



Vizrt 2110 I/O Module User Guide

Version 1.0



Viz 2110 I/O Module



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1 Introduction

1.1 Welcome

Thank you for purchasing this Vizrt product. As a company, Vizrt is extremely proud of its record of innovation and commitments to excellence in design, manufacture, and superb product support. We are determined to deliver the most complete, reliable and efficient integrated systems available for live production and web streaming, with capabilities suited to almost any broadcast need. As well, support of NewTek's innovative NDI® (Network Device Interface) protocol places your new system squarely in the forefront of IP technology solutions for the video broadcast and production industries.

1.2 Overview

Commitments and requirements can change from production to production. A powerful, versatile platform for multi-source production and multi-screen delivery workflows, the Viz 2110 I/O Module quickly pivots to accommodate additional connections.

Viz 2110 I/O IP's turnkey installation and operation lets you assemble a network of modules to configure multi-system and multi-site workflows with a minimum of fuss.

Your Viz 2110 I/O IP Module provides a highly efficient interoperability link between production locations and systems on your network and is readily adaptable to your needs.



Translate as many as four A/V streams (up to 1080p at 59.94) from SMPTE 2110 input to NDI output, and four more from NDI (or other supported source) to SMPTE 2110 output.

Integrate with compatible systems and devices across your network for switching, streaming, display, and delivery. You can stack modules in a single rack, or station them in multiple locations as required to meet the demands of your production environment.

1.3 Feedback And Suggestions

We encourage suggestions and feedback about our products and documentation. To give feedback and/or suggestions, please contact your local Vizrt customer support team at www.vizrt.com.

2 Setup

This chapter explains how to connect power, monitors and audio-visual devices to your Viz 2110 I/O Module. After completing this short section, you'll be all set to begin using your Viz 2110 I/O.

This section contains information on the following topics:

- [Command and Control](#)
- [Input and Output Connections](#)
- [Networking](#)
- [Configuration and Administration](#)

2.1 Command And Control

✔ **Tip:** Viz 2110 IO's interface requires a monitor resolution setting of at least 1280x1024.

1. Connect an external computer monitor to the HDMI port on the backplane (see [Input/Output Connections](#)).
2. Connect the mouse and keyboard to USB ports also on the backplane.
3. Connect the power cord to Viz 2110 IO's backplane.
4. Turn on the computer monitor.
5. Press the Power switch on Viz 2110 IO's faceplate (behind the drop-down door).

At this point, the blue Power LED illuminates, as the device boots up (if this does not happen, please check your connections and retry). Though not a requirement, we do strongly recommend that you connect the unit using an uninterruptable power supply (UPS), as for any mission critical system.

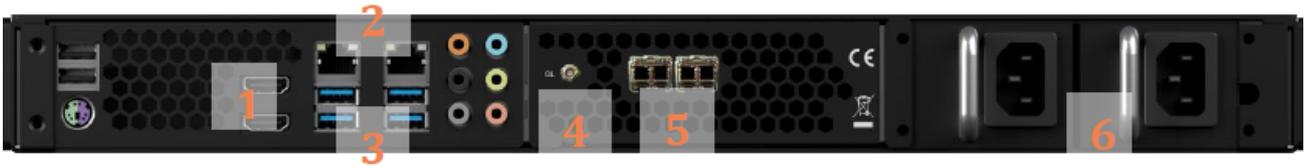
Likewise consider A/C power conditioning, especially in situations where local power is unreliable or noisy. Surge protection is especially important in some locales. Power conditioners can reduce wear on power supplies and other electronics, and provide a further measure of protection from surges, spikes, lightning and high voltage.

❗ **A word about UPS devices:** Modified sine wave UPS devices are popular due to low manufacturing costs. However, such units should generally be viewed as being of low quality and possibly inadequate to fully protect the system from abnormal power events.

For a modest added cost, consider a pure sine wave UPS. These units can be relied on to supply very clean power, eliminating potential problems, and are recommended for applications demanding high reliability.

2.2 Input And Output Connections

External audio and video sources are connected to the appropriate inputs on Viz 2110 IO's backplane.



1. **HDMI:** Monitor port
2. **Ethernet:** Network connections
3. **USB:** Connects keyboard, mouse and other peripheral devices.
4. **RESERVED:** HD-BNC connector (High Density BNC)
5. **SFP A and SFP B**
6. **Power**

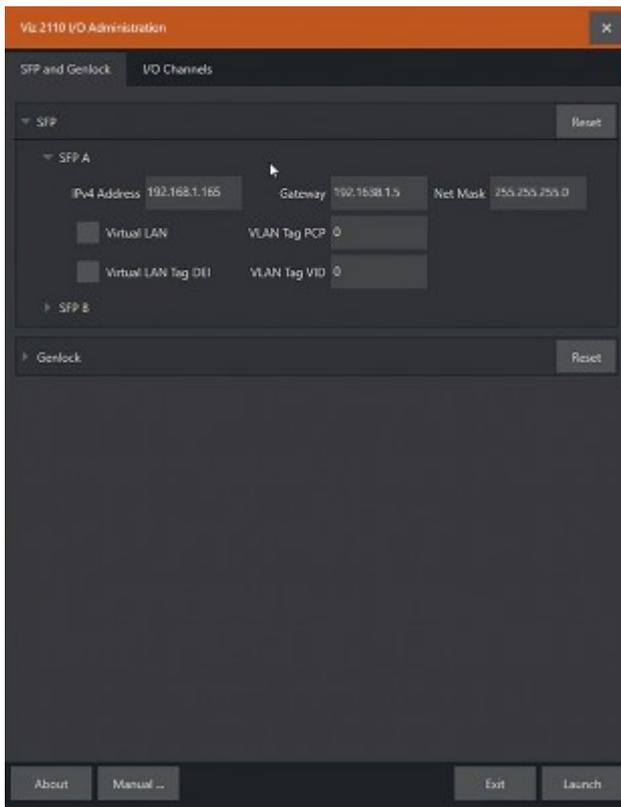
2.3 Networking

2.3.1 Ethernet

Generally, connecting a suitable cable from one of the two Gigabit Ethernet ports on the backplane is all that is required to add it to a local area network (LAN), which typically serves for NDI I/O connections as well as more mundane networking chores. In some settings, additional steps may be required. You can access the system Network and Sharing control panel to accomplish more extensive configuration tasks. If further help connecting is required, please consult your system administrator.

2.3.2 SFP A and B (SMPTE 2110)

The two MSA compatible SFP cages (identified as SFP A and B) are provided.



This is where you plug in your preferred SFP (Small Form-factor Pluggable) transceivers to connect and serve SMPTE 2110 traffic between external systems and your Viz 2110 I/O IP.

Each of the two SFP connection allows two SMPTE 2110 input connections and two outputs to SMPTE 2110 (for a total of four).

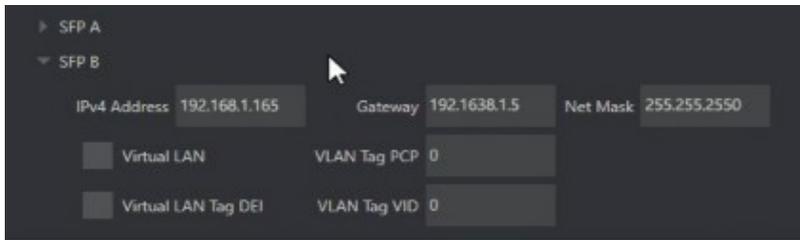
2.4 Configuration And Administration

The configuration of the two SFP ports, Genlock, and (SMPTE 2110) I/O Channels is performed in Viz 2110 I/O IP's Administration panel.

This control panel appears on first launch, and thereafter can be accessed by selecting Exit to Admin from [the Desktop](#), or from the Windows start menu.

- [SFP Configuration](#)
- [Genlock Configuration](#)
- [I/O Channels](#)
 - [Inputs](#)
 - [Outputs](#)
- [Administration Panel Footer Tools](#)

2.4.1 SFP Configuration



Click the SFP and Genlock tab and the header (A or B) for the SFP you wish to configure to expand its settings group.

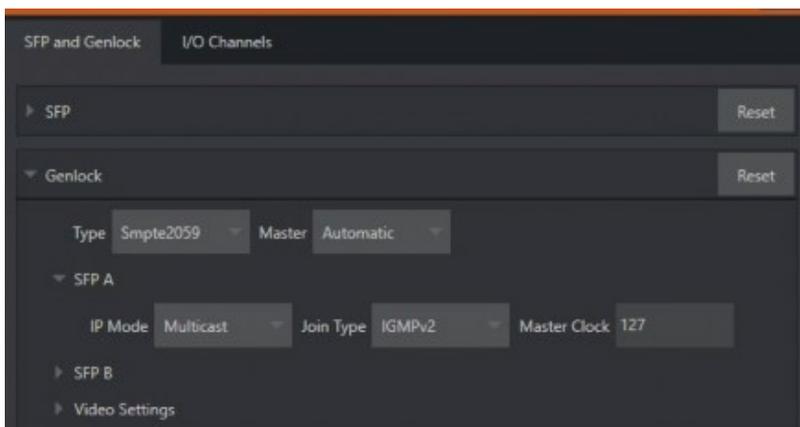
As a minimum, you will need to supply the following values in order to identify the SFP connection on the network you wish to connect it to:

- IPv4Address
- Gateway
- Net Mask

Optionally, enable the Virtual LAN switch if you intend these connections to be associated with a VLAN. In this case, continue to configure the following VLAN tags:

- **PCP:** The Priority Code Point refers to the IEEE 802.1p class of service and maps to the frame priority level. PCP values can be used to prioritize traffic.
- **DEI:** Enable the Drop Eligibility Indicator field indicates the frames eligible to be dropped when congestion makes it necessary.
- **VID:** The VLAN IDentifier specifies the VLAN to which the frame belongs.

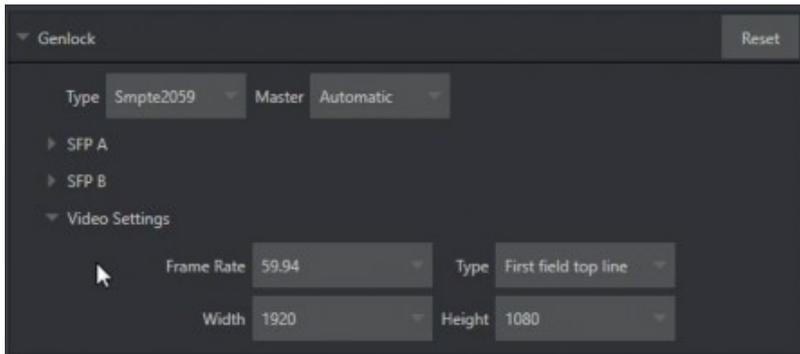
2.4.2 Genlock Configuration



Genlocking provides a mechanism to ensure that your video sources are in sync with one another and other external systems. The **Genlock** tab in the Administration panel provides the necessary settings and options.

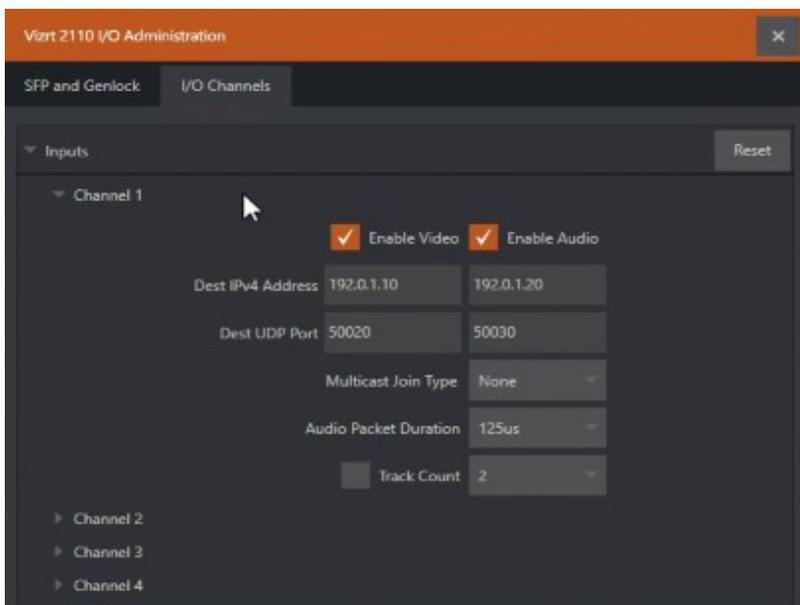
- **Type:** Normally, you select *SMTPE2059* as the method by which timing reference information is supplied to the system (the other option, *Internal*, uses the system clock for timing (free running) rather than an external reference).

- **Master:** Either SFP (A or B) can be designated as the Genlock reference source, or you can select Automatic.
- **SFP (A/B):** Configure the SFP you designated as Master (unless you selected Internal above).
 - **IP Mode:** Select the appropriate IP protocol, choosing Multicast, Unicast, or Hybrid.
 - **Join Type:** Choose None or IGMPv2.
 - **Master Clock:** Specify the for the Master Clock ID for genlock over IP.
- **Video Settings:** Specify the Frame Rate, Type (choose between fielded and progressive options), Width and Height.



Note: The frame rate selected determines which optional formats are shown in the Live Desktop menus. For example, selecting 29.97 or 59.94 results in only NTSC format frame rate options being listed.

2.4.3 I/O Channels



As mentioned previously, each SFP transceiver allows two SMTPE 2110 input connections (for a total of four) and two outputs to SMTPE 2110. Inputs 1 and 2, and outputs 1 and 2 are served by SFP A, while SFP B handles inputs 3 and 4 and outputs 3 and 4.

The settings for **inputs** and **outputs** are configured individually in the I/O Channels tab of the Administration panel, as presented below.

Inputs

After expanding an input control group, you typically check the Enable Video and Enable Audio switches. Then enter values and choose appropriate settings for the corresponding IP streams in the columns below.

- **Dest(ination) IPv4 Address:** Reception multicast IPv4 address.
- **Dest(ination) UDP Port:** Reception User Datagram Protocol (UDP) port.
- **Multicast Join Type:** The membership request type when Dest IPv4 Address is a multicast address.
- **(Audio column only)**
 - **Audio Packet Duration:** The duration of incoming audio packets.
 - **Track Count (switch):** Enable this to use a value entered at right to limit the IP stream track count received.

Outputs

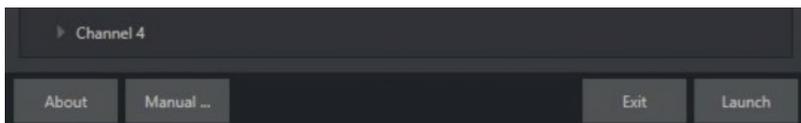
Expand the Outputs control group and continue in similar fashion to checkmark Enable Video and Enable Audio for each SMPTE 2110 output.

Parameter	Value	Value
Enable Video	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Enable Audio	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
RTP Sync Source ID	0	0
Type of Service DSCP	0	0
Type of Service ECN	0	0
Time to Live [Seconds]	128	128
Source UDP Port	0	0
Dest IPv4 Address	192.0.1.50	192.0.1.60
Dest UDP Port	70020	70030
RTP Payload ID	96	97
Audio Packet Duration	125µs	
Track Count	<input type="checkbox"/>	2

- **RTP Sync Source:** The RTP (Real-time Transfer Protocol) Synchronization Source Identifier (SSRC).

- **Type of Service DSCP:** Indicates that the Type of Service (ToS) is Differentiated Service Code Point (DSCP), with a range of [0-63] (6 bits)
- **Type of Service ECN:** Indicates that the Type of Service (ToS) is Explicit Congestion Notification (ECN). Range is [0..3] (2 bits)
- **Time to Live (Seconds):** The time in which packets can be used in seconds. That is, it indicates the packets' Time to live (TTL)
- **Source UDP Port:** The User Datagram Protocol (UDP) port of the sender (the transmitter)
- **Dest(ination) IPv4 Address:** The UDP port of the destination (the receiver). Only used in multicast.
- **Dest(ination) UDP Port:** The UDP port of the destination (the receiver).
- **RTP Payload ID:** The RTP (Real-time Transfer Protocol) payload ID.
- **(Audio column only)**
 - **Audio Packet Duration:** The duration of outgoing audio packets.
 - **Track Count (switch):** Enable to use the value entered at right to limit the IP stream track count transmitted.

2.4.4 Administration Panel Footer Tools



At the bottom of the Administration pane are **About**, **Manual**, **Exit**, and **Launch** buttons.

The **About** panel provides important licensing information and hardware/software version information that is useful should you require product support.

3 User Interface

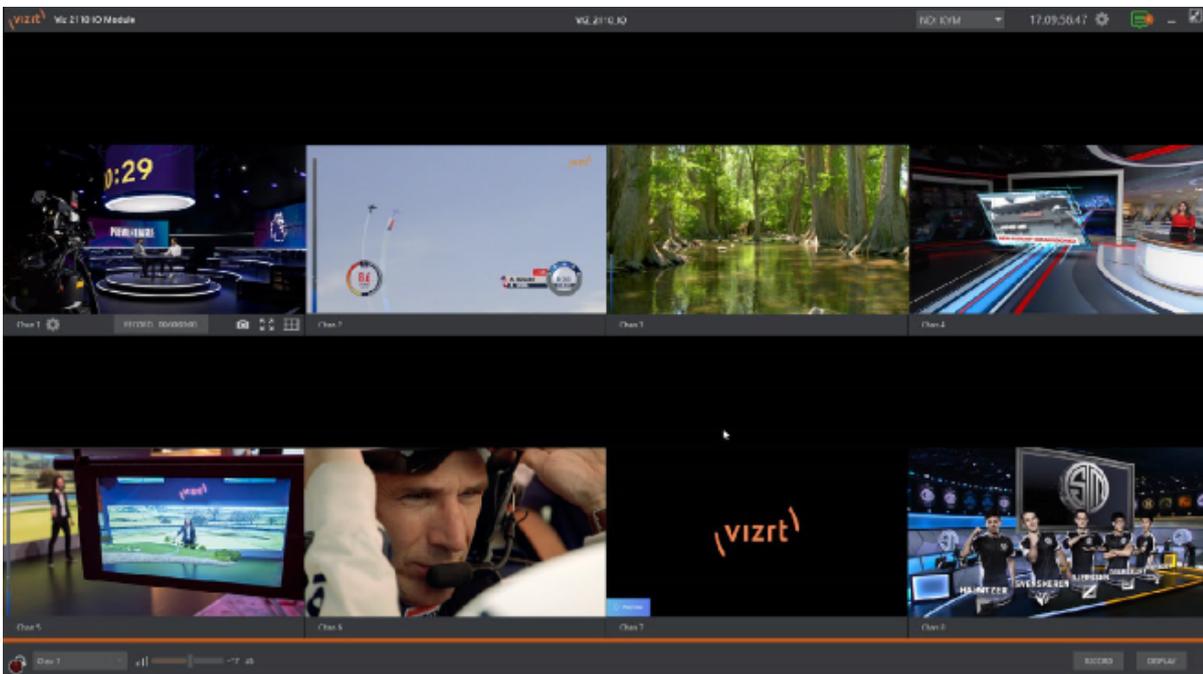
This section explains the layout and options provided in the user interface, and how to configure Viz 2110 I/O audio and video input and output. It also introduces the various supplemental video production features Viz 2110 I/O provides, including Proc Amps, Scopes and capture.

Topics presented:

- [The Desktop](#)
- [Title Bar and Dashboard](#)

3.1 The Desktop

The Viz 2110 I/O IP default Desktop interface provides very useful remote monitoring options in addition to configuration and control features.



The Desktop interface includes a title bar running across the top of the screen, and a Dashboard at the bottom. By default, the large middle section of the Desktop shows eight viewports, each displaying one video channel. Each channel's viewport is labeled in the toolbar beneath.

Note: Some viewport toolbar controls are hidden when not in use, or until you move the mouse pointer over a viewport.

Continue reading for an overview of Viz 2110 I/O IP Desktop features.

- [Input Tab](#)
- [Capture](#)
- [Audio Levels](#)

- [Output Tab](#)
- [Clips and IP Sources](#)
- [Supplemental Audio Device](#)
- [Color Tab](#)

3.1.1 Configure Channels



Viz 2110 I/O IP allows you to select different audio and video sources for each input or channel via the Configure panel. Click the gear next to the channel label below a viewport to open its Configure panel.

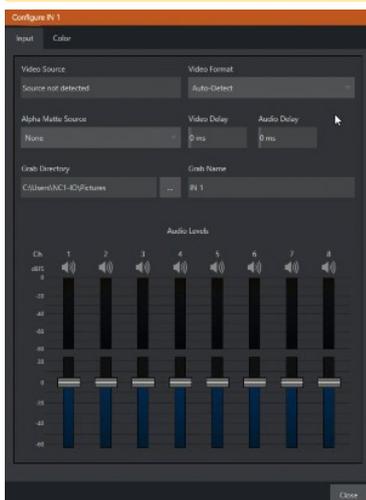
TIP: Alternatively, you can quickly access the Configure Channel pane by double-clicking the viewport.

The tabs shown in a Configuration panel vary according to whether you wish to configure an input (from a SMPTE 2110 source) or an output (sending a SMPTE 2110 stream to a downstream receiver).

Input Tab

Let's consider configuring an input channel first. An input supplied by a SMPTE 2110 source is automatically converted to an NDI stream. The editable Channel Name under the viewport identifies output the channel to other NDI-enabled systems on the network.

Note: NDI Access Manager, included in NDI Tools (available without charge from <https://ndi.tv/tools/>), can be used to control access to NDI source and output streams.



The tabbed Input pane allows you to the video sources for this channel and set its format. The Video Source information display identifies the specific input you have chosen to configure. The nearby Video Format menu allows you to match the input to the format of the incoming SMPTE 2110 video stream.

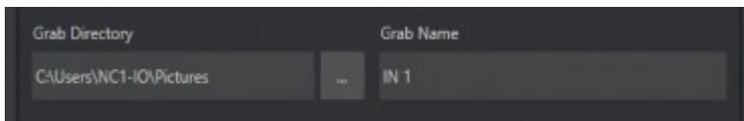
✔ **Tip:** Remember that the video standard selections shown in these menus is determined by the Frame Rate setting in the Administration panel's Genlock options – see Section 1.6.2.

⚠ **Note:** The Alpha Matte Source menu allows you to configure key/fill inputs, where the transparency and fill color information for a 32-bit NDI output with embedded alpha are supplied via two separate SMPTE 2110 inputs (the video format of both sources must match).

A Delay setting is provided for both audio and video sources, allowing precise A/V synchronization where a/v source timing differs.

Capture

This tab is also where you assign the path and filename for captured still images.



The initial Grab Directory is the default Pictures folder on the system, but you can choose to use a network storage volumes or external drive connected to one of the USB ports on your Viz 2110 I/O's rear panel instead.

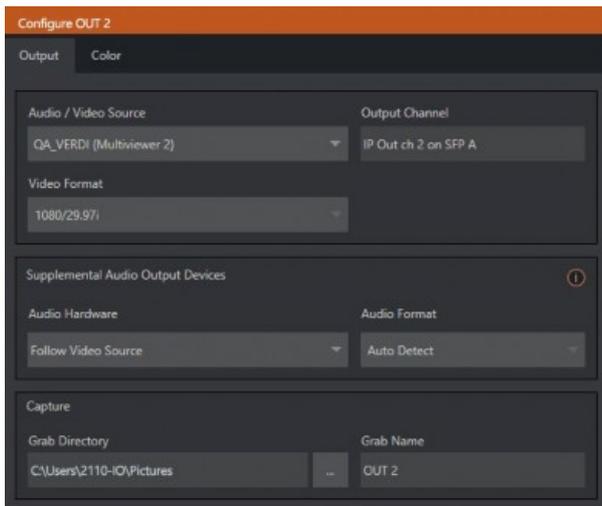
Audio Levels



Faders in the Audio Levels section of the **Configure Channel > Input** tab let you modulate the audio levels for up to eight audio channels incoming from SMPTE 2110. The VU meters above the faders are calibrated in dB FS (Full Scale). Click the **Speaker** icon above an audio channel to mute the associated audio stream.

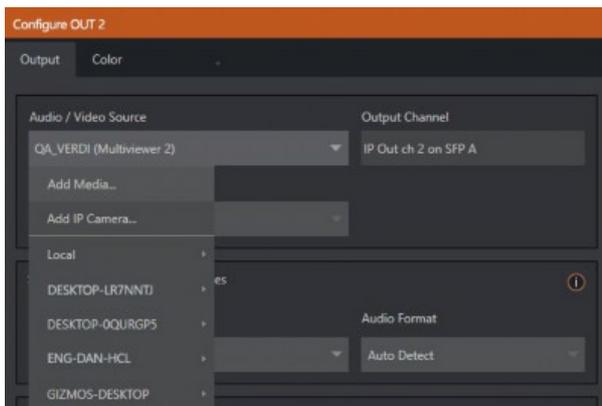
Output Tab

If you open the Configure Channel pane for an output, instead, there are settings related to output from the channel to SMPTE 2110.



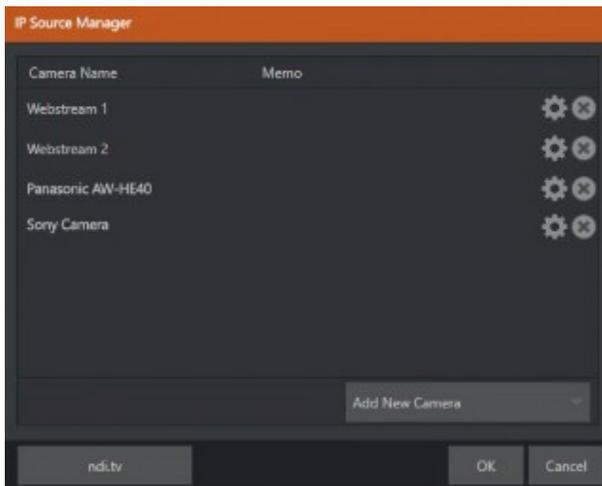
The first choice you will usually make is which audio/video source you wish to output as SMTPE 2110. Often, you use the Audio/Video Source menu to select an NDI A/V stream from your network, but there are other possibilities, too. Selecting a Video Format at right determines the video output format applied.

Clips and IP Sources



As mentioned in the previous section, NDI® sources (such as a PTZ camera with native NDI network video output) can be directly selected.

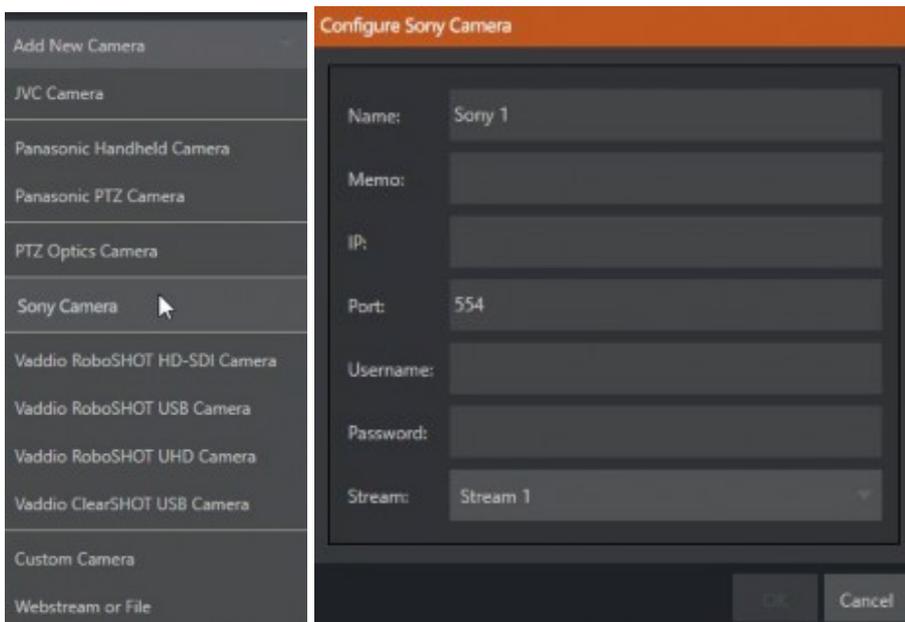
The Video Source drop down menu also contains an **Add Media** item to let you select a video file to play. The **Add IP Camera** menu item requires a little more explanation.



Clicking **Add IP Camera** opens the IP Source Manager. Adding entries to the list of sources shown in this panel causes corresponding listings to appear in the Local group shown in the Video Source menu of the Configure Channel panel (along with the SMTPE 2110 inputs from SFP A and B).

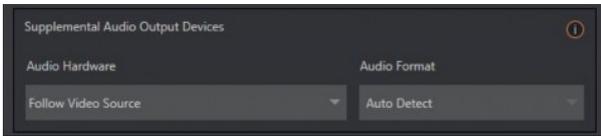
- To use, click the **Add New Camera** menu, select a source type from the dropdown list provided.

This opens a dialog suited to the particular source device you wish to add, such as one of the numerous supported PTZ camera brands and models.



Note: After adding an IP source, you must exit and restart the software for the new settings to be applied.

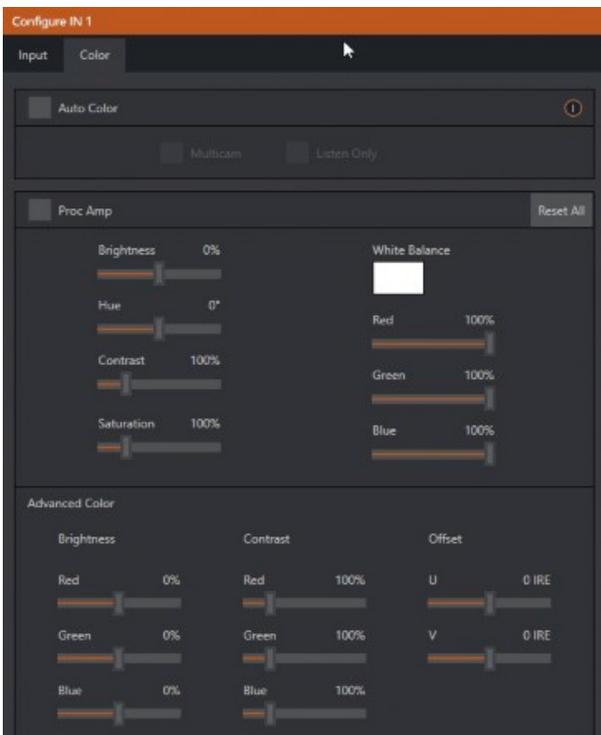
Supplemental Audio Device



The Supplemental Audio Device allows you to direct audio output to system sound devices as well as any supported third part audio devices you may connect (typically by USB). As required, Audio Format options are provided in a menu at right.

Color Tab

Both input and output channels provide a Color tab.



This panel provides an extensive set of tools for adjusting the color characteristics of each video channel.

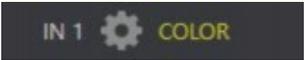
- Choosing Auto Color automatically adapts color balance as lighting conditions change over time.

Note: Proc Amp adjustments follow Auto Color processing.

By default, each camera with Auto Color enabled is processed by itself. Enable Multicam to process multiple cameras as a group.

- To apply Multicam to a source without its own colors being evaluated, check Listen Only.

Typically, you enable Listen Only for all Multicam group members except one to make that source the master color reference.

Note: Custom settings in the Color tab trigger a COLOR notification message that appears in the footer below the viewport of the channel .

3.2 Title Bar And Dashboard

Viz 2110 I/O's Title bar and Dashboard are home to a number of important displays, tools and controls. Prominently located at the top and bottom of the Desktop, the Dashboard occupies the full width of the screen.



The various elements presented in these two bars are listed below (starting from the left):

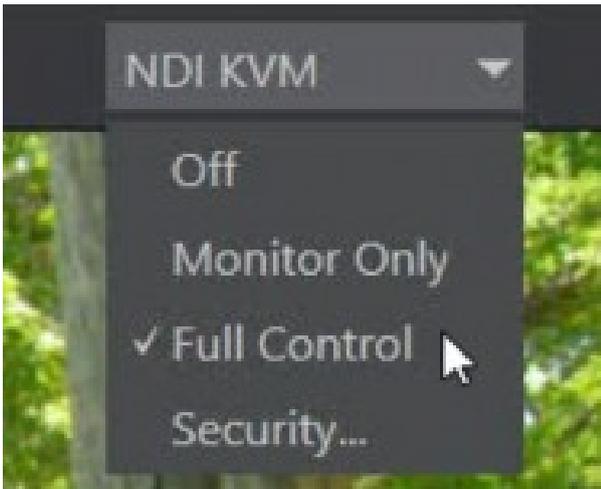
1. Machine name (the system network name supplies the prefix identifying NDI output channels)
2. [NDI KVM](#) menu: Options to control Viz 2110 I/O remotely via NDI connection
3. Time Display
4. Configuration
5. Notifications Panel
6. Minimize and Exit
7. [Headphones](#) Source and Volume
8. [Display](#)

Of these items, some are so important that they rate their own sections. Others are detailed in various sections of this guide.

3.2.1 Title Bar Tools

NDI KVM

Thanks to NDI®, it is no longer necessary to configure complicated hardware KVM installations to enjoy remote control over your Viz 2110 I/O system. The free NDI Studio Monitor application for brings network KVM connectivity to any Windows® system on the same network.



- To enable NDI KVM, use the title bar **NDI KVM** menu to select an operating mode, choosing between Monitor Only or Full Control (which passes mouse and keyboard operations to the remote system).
- The **Security** option lets you apply NDI Group control to limit who can view the NDI KVM output from the host system.
- To view the output from the remote system and control it, select your **Viz 2110 I/O IP system's Device Name]>User Interface** in the Studio Monitor application supplied with the free NDI Tool pack and enable the **KVM** button overlaid at upper-left when you move the mouse over the screen.

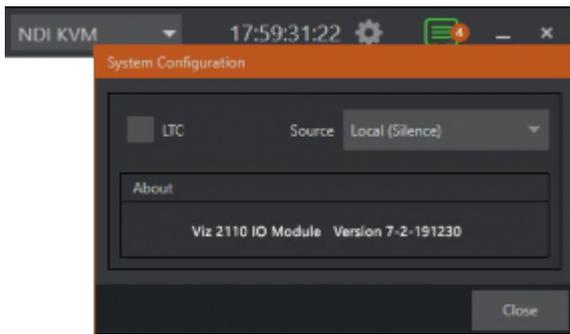
✓ **Tip:** Note that Studio Monitor's KVM toggle button can be relocated to a more convenient spot by dragging.

This feature gives you a great way to control the system around your studio or campus. With the User Interface running full screen in Studio Monitor on a receiving system, it's really hard to remember that you're actually controlling a remote system.

Even touch is supported, meaning you can run the User Interface output on a Microsoft Surface™ system for portable touch control over your entire live production system (many of the interface screengrabs shown in this manual, including those in this section, were grabbed from NDI Studio Monitor while controlling the remote system in the manner described above).

System Configuration

The System Configuration dialog is opened by clicking the 'gear' gadget next to the Title bar time display and appears.



LTC Timecode

LTC timecode support can be activated by choosing an input using the **LTC > Source** menu to choose almost any audio input to provide the timecode signal and enabling the checkbox at left.

About

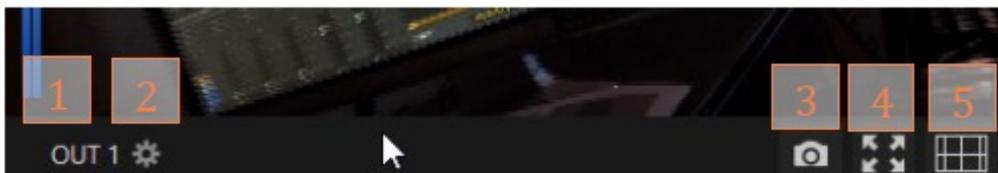
The **About** box displays the current software version and hardware revision of the unit.

Notifications

The Notifications panel opens when you click the text balloon gadget at right in the Title bar. This panel lists information messages the system provides, including any cautionary alerts.

✔ **Tip:** You can clear individual entries using by right-clicking to show the item's context menu, or the **Clear All** button in the panel's footer.

3.2.2 Viewport Tools



SDI I/O's channels each have a toolbar beneath their respective viewports. The various elements comprising the toolbar are listed below from left to right:

1. **Channel name:** Can be changed by clicking on the label, and also in the Configure Channel panel.
 - a. A Configuration gadget (gear) pops up next to the channel name when the mouse is over a viewport.
2. **Record and Record Time:** The record button below each viewport toggled recording that channel; the **RECORD** button in the bottom dashboard opens a widget enabling capture from any SDI input.
3. **Grab:** The base filename and path for still image grabs are set in the Configure Channel panel.
4. **Full screen**

5. Overlays

Grab



A Grab Input tool is located in the lower right corner below the monitor for each channel.

By default, still image files are stored in the system Pictures folder.

The path can be modified in the Output window for the channel (see the [Output](#) heading above).

Fullscreen

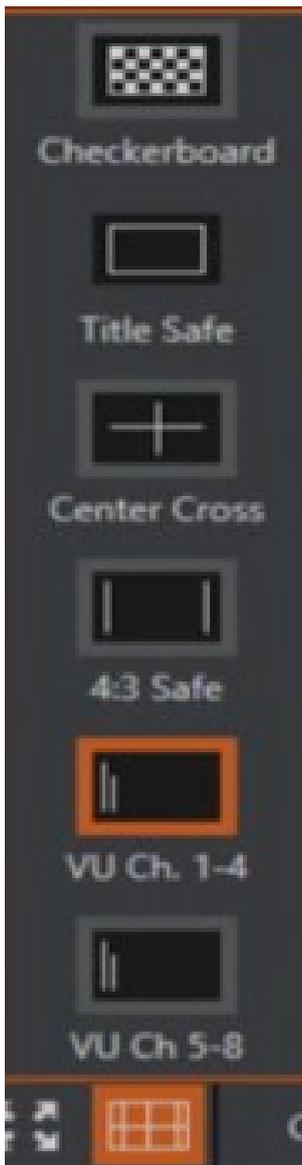


Clicking this button expands the video display for the selected channel to fill your monitor. Press **ESC** on your keyboard or click the mouse to return to the standard display.

Overlay



Found in the lower right corner of each channel, Overlays can be useful for visualizing safe zones, centering and more. To use an overlay, just click on an icon in the list. More than one overlay can be active at the same time.



3.2.3 Dashboard Tools

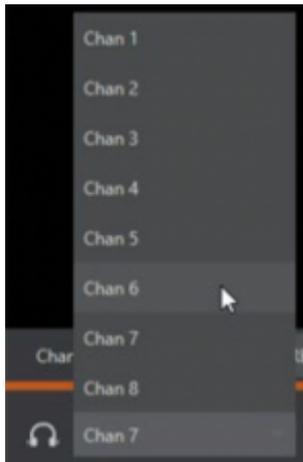
Audio (Headphones)

You can connect a headset to the (green) audio output jack on the rear of SDI I/O's motherboard.

Controls for Headphone audio are found in the lower-left corner of the dashboard at the bottom of the screen.



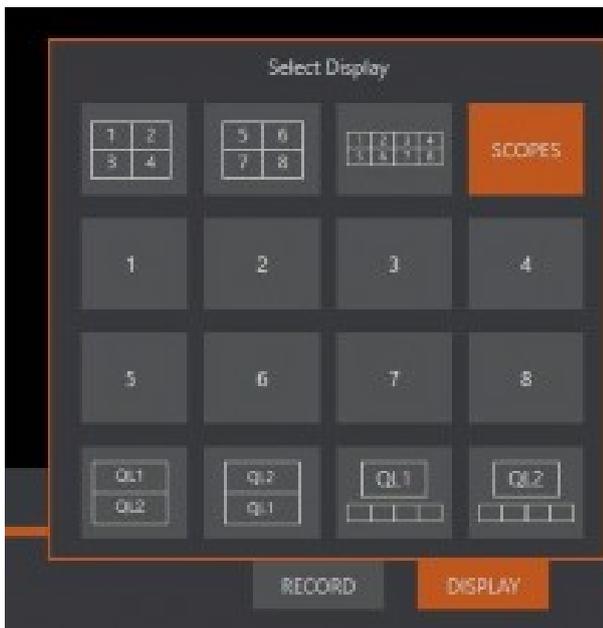
1. The audio source supplied to the Headphone jack can be selected using the menu next to the headphone icon.



- The Volume for the selected source can be adjusted moving the slider provided at right (double-click this control to reset it to the default 0dB value).

Display

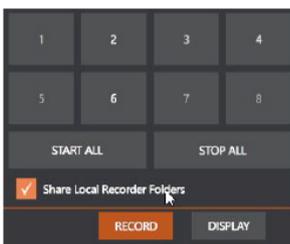
In the bottom-right corner of the Dashboard at the bottom of the (primary) screen, the **Display** widget offers a variety of layout options to let you viewing channels individually or in groups, as well letting you configure a second monitor.



Waveform and Vectorscope features are shown when you select the SCOPES option in the Display widget.



Record



The **Record** button is also located in the lower-right corner of the dashboard. Click it to open a widget allowing you to begin or stop recording of individual channels (or start/stop all recordings).

⚠ Note: The destinations for recorded clips, their base file names and other settings are controlled in the Configuration panel. Recording NDI sources is not supported. The Share Local Recorder Folders can be used to expose local folders assigned to capture duties on your network, making it easy to access captured files externally.

4 Appendices

- [NDI](#)
 - [Third Party Licenses](#)
-

4.1 NDI

Network Device Interface (NDI) technology is the world's most prolific video over IP protocol for live production. NDI allows systems and devices to identify and communicate with each other, and to encode, transmit, and receive high quality, low latency, frame-accurate video and audio over IP in real time.

NDI enabled devices and software have the potential to greatly enhance your video production pipeline, by making video input and output available anywhere your network runs. Vizrt systems and a growing number of third-party systems provide direct support for NDI, both for ingest and output.

Although Viz 2110 IO provides many other useful features, it is purposely designed primarily to turn SMPTE 2110 sources into NDI signals and vice versa.

- For more details on NDI, please visit <https://ndi.tv/about-ndi/>.
-

4.2 Third Party Licenses

This product uses a number of third-party software libraries under license. Related license requirements are defined in documentation installed on the product.

- To view these licenses, click the Additional Licenses link provided in the Help menu on the **Startup > Home** page shown upon launching the product.
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4.3 NDI

What is NDI?

In a nutshell, Network Device Interface (NDI) technology is the world's most prolific video over IP protocol for live production. NDI allows systems and devices to identify and communicate with each other, and to encode, transmit, and receive high quality, low latency, frame-accurate video and audio over IP in real time.

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