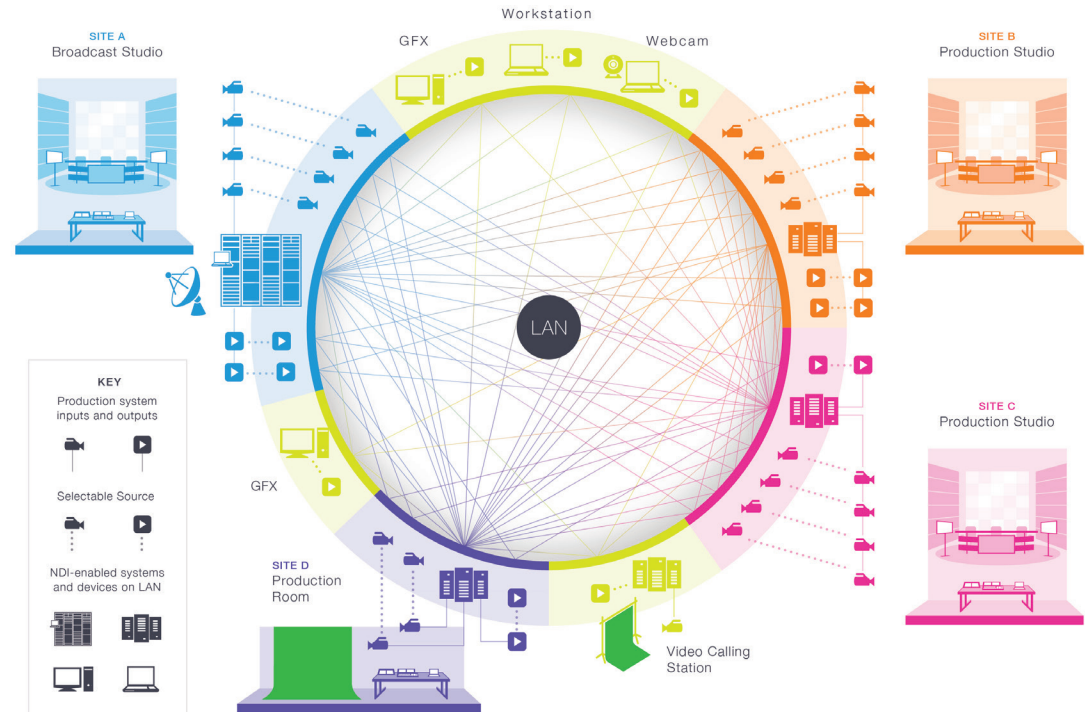
Its coexistence within SDI infrastructures is also highly unique—since without specialized hardware, its encoding algorithm allows video from baseband devices to be accommodated in multiple simultaneous, high-quality, ultra-low latency video streams over IP. What makes the “interconnect” aspect of an NDI workflow more compelling (and easier) than other paths to IP is that—just as with the coming “Internet of Things”—nearly anything that’s connected can become a part of an NDI workflow; not only cameras and video signals.

An interconnected video workflow with NDI can involve:

- ISO source recording – of anything on the network, including what’s being switched in the live program
- IP source monitoring – viewable in a browser
- Bars-and-tone generator
- Capture cards or media players on any connected workstation
- Sources originating from VOIP (Google Hangouts, Skype, webcam)
- IP cameras
- Programmable SDKs to integrate any video source – think gaming systems, presentation software, scan converters

And more importantly, it natively supports video from devices and formats included in the emerging industry standards. Even facilities that take the island, bridge, or migration path to a full IP workflow can incorporate additional sources, devices and capabilities into their productions in an interconnected, NDI workflow.

## Advanced IP Workflow





# WHEN DOES THE INTERCONNECTED FUTURE START?

The common justification for the transition of video production from SDI to a LAN is to “future-proof” a facility. But it’s limiting to think only about extending equipment lifespan, or avoiding obsolescence, by swapping out baseband for IT. That may seem to be the marketplace’s reasoning, but chances are it’s not yours. Unprecedented competition for audiences and revenue is taking place today. Media sources and destinations are innumerable—and growing—today. Businesses are looking for innovations that will have a positive impact on their bottom line immediately. Not someday. Today. Facilities can move their productions to an NDI-based interconnected IP workflow—today—and gain more than immediate future-proofing.

## 1) COST SAVINGS

We already know this one is a no-brainer for facilities looking to extend their equipment ROI and the longevity of their purchases. But an NDI workflow can also leverage your current (and legacy) equipment and infrastructure, bringing older production devices into the future by giving them a presence and visibility on the LAN. This avoids extraneous purchases of conversion or replacement hardware. It’s also optimized for standard GigE networking, another immediate way to achieve massive savings.

## 2) PRODUCTION SCALABILITY

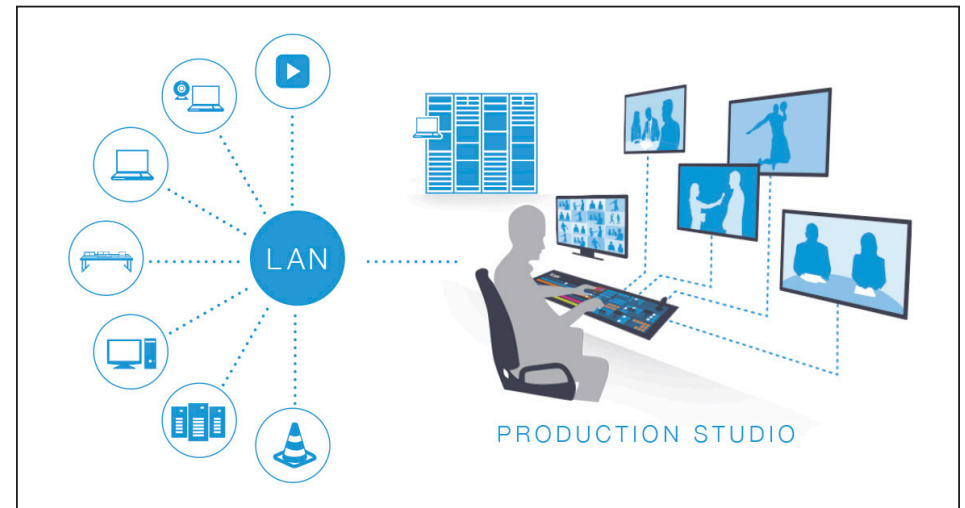
In video facilities, if multiple switchers need to access multiple production devices, then the number of connections needed on the matrix router is essentially multiplied by both switchers and devices. Adding just one new source beyond that requires adding another router... or constant jury-rigging to get the unneeded sources temporarily unplugged to make way for the new ones. With IP networks, port limitations are not nearly as constricted—and heavy, expensive, space-filling SDI wiring is drastically reduced. So productions can scale, without any additional space.

## 3) SOURCE FLEXIBILITY

If there’s one thing an SDI platform is really great at moving around, it’s a one-way video signal. If there’s another, it’s audio. Throw in some sync to time everything together, and you’ve reached SDI’s potential. LAN architectures can transport nearly limitless data, file formats, packets, streams, communications, commands, and bit types. If it can be digitized, it can be transmitted. What’s that mean? It means as you discover new sources you want to add to your shows, with a LAN-based NDI production network, you can. Your programs can use the freshest, real-time, breaking or trending material from any device or channel without thinking about how to get from here to there, or about whether everything is in the same format.

## 4) DISTANCE

The ability for IP backbones to traverse great distances is no secret in the broadcasting community. But even for workflows in which long-distance backhaul is not necessary, this is an enormous advantage. LAN networks cross walls and distances to connect devices and peripherals on the network without the need for physical proximity. With NDI workflows, which can identify any device on the LAN, a switcher in one studio can use a camera connected to a switcher in another building for a live source—and both locations can use each others’ inputs and outputs interchangeably.



## 5) DEVICE INTEROPERABILITY

Interoperability is truly the only way any IP workflow will be sustainable—whether an entire migration or just an island. Many manufacturers are striving to bring enough development partners on board to ensure their equipment will be supported by the peripherals and production devices customers choose. It’s difficult, because just like customers, device manufacturers have to place their bets on whichever standards will win—and often pay a hefty licensing fee for the privilege. NDI is compatible with more than 100,000 baseband units already deployed in live production workflows—and is openly programmable and free to anyone (manufacturers, partners, developers, customers) to create their own custom apps, workflows and device interfaces.

## 6) YOUR ENTIRE NETWORK, CONNECTED

Most IP video methods comprise linear, one-way, point-to-point delivery of a single video output signal to a single destination. This seriously marginalizes the potential gains of IP. But IP networks are inherently bidirectional, and can be programmed to identify all connected devices—like a personal computer that asks to join a network, or displays printers and servers upon startup and lets you manipulate them from your desktop. Far beyond unilaterally sending or receiving, the person running the switcher or managing a production in an NDI environment can have, among other things, access to, visibility into, control of, and intelligence about all connected devices. Where the switcher ends, the production possibilities only just begin.

And that’s how video producers will realize the awesome and full potential of an interconnected IP workflow.

## CONCLUSION

### SET A NEW COURSE

Merely migrating away from a traditional infrastructure doesn't have much upside, if the only thing it accomplishes is to replace one type of cable or format with another—but keeps the old workflow more or less the same.

With what IP can do today, new possibilities using an interconnected NDI workflow can open up your live video workflow immediately, remove limitations and obstacles—and put every production possibility in your path.

