

What's The Difference Between NDI® and NDI® |HX

Ever since the introduction of NDI® |HX back in 2017, people have been asking about the differences between the original NDI® Full Bandwidth launched in 2015 and NDI® |HX. To make things even more confusing, there's been mentions of NDI® |HX2 since 2019. What do these have in common and where do they differentiate? In this article we will try to cover these basics.

Let's start with the introduction of NDI® in 2015, now referred to as Full Bandwidth. NDI® itself stands for Network Device Interface and was introduced as a solution for video over IP production environments, where instead of having to run multiple wires from a camera to a video switcher, you could now route audio, video, control, tally and ancillary data over a single CATx cable. The benefit of using IP technology is that the infrastructure required for NDI® is relatively cheap and that these signals can be distributed over the entire network.

One of the NDI® protocol's core values are that it has to be simple to set up, without the need for an educated network professional tweaking all kinds of settings to get it to work. The auto-discovery implemented in NDI® makes it very simple to find the various sources on the network, without the need of entering IP addresses manually. This ease of integration is one of its key selling points and also one of the reasons why we see an increase in demand in the Pro-AV domain over the past couple of years.

How Much Latency?

One of the first questions these integrators have when using video over IP solutions, is about how much latency does this solution introduce. They've been used to near-to-zero latency solutions like HDBaseT or simple point-to-point HDMI or SDI cabling. Switching to IP traditionally introduces more latency. There are plenty of applications where it really doesn't matter much, but for those where you show the video on a big screen in a live environment, this causes all kinds of unacceptable issues. NDI® Full Bandwidth tackled this problem by using SHQ, or SpeedHQ, encoding which has a very low latency, while utilizing higher bandwidths to get its signal across.

Available Bandwidth

Another concern when talking about video over IP is the available bandwidth on existing infrastructure. In a lot of installations, you will not have the luxury to replace the existing network infrastructure and you'll find yourself with the challenge to use the existing network equipment. When looking at NDI® Full Bandwidth, it will be no surprise that it requires quite a bit of bandwidth. Even though it is possible to run it over a 1Gbe network, you will find yourself in trouble when connecting using multiple sources to a single endpoint. Your network will be maxed out even when using just a few sources.

The solution was introduced by Newtek™ in 2017 when they released NDI® |HX. HX utilizes the common compression method H.264 drastically lowering the bandwidth required. The small drawback is a slight increase in latency. But that is inevitable. There's always a tradeoff between Latency and Bandwidth, High bandwidth provides low latency, and Low bandwidth will always introduce latency due to the fact that you need time to compress and decompress the video. Just to give you an idea, HDMI 1.4 (1080p60) runs at a 10.2Gbps, and HDMI 2.0 even utilizes a staggering 18Gbps for 4K video, both uncompressed and without latency. For 1080p60 streams, Full bandwidth NDI® utilizes about ~150Mbps with latencies of ~16ms where HX can use anything between 1~50Mbps with latencies ranging between 80-200ms depending on the equipment used.

The Updated NDI® | HX

To further improve on the bandwidth requirements [Newtek™](#) updated NDI® | HX in September 2019 with the introduction of H.265 encoding capabilities. This update was referred to as HX2. HX is still what is being marketed, and HX2 only ever surfaces now and then. Usually, both could mean the exact same thing as both are fully compatible with one another. All Avonic NDI® | HX enabled cameras, fully support the HX2 feature set.

In short, NDI® Full Bandwidth and NDI® | HX are two complementary methods to transport video across a network. Depending on the infrastructure and demands with regards to latency, you can easily make a choice between the two.

