

*LivePremier:*

*The IP-SDI input card*

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**1) How is the IP-SDI input card different from the 12G-SDI input card for LivePremier?**

The IP-SDI input card is a hybrid input card that can receive either four 12G-SDI streams or four NDI streams or any combination of NDI/SDI within the limit of four streams. When this input card is not used to receive NDI streams, then it works 100% as the 12G-SDI input card for LivePremier.

**2) What is NDI?**

NDI stands for Network Device Interface. It is a technology developed by NewTek that enables video and audio signals to be transmitted over an IP network. NDI allows multiple video sources to be accessed and used in real-time on a single network, making it a popular choice for live streaming, video production, and other multimedia applications.

**3) Are there different variants of NDI?**

There are today four variants of NDI:

- NDI Full bandwidth is the highest quality variant of NDI. It uses a visually lossless compression algorithm and offers the best image quality and the lowest latency possible but requires a high-bandwidth network to operate smoothly.
- NDI|HX is designed for use with low-bandwidth networks, such as Wi-Fi or cellular networks. It compresses the video signal using H.264 compression, which reduces the bandwidth required for transmission. However, this compression can result in some loss of quality and increased latency.
- NDI|HX2 is an improvement over NDI|HX and provides even better quality at lower bitrates. It uses a more efficient compression algorithm to reduce the bandwidth required for transmission while minimizing the loss of quality.
- NDI|HX3 is the latest variant of NDI and provides even better quality than NDI|HX2. It uses a more advanced compression algorithm that offers higher quality at even lower bitrates.

**4) Is the IP-SDI card compatible with all NDI variants?**

The IP-SDI input card supports NDI Full bandwidth only.

**5) What version of NDI does the IP-SDI input card support?**

The IP-SDI input card supports NDI version 5.0.

**6) What is the version of LivePremier firmware required for the IP-SDI input card?**

The IP-SDI input card requires the installation of LivePremier firmware version 3.1.78 or higher.

**7) Is it possible to update the IP-SDI card with new firmware compatible with a newer version of NDI?**

Yes, the IP-SDI input card will be automatically updated when a new LivePremier firmware including a new version of NDI or new features for that card is applied.

**8) How many ports does the IP-SDI input card have?**

The IP-SDI input card has four 12G-SDI ports as well as one network connector to receive NDI streams.

**9) Which network connector is used to receive the NDI streams?**

The network connector on the IP-SDI input card is an RJ45 connector compatible with both 2.5GbE and 1GbE networks.

**10) What is the recommended type of Ethernet cabling to use with the IP-SDI input card?**

We recommend using CAT5e cabling or better.

**11) Are there any recommendations for the selection and configuration of the network switch for NDI applications?**

For optimal performance, it is recommended to use managed switches with a 1GbE or 2.5 GbE capacity that are specifically designed for AVoIP applications, such as the M4250 series from Netgear. These switches are equipped with dedicated settings and are typically ready-to-use for any NDI application. However, if you intend to use standard network switches, it is important to disable QoS and Jumbo Frames, and to enable IGMP Snooping for mDNS.

**12) How much latency is added by encoding, transporting and decoding NDI video with the IP-SDI card?**

The latency varies depending on several factors such as network conditions, NDI encoder processing power, or the video resolution. However, the IP-SDI card is designed to minimize NDI latency as much as possible, and typically adds less than two frames of latency (less than 32ms for 60 fps video) in most cases.

**13) What NDI transport modes does the IP-SDI input card support?**

The IP-SDI input card supports both TCP and UDP, but it is worth noting that the performance with UDP is noticeably lower than that of TCP.

**14) What are the video formats supported by the IP-SDI input card for LivePremier?**

The IP-SDI input card is capable of handling 12G-SDI sources with a resolution of up to 4K60 4:2:2 or 4K30 4:4:4 at 10-bit. Additionally, it can support NDI formats with a resolution of up to 4K60 4:2:0 or 4K30 4:2:2 at 8-bit.

**15) Does the IP-SDI input card for LivePremier support custom NDI formats?**

Yes, the IP-SDI input card supports custom NDI formats including extra-wide custom formats such as 8K x 1K. But depending on the resolution and framerate, the chroma subsampling may be limited to 4:2:0.

**16) Can the IP-SDI input card for LivePremier decode NDI streams with alpha channel?**

Yes, the IP-SDI input card allows direct decoding of NDI streams with alpha channel which eliminates the need for input and layer masks and makes this input card the perfect match for advanced NDI graphics tools like vMix or SPX available on all Picturall media servers.

**17) How is HDR and deep color video supported by IP-SDI input card for LivePremier?**

The IP-SDI input card can handle 12G-SDI sources with HDR and deep color information. However, it is not able to support HDR on NDI streams.

**18) How many audio channels does the IP-SDI input card support?**

The IP-SDI input card supports 8 audio channels for each input source (SDI or NDI).

**19) Can you provide information on the NDI performance of the IP-SDI input card?**

The NDI performance of the IP-SDI input card is influenced by various factors, including network bandwidth, encoder protocol, video resolution and frame rate as well as the presence of audio or alpha channels. However, here are some examples of performances that we have measured in our labs with TCP protocol for a 1GbE network and for a 2.5GbE network:

With 2.5GbE network (TCP)

- Up to 4x 1080p60 4:2:2 8-bits with alpha channel
- Up to 3x 2160p60 4:2:0 8-bits
- Up to 2x 2160p60 4:2:0 8-bits + 2x 1080p60 4:2:2 8-bits
- Up to 4x 2160p30 4:2:2 8-bits
- Up to 3x 2160p30 4:2:2 8-bits with alpha channel

With 1GbE network (TCP)

- Up to 4x 1080p60 4:2:2 8-bits

- Up to 3x 1080p60 4:2:2 8-bits with alpha channel
- Up to 2x 2160p60 4:2:0 8-bits + 1x 1080p60 4:2:2 8-bits
- Up to 3x 2160p30 4:2:2 8-bits with alpha channel

**20) How does the user choose whether to receive an NDI stream or an SDI stream?**

During the pre-configuration phase of the IP-SDI card, user can select individually for each of the 4 possible input streams whether to use the network port to receive an NDI stream or whether to use one of the four BNC ports to receive a 12G-SDI signal. Examples of configurations:

- 4 x 12G-SDI
- 2 x NDI + 2 x 12G-SDI
- 4 x NDI

**21) How does the IP-SDI card discover the NDI sources available on the network?**

There are several discovery systems that can be used by the IP-SDI input card to find and communicate with NDI sources:

- mDNS (multicast Domain Name System): As default, NDI utilizes mDNS to create the zero-configuration environment for discovery. This service sends an IP multicast message that asks each NDI source to identify itself. Each NDI source then multicasts a message that includes its own IP address. This multicast is seen by the IP-SDI input card on the subnet, which then uses the information in that message to update its own cache.
- NDI Discovery Server (central repository): The NDI discovery service is designed to replace the automatic discovery NDI uses with a server that operates as a centralized registry of NDI sources. This can be very helpful for installations where users want to avoid having significant mDNS traffic for a large number of sources. It can also be useful in situations where multicast is not possible or desirable.
- NDI Direct Access (active polling): In this method, it is necessary to register the exhaustive list of IP addresses of the NDI encoders on the network from which the user may wish to receive the streams.

**22) How long does it take for the IP-SDI input card to switch between 2 different NDI sources?**

Switching between 2 different NDI sources usually takes 2 seconds for video and up to 10 seconds for the audio.

**23) Does the IP-SDI input card feature a buffer to temporarily store incoming NDI data?**

Yes, the IP-SDI input card can buffer up to 100 msec per NDI stream to ensure the reliability and accuracy of the decoding process, especially when the incoming NDI stream contains one or more audio channels. The use of buffers may be necessary to prevent audio pops or audio/video desynchronization problems, particularly in cases where network conditions may be uncertain or variable. However, if the NDI stream does not include audio channels, the buffer is not necessary and can be set to 0. However, it's important to note that increasing the buffer size will also increase latency.

**24) Does the IP-SDI card provide real-time load information to detect potential NDI performance issues?**

Yes, the IP-SDI input card provides real-time network and CPU load statuses as well as some warning messages to help the user to understand why the performance.

**25) Does LivePremier support NDI source selection from presets?**

No, LivePremier doesn't support NDI source selection from presets. NDI sources selection can be achieved using the Web RCS controller, but the selected source is not stored in the presets.

**26) Is NDI tally option supported by the IP-SDI input card?**

Currently, the IP-SDI input card does not support NDI tally option. However, it is expected that this feature will be added through a software upgrade in the future.

**27) Does Analog Way also provide NDI transmitters?**

No, Analog Way doesn't provide NDI transmitters, but the IP-SDI input card is compatible with a large variety of NDI transmitters and software solutions.

**28) What network ports are used to support NDI?**

NDI Encoders and the IP/SDI input card need to be on the same network / subnetwork. mDNS port needs to be open on the source or not filtered by the switch (UDP 5353). Following ports need to be open (not blocked by the network switch):

- TCP 5959 and up: TCP connection
- UDP 5960 and up: RUDP connection
- TCP/UDP 6960 and up: Multi-TCP and UDP receiving
- TCP/UDP 7960 and up: Multi-TCP and UDP sending