matrox ®

Matrox ConductIP

Installation and User Guide

Contents

CHAPTER 1

Introduction

This chapter includes the following topics:

- *About Matrox ConductIP*
- *Supported web browsers and operating systems*
- *About the Matrox ConductIP Media Routing Appliance*

About Matrox ConductIP

Transitioning your equipment installation to IP does not have to be expensive or complicated. With Matrox® ConductIP, you can discover, monitor, and route any AMWA NMOS-enabled SMPTE ST 2110 or IPMX-ready device or signal. ConductIP is available as a web server-based application packaged in a small-form factor appliance.

ConductIP gives you a real-time, comprehensive view of all media content on your IP network while allowing you to organize devices based on your unique setup. Designed to simplify content distribution in AV networks of any size, ConductIP enables you to manage video, audio, and ancillary data streams, whether they come from native IP devices or are converted from your existing broadcast and ProAV equipment.

For more information about Matrox ConductIP, go to our *website*.

Matrox ConductIP terminology

This section provides short definitions of some of the terms commonly used in this documentation and in the ConductIP user interface. Whenever possible, our terminology attempts to be consistent with the official NMOS (Networked Media Open Specifications) terminology:
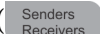
- **Devices:** These are physical devices on the network that are NMOS compliant, can be seen by ConductIP, and whose video/audio/ancillary data can be routed in the ConductIP user interface (e.g. Matrox ConvertIP devices).

  In ConductIP, devices are shown as rectangles (Devices).

- **Groups:** These are groups of senders or receivers. A natural group, as defined by NMOS, includes all three types of streams (audio/video/ancillary data). ConductIP allows you to go beyond this specification and create virtual groups containing the streams you choose.

  In ConductIP, groups are shown as rectangles with rounded corners (Groups).

- **Senders (Tx):** A sender is an NMOS resource that transmits a single video, audio, or ancillary data stream to a receiver. In the Matrox ConductIP user interface and documentation, the abbreviation "Tx" may be used depending on the context.

  In ConductIP, senders are shown as rectangles with two rounded corners (Senders Receivers).

- **Receivers (Rx):** A receiver is an NMOS resource that receives a single video, audio, or ancillary data stream from a sender. In the Matrox ConductIP user interface and documentation, the abbreviation "Rx" may be used depending on the context.

  In ConductIP, receivers are shown as rectangles with two rounded corners (Senders Receivers).

- **Streams/flows:** Streams or flows are audio/video/ancillary data that pass from senders to receivers. In the Matrox ConductIP documentation, either term may be used depending on the topic's context.

- **Rooms:** A ConductIP Administrator or Super operator creates rooms for operators. A room contains the groups, and optionally devices as well, that ConductIP users are allowed to route.
- **Panels:** These are where you connect the flows between senders and receivers.

Matrox ConductIP roles

There are three different types of ConductIP users:

Administrators: As a ConductIP Administrator, you have full rights and permissions over all aspects of the ConductIP.

Super operators: As a Super operator, you have the same rights that an Administrator has regarding Room and Panel management, but you do not have access to advanced configuration options such as registry or certificate configuration, user management, licensing, updating, etc.

Operators: As an operator, you can see the available Rooms and Panels and make the required sender/receiver connections in the Panels page.

Matrox ConductIP user documentation

The Matrox ConductIP user documentation consists of the following:

Matrox ConductIP Device Setup sheet: This is a printed quick start sheet included with your ConductIP MRA (Media Routing Appliance). It describes the hardware connections and basic setup required to create an Administrator account and get you logged in to the ConductIP. This document is also available on our *website*.

Matrox ConductIP Installation and User Guide: This is the main documentation for the ConductIP and is accessible from the ConductIP user interface at any time. Please note that the version of the user guide included with the ConductIP software is only current at the time of the official release. The most up-to-date version of the user guide can always be found on our *website*.

Tooltips: In addition to the traditional documentation, the ConductIP user interface includes tooltips that provide immediate contextual information on various commands and settings. Mouse over most buttons in ConductIP for a short description of their function.

Supported web browsers and operating systems

Supported web browsers

Matrox ConductIP currently supports Google Chrome only (on Windows and macOS).

Other web browsers may work but have not been fully validated by Matrox.

Supported operating systems

Although Matrox ConductIP is a web-based application, there are certain requirements that are specific to the operating system, such as importing a new license or updating the ConductIP.

Matrox ConductIP currently supports Microsoft Windows 10 only. Other operating systems and Windows versions may work but have not been fully validated by Matrox.

About the Matrox ConductIP Media Routing Appliance

The Matrox ConductIP MRA (Media Routing Appliance) is a small form factor appliance that you connect to your network and then log in to using your web browser. If needed, you can also connect to it locally using a keyboard, mouse, and monitor for troubleshooting or debugging purposes (see *Logging in locally to the ConductIP MRA*).

ConductIP MRA (front view)

ConductIP MRA (rear view)
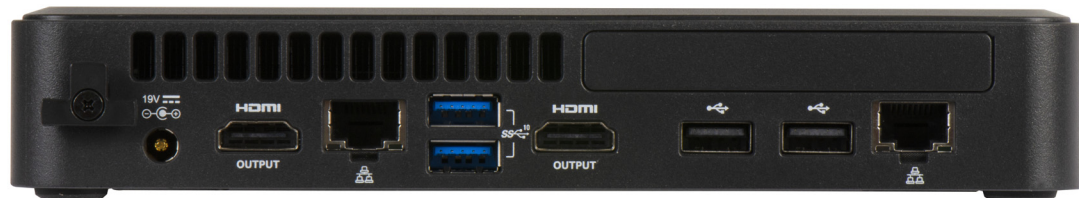
Where to find more information

Matrox ConductIP MRA Device Setup: The setup sheet that is included in the box with your ConductIP MRA device provides all the information needed to get started with connecting it to your network and setting it up. The setup sheet is also available on the Matrox *website*.

Rackmount kit: If you want to secure the Matrox ConductIP MRA to a rack, please contact Matrox technical support for more information.

CHAPTER 2

Getting started with Matrox ConductIP

This chapter includes the following topics:

- *Initial setup overview*
- *Configuring your network and security*
- *Finding Matrox ConductIP on your network*
- *Logging in to Matrox ConductIP*
- *Activating your ConductIP license*
- *Connecting to an NMOS registry server*
- *Managing ConductIP certificates*
- *Updating Matrox ConductIP*
- *Creating user accounts*

Initial setup overview

The following list is an overview of the tasks you'll need to perform to get started with Matrox ConductIP. When needed, links to other topics are provided for more information.

Although this list is shown as a series of steps, you do not necessarily need to do all these tasks in the order described. For example, you could update your ConductIP before updating the security certificate and it would not impact your setup process. With other tasks, the order matters; such as connecting your hardware before logging in to the ConductIP software.

To get started with Matrox ConductIP:

Step 1. **Verify your network:** Make sure your NMOS devices (such as your Matrox ConvertIP devices) are connected to your network.

Step 2. **Connect the Matrox ConductIP MRA to your network:** Matrox ConductIP is installed on a small form factor Media Routing Appliance (the ConductIP MRA) that you must connect to your network. When it is connected to your network, you can log in to it from your web browser, or you can physically connect to it using a monitor, keyboard, and mouse.

More info: This process is described in the *Matrox ConductIP MRA Device Setup* sheet that is included in the box with your device. You can also download it from the Matrox *website*.

Step 3. **Create an Administrator account:** When ConductIP is connected to your network, it will boot in DHCP and broadcast in mDNS, so you can connect to it by going to *https://conductip* or by using the IP address. When you first log in to ConductIP, you will need to create the initial Administrator account.

More info: This process is described in the *Matrox ConductIP MRA Device Setup* sheet that is included in the box with your device. You can also download it from the Matrox *website*.

Step 4. **Verify your date and time settings:** If you have not already done so in the basic setup when connected locally to the ConductIP MRA, you must verify the date and time settings now. Specify whether ConductIP uses an NTP time server (recommended), or set the time and date manually. If your date and time settings are not correct, you will not be able to activate your trial or full license.

More info: Management tools

Step 5. **Review network and security best practices:** There are several best practices you should follow when setting up your ConductIP.

More info: Configuring your network and security

Step 6. **Activate your license:** Whether you already have a full license for ConductIP or want to activate the trial license, you will need them activated in ConductIP to begin using the software.

More info: Activating your ConductIP license

Step 7. **Update security certificate:** When you log in to ConductIP, you typically receive a warning that the security certificate is not valid. You can ignore this

warning each time you log in, but it is better to update your computer certificate store to verify the ConductIP user interface and remove the warning.

More info: Managing ConductIP certificates

Step 8. **Specify your NMOS registry:** You need to specify which NMOS registry server ConductIP will use, as well as any redundancy servers if applicable. You can use ConductIP's internal registry server, or you may already have one available.

More info: Connecting to an NMOS registry server

Step 9. **Update Matrox ConductIP:** There may be a more recent firmware version available for your ConductIP from the Matrox website. It is recommended to always use the latest version. Ignore this step if you already have the latest version of ConductIP.

More info: Updating Matrox ConductIP

Step 10. **Confirm that your devices appear:** Whenever you log in to ConductIP, the available NMOS devices on your network will automatically appear in the device bin. If no devices appear, there may be a network issue that is interfering with ConductIP's scanning.

Step 11. **Create users:** As an Administrator, you will need to create user accounts for the ConductIP. You can create other Administrators, Super operators, and Operators. Each user type has specific permissions.

More info:

o *Matrox ConductIP roles*

o *Creating user accounts*

Step 12. **Create and configure your Rooms:** By default, a single Room is created for you when you first start with ConductIP. At minimum, you will need to rename and configure that room for your specific workflow. Depending on your needs, you may need to create more rooms for your users.

More info:

o *About the Matrox ConductIP User Interface*

o *Creating rooms*

o *Adding groups and devices to rooms*

Step 13. **(Optional) Create your Panels:** The Panels page is where you make the connections between devices and set up your streaming workflow. This step is optional because ConductIP automatically creates a panel every time you create a room. However, you can create other panels when needed or change the names of your panels to customize your workspace.

More info:

o *About the Matrox ConductIP User Interface*

o *Creating panels*

o *Connecting senders and receivers*

Step 14. **Export your database:** After you have configured your ConductIP, it is highly recommended that you export your database (i.e. back it up) so that you can

easily re-configure your settings in the event an unexpected issue occurs. This can also help you configure other ConductIP setups if they are similar.

More info: Management tools

Result of this task: You are ready to use ConductIP. Any remaining tasks, such as customizing your workspace, can be done at your convenience.

Configuring your network and security

When you connect ConductIP to your network, it is recommended to follow these best practices to maintain optimal security:

- Make sure the ConductIP MRA is in a secure area that cannot be easily accessed by unauthorized personnel.
- If possible, install and use your own security certificate instead of the standard ConductIP certificate.
- Protect the ConductIP MRA BIOS with a secure password.
- If you want to use DNS-SD to detect the ConductIP registry, it must be added to the table of the DNS-SD server. The table entry must expose the service name "_nmos-register._tcp".

Finding Matrox ConductIP on your network

When Matrox ConductIP is connected to your network, it will boot up in DHCP mode and broadcast itself in mDNS (multicast DNS). This means that you can connect to it by going to *https://conductip*, or by using the IP address. The mDNS capability ensures that the domain name is recognized.

If the mDNS address system does not work (e.g. if your computer does not have *Bonjour* or *Avahi* installed), you can always use the IP address to connect to ConductIP.

You can find the IP address as follows:

- **Connect an HDMI monitor:** If an HDMI monitor is connected to the ConductIP hardware when you turn it on, the IP address will be displayed on the monitor. This is the simplest way to find the IP address if you have a monitor available and have access to the ConductIP MRA.
- **Use Matrox ConvertIP Manager:** The *Matrox ConvertIP Manager* utility that is offered with the Matrox ConvertIP devices allows you to find any ConvertIP device on the network, as well as the ConductIP MRA.

When you know the IP address of your ConductIP, you can bookmark it in your web browser for easier and quicker access.

Logging in to Matrox ConductIP

You can log in to ConductIP remotely from your web browser, or locally using a keyboard, mouse, and monitor connected to the ConductIP MRA.

Logging in to ConductIP remotely

To access the ConductIP user interface from a web browser:

Step 1.   Open your web browser (Google Chrome is recommended).

Step 2.   Do one of the following:

    ○   Go to the IP address of your ConductIP MRA (e.g. https://192.168.123.456). If you don't know the IP address, see *Finding Matrox ConductIP on your network*.

    ○   Go to *https://conductip*. If your computer is set up to use mDNS, this will take you to the ConductIP login page.

Step 3.   Log in to the ConductIP with your username and password.

More info: If this is the first time you are logging in to this ConductIP, you will instead be prompted to create an Administrator account so you can continue with initial setup. This process is described in the *Matrox ConductIP MRA Setup* sheet included with your ConductIP MRA, or you can download the setup sheet from our *website*.

Result of this task: You are logged in to the ConductIP and you should see your Rooms and available devices.

Logging in locally to the ConductIP MRA

You can log in to the ConductIP MRA by connecting a monitor, keyboard, and mouse to the device and booting it up. Logging in locally is typically used for the following:

- Creating the Administrator account as part of the initial setup process. Although this is usually done by remote login, you have the option of doing it by logging in locally. For more information on this, see the *Matrox ConductIP MRA Setup* sheet included with your device, or download it from our *website*.

- Accessing the Recovery Tools for troubleshooting or technical support purposes.

- Finding the IP address of the ConductIP MRA. When the log in page appears, the IP address is shown on the bottom left of the screen.

To log in to the ConductIP MRA:
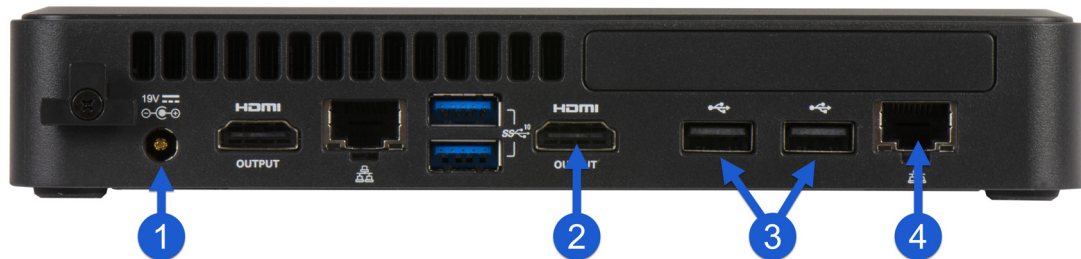
Step 1. Connect your power cable to the ConductIP MRA.

Step 2. Connect an HDMI monitor to the HDMI port.

Step 3. Connect a keyboard and mouse to any of the USB ports. The ports indicated may be the most accessible.

Step 4. Connect the ConductIP MRA to your network via the LAN port.

Step 5. Press the power button (⏻) on the front of the ConductIP MRA to turn it on.

When the ConductIP boots up you will see the initial splash screen. After a few seconds the **ConductIP Boot Menu** will appear.
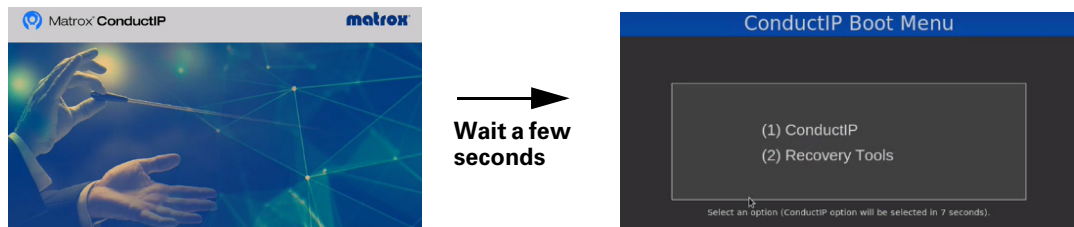
Step 6. Select **ConductIP** to access the ConductIP user interface, or select **Recovery Tools** to access the options required for technical support purposes.

Result of this task: You are logged in to the ConductIP locally on the MRA.

Activating your ConductIP license

Activating your Matrox ConductIP license requires that you download a system token from the ConductIP **Licenses** page, and use that token to get a license file (*.lic*) from the Matrox.

Step 1.   Go to **Settings > Application > Licenses**.

Step 2.   Click **Download system token** and save the file to your computer.

More info: Contact your Matrox reseller and specify the number of video ports and number of years you require for your license. Your reseller will use your system token to obtain the corresponding license file (*.lic*) you'll need to activate your license in ConductIP.

Step 3.   When you have your license file, go to **Settings > Application > Licenses**, click **Install license**, then select the license file you received.

Step 4.   Click **OK** to install the new license.

Result of this task: Your Matrox ConductIP license has been activated.

Connecting to an NMOS registry server

Matrox ConductIP has an internal NMOS registry server that is enabled by default, but you can choose to use any NMOS registry server available on your network. For more information on the settings described in this section, go to *NMOS registry*.

Configuring the ConductIP NMOS registry

If you want to use the ConductIP internal NMOS registry, you must configure the following settings. For more information on any of these settings, see *NMOS registry*.

To configure the ConductIP NMOS registry:

Step 1. Go to **Settings > NMOS registry > Registry configuration**.

Step 2. Enable the **Matrox ConductIP registry**.

More info: If you disable the ConductIP registry, the remaining settings on this page will become unavailable.

Step 3. Make sure **MDNS advertisement** is enabled.

Step 4. Select the **Protocol** for the ConductIP registry (http or https).

More info: If you select https, you may need to configure your server certificates accordingly (see *Managing ConductIP certificates*).

Step 5. Select the **Priority** for the ConductIP registry.

More info: If you have several NMOS registry servers on your network (e.g. for redundancy), specify what priority the ConductIP NMOS registry has in relation to the other servers.

Step 6. Click **Apply**.

Result of this task: The ConductIP NMOS registry has been configured.

When done, remember: Make sure **Select the internal registry** is selected in **Settings > NMOS registry > Registry selection** or the ConductIP NMOS registry will not work even if you enabled it above (see *Selecting an NMOS registry*).

Selecting an NMOS registry

Whether you want to use the ConductIP NMOS registry or any other NMOS registry, you must specify which registry you want ConductIP to use. For more information on any of these settings, see *NMOS registry*.

To select an NMOS registry:

Step 1.   Go to **Settings** > **NMOS registry** > **Registry selection**.

Step 2.   There are three options for registry selection:

    a. To use the ConductIP NMOS registry, click **Select the internal registry** and configure the settings described in *Configuring the ConductIP NMOS registry*.

    b. To use a specific NMOS registry on your network, click **Manually select the registry** and configure the corresponding settings. For more information on the settings, see *NMOS registry*.

    c. To allow ConductIP to automatically select from available NMOS registries on the network, click **Automatically select the registry** and enter your search domain name. NMOS registries with DNS-SD advertisement will be prioritized before mDNS advertisement, with advertised priority (such as what you would select for the ConductIP NMOS registry) coming after that.

Step 3.   Click **Apply**.

Result of this task: You have selected the NMOS registry that ConductIP will use.

When done, remember: If an NMOS registry uses the https protocol, you may need to configure your server certificates accordingly (see *Managing ConductIP certificates*).

Managing ConductIP certificates

The Matrox ConductIP has a self-signed root certificate (root CA) that you can use to verify the secure connection between the ConductIP user interface and your client machine. If you don't want to use the default certificate, you have the option to specify a different one.

Downloading the root certificate

When you first log in to the ConductIP user interface, your browser will not recognize the ConductIP root certificate and display a security warning. You will need to accept the warning to continue. By downloading the root certificate and installing it in your browser, that security warning will no longer be displayed, as you have designated the ConductIP as a trusted secure connection.

For more information on any of these settings, go to *Security*.

To download the root certificate:

Step 1. Log in to ConductIP (see *Logging in to Matrox ConductIP*).

Step 2. Go to **Settings > Security > Server certificate**.

Step 3. Click **Download RootCA** and save the file to your computer.

Step 4. Install the root certificate in your web browser.

Step 5. Close your web browser.

Step 6. Re-open your web browser and log in to the ConductIP user interface.

Result of this task: The security warning is not displayed when you log in to ConductIP.

Specifying a different certificate

If you don't want to use the ConductIP root certificate, you can upload a different one that ConductIP will use.

For more information on any of these settings, go to *Security*.

To specify a server certificate:

Step 1. Log in to ConductIP (see *Logging in to Matrox ConductIP*).

Step 2. Go to **Settings > Security > Server certificate**.

Step 3. Click **Specify server certificate** and follow the on-screen instructions.

More info: If your certificate includes an embedded private key, ConductIP will detect it and you can skip that step.

Step 4. After you have uploaded the certificate and the ConductIP has rebooted, click **Download RootCA** to use the certificate (see *Downloading the root certificate*).

Result of this task: ConductIP is now using your specified certificate as the root certificate.

Adding trusted certificates

ConductIP connects to NMOS devices on a network in non-encrypted http protocol. However, if you have an NMOS device (e.g. an NMOS secure registry) that is using https protocol, you may need a trusted security certificate to allow the connection. You can add the certificate to ConductIP.

For more information on any of these settings, go to *Security*.

To add a trusted certificate to ConductIP:

Step 1. Log in to ConductIP (see *Logging in to Matrox ConductIP*).

Step 2. Go to **Settings > Security > Trusted certificates**.

Step 3. Click **Add certificate** and select the certificate file to upload.

Your certificate will appear in the list of certificates.

Step 4. (Optional) If you want ConductIP to ignore specific IP addresses or hostnames, you can add them to the **Exceptions** list.

Example: If your certificate has expired and you do not want to renew it, add the device's IP address or hostname to this list and ConductIP will not verify the certificate for that device.

Step 5. (Optional) If you do not want ConductIP to verify any certificates on the network, click **Disable certificate checking**.

Example: If your secure NMOS registry has an expired certificate, you can temporarily disable certificate checking so you can continue working while resolving the issue.

Result of this task: You have added your trusted certificate(s) to ConductIP.

Updating Matrox ConductIP

Software updates will be made available on our website. We recommend that you visit the site periodically to check for new software versions.

To update your Matrox ConductIP:

Step 1. Download the latest update from our *website*.

Step 2. Log in to your ConductIP (see *Logging in to Matrox ConductIP*).

Step 3. Go to **Settings > Application > Software update**.

Step 4. Click **Update** and follow the on-screen instructions. Do not refresh or close the page while an update is in progress.

More info: The ConductIP MRA will reboot to complete the update.

Result of this task: The Matrox ConductIP has been updated.

Creating user accounts

As a Matrox ConductIP Administrator, it is up to you to create the required ConductIP Super operator and Operator user accounts. Each role has specific permissions and responsibilities. For more information on what each type of user can do in ConductIP, see *Matrox ConductIP roles*.

To create a new user:

Step 1. Go to the ConductIP *User management* settings.

Step 2. If you have access to an LDAP (Lightweight Directory Access Protocol) server, follow the steps below. If you are creating users manually, go to *Step 3.*

a. Go to the *User management* settings.

b. If you know the user domain enter the information required, or scan for LDAP servers on the network and select **Use detected LDAP servers** for ConductIP to use them. The additional LDAP servers are listed.

c. Click **Apply**.

Step 3. Go to the *Users* settings.

More info: If this is the first time you are creating ConductIP users, your Administrator account (created at initial log in) will be the only account listed in the table. Otherwise, all the users with access to the ConductIP should be listed.

Step 4. Click **Add user.**

The **Create a new user** window opens.

a. Enter the user's personal information.

b. Select the user's ConductIP **Role**.

c. Select the **LDAP** or **LOCAL** authentication method. If you select **LDAP**, enter the username that corresponds to the user's LDAP server (the LDAP server verifies the password). If you select **LOCAL**, provide a password for your new user.

d. Click **Ok**.

Step 5. Verify that your new user is on the list.

Result of this task: Your new user is created and has the credentials associated to their role.

When done, remember: With your users created, from this list you can quickly activate/deactivate their accounts, edit their information, change their passwords, or delete them.

CHAPTER 3

Using Matrox ConductIP

This chapter includes the following topics:

- *About the Matrox ConductIP User Interface*
- *Creating rooms*
- *Adding groups and devices to rooms*
- *Creating panels*
- *Connecting senders and receivers*

About the Matrox ConductIP User Interface

You control and configure the Matrox ConductIP via a web-based user interface that you access through a web browser.

Here are some quick concepts to understand about the user interface:

- The user interface is split into two main work areas: **Rooms** (see *About Rooms*) and **Panels** (see *About Panels*).
- There are three types of users for ConductIP: *Administrators*, *Super operators*, and *Operators*. Each type of user has different responsibilities and tasks which will be discussed in later sections.
- As a browser-based user interface, ConductIP can be used on many different operating systems and devices (e.g. Windows, macOS, iOS, Android, etc). However, there are certain requirements that you should be aware of before you begin using ConductIP (see *Supported web browsers and operating systems*).

About Rooms

Matrox ConductIP uses the concept of a "room" to show the senders and receivers that can be manipulated by users. Administrators and Super operators can create, edit, and delete rooms, and populate those rooms with devices and groups of senders and receivers.

ConductIP rooms do not necessarily represent physical places in the real world. They are simply a way of grouping senders and receivers together for an operator. A room's devices and groups of senders and receivers can literally be in the same room (such as a server room), or they could be miles apart in completely different locations.

For example, to illustrate how this concept works, here is a **Rooms** page called *John's room* that contains a variety of devices and groups:

Image A. John's Rooms page
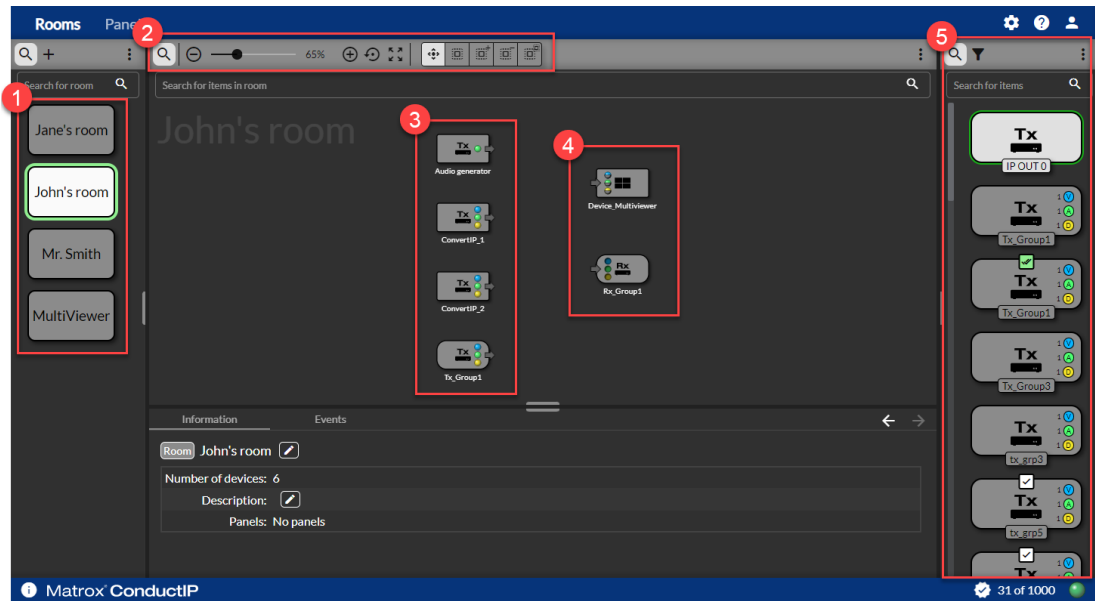
1. These are the rooms that Administrators or Super operators have created for this ConductIP. Although all the rooms are visible, for the purposes of this example, we will assume that John will only manipulate his own room and the resources in it.

2. These options allow you to change the view of the items in the room (e.g. zoom, scale to fit, etc), and to change the behavior of your mouse when selecting items (e.g. grab, select all, etc).

3. These are the senders available to John. There are three (3) sender devices (*Audio generator*, *ConvertIP_1*, *ConvertIP_2*), and one (1) sender group (*Tx_Group1*).

4. These are the receivers available to John. There is one (1) receiver device (*Device_Multiviewer*) and one (1) receiver group (*Rx_Group1*).

5. This is the device bin. All the devices and sender/receiver groups that are visible on the network are shown here. Administrators and Super operators can drag and drop the ones they want to include in John's room.

John's room is essentially a visual representation of John's ConductIP workspace. He can quickly see which senders and receivers are connected and if the connections are working (no connections have been made yet from the **Panels** page).

Now that John's room has been set up by the Administrator or Super operator, some of the things he can do in the room are:

- Search for and view the details of other rooms. For example, John can see what's happening in Jane's room.
- Search for and view the devices and sender/receiver groups on the network. From the device bin, John can see all the network NMOS resources visible to the ConductIP. He does not have permission to add them to his room but he can see them.
- View the connection status of the senders and receivers in his room. This is the main function of the **Rooms** page.
- Arrange the senders and receivers as needed for a better visual representation of the actual workspace. For example, in the image of *John's Rooms page* above, senders are

positioned on the left and the receivers on the right. John can re-arrange these as desired.

- The bottom half of the **Rooms** page consists of the status window, where John can view information about the room, the items in the room, and the events that have occurred. John can open and close this status window as needed. Administrators and Super operators can edit properties in the information window.

John is now ready to make the needed connections in the **Panels** page (see *About Panels*).

About Panels

The Matrox ConductIP **Panels** page is where you make the connections between your senders and receivers. You can think of this as a virtual switchboard that allows connections between any available senders and receivers (devices, groups, or individual senders/receivers).

Before you can make connections from the **Panels** page, you must have a room created and populated with senders and receivers (see *About Rooms*). After the Administrator or Super operator has created and populated the room, you have several different ways to connect senders and receivers (see *Connecting senders and receivers*).

To continue with the example of John's room from the *About Rooms* topic, this is the **Panels** page that John sees, based on the room that was created for him.

Image B. John's Panels page (Side-by-side mode)
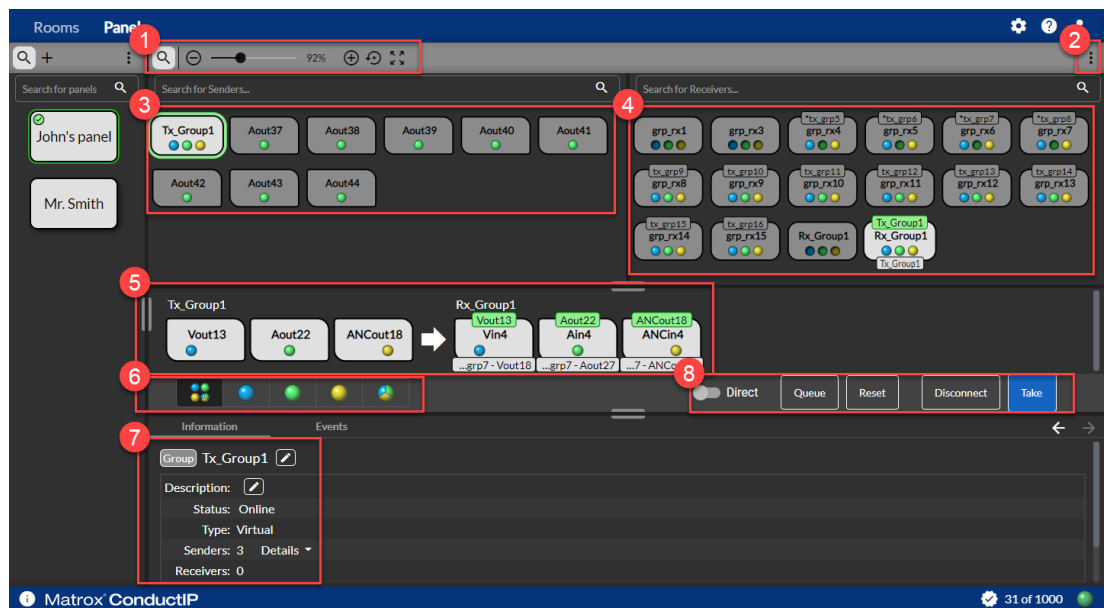
1. John can search for senders and receivers, and adjust the view of the page (e.g. zoom in/out, scale to fit, etc).
2. John can modify how he sees the senders and receivers:
   a) John can view senders and receivers in **Matrix mode** or **Side-by-side mode**. Depending on the number of senders and receivers available, one mode may be easier than another to help visualize and make the connections (see *Connecting*

senders and receivers). In this example, John is using **Side-by-side mode**, but he can switch between modes at any time as needed.

    b) John can select **Group by devices** to show which senders and receivers are part of the same device(s). As with the viewing modes, grouping senders and receivers by device might make it easier to make the connections between them (see *Connecting senders and receivers*).

3. John's available senders (*Tx_Group1* is selected).

4. John's available receivers (*Rx_Group1* is selected).

5. The subpanel is where the connections between senders and receivers are made. In this subpanel, *Tx_Group1* will be connected to *Rx_Group1*. For more information on connections, see *Connecting senders and receivers*.

6. Filters the senders/receivers by type of flow:

    – () Shows senders/receivers with all flows.

    – () Shows senders/receivers with Video only.

    – () Shows senders/receivers with Audio only.

    – () Shows senders/receivers with Data only (ancillary data).

    – () Shows senders/receivers with video, audio, and ancillary data mixed together in a single flow.

7. The information and events panel lets John see the status of whatever he clicks on in the main page (e.g. room, device, group, etc), and any events that have occurred (e.g. deleted rooms, lost connections, etc).

8. This is the connection toolbar. When John selects his senders and receivers, this is where he makes the connections (i.e. he "takes" the sender data he wants). For more information on connections, see *Connecting senders and receivers*.

Creating rooms

Matrox ConductIP Administrators and/or Super operators must create rooms for their Operators. A single room is available by default when you initially start Matrox ConductIP. A room contains the individual senders and receivers, or groups of senders and receivers, that users can route in the **Panels** page (see *Connecting senders and receivers*).

For more information about ConductIP **Rooms** and how they are used, see *About Rooms*.

To create a room:

Step 1. Go to the ConductIP **Rooms** page.

Step 2. Click the **Create room** button (+).

Step 3. In the **Create room** window, enter the information for the room.

Step 4. Click **Ok**.

Result of this task: Your new room is created and will appear in the list of rooms.

Additional room options

From the ConductIP **Rooms** page, click on a room and then click (⋮) directly above the Rooms list for more room management options.

- **Edit** (✏): Administrators and Super operators can edit the selected room's name and/or description.

- **Delete** (🗑): Administrators and Super operators can delete the selected room.

- **Duplicate** (🗔): Administrators and Super operators can quickly create a new room with the same senders and receivers in it (i.e. clone a room).

Adding groups and devices to rooms

After creating a room, Administrators and Super operators must add sender and receiver groups and devices to the room so that Operators can perform their routing tasks. The sender/receiver groups and devices are available from the device bin.

To add a sender or receiver to the room:

Step 1.   Go to the ConductIP **Rooms** page.

More info: The device bin on the right side of the page contains all the senders and receivers that ConductIP can see on the network via the NMOS registry.

Step 2.   From the device bin toolbar, search for items (🔍), filter for items (▼), or see other options (⋮) to help you find the senders and receivers you want. You can also edit the device properties.

Step 3.   Drag and drop items from the device bin onto the main rooms page to make them available for your Operators.

Step 4.   Repeat for all the senders and receivers you need.

Result of this task: The room is ready for your Operators.

Creating panels

Matrox ConductIP automatically creates a panel each time a room is created, but Administrators and/or Super operators may need to create additional panels for their Operators. A panel is where the connections between the senders and receivers are made.

For more information about ConductIP **Panels** and how they are used, see *About Panels*.
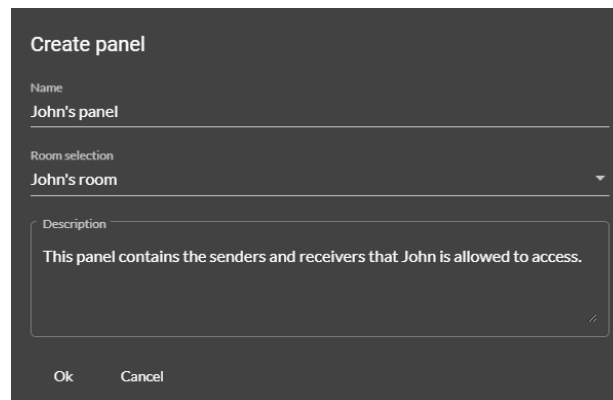
To create a panel:

Step 1.   Go to the ConductIP **Panels** page.

Step 2.   Click the **Create panel** button (**+**).

Step 3.   In the **Create panel** window, enter the information for the panel and specify which room it is associated to (e.g. create "John's panel" and associate it to "John's room").

Step 4.   Click **Ok**.

Result of this task: Your new panel is created and the senders and receivers in the room associated to it will appear.

Additional panel options

From the ConductIP **Panels** page, click on a panel and then click (⋮) directly above the Panels list for more panel management options.

- **Group by rooms:** You can associate rooms to more than one panel. Grouping them by rooms will help you visualize which rooms are associated to which panels.

- **Edit** (✏): Administrators and Super operators can edit the selected panel's name and/ or description.

- **Delete** (🗑): Administrators and Super operators can delete the selected panel.
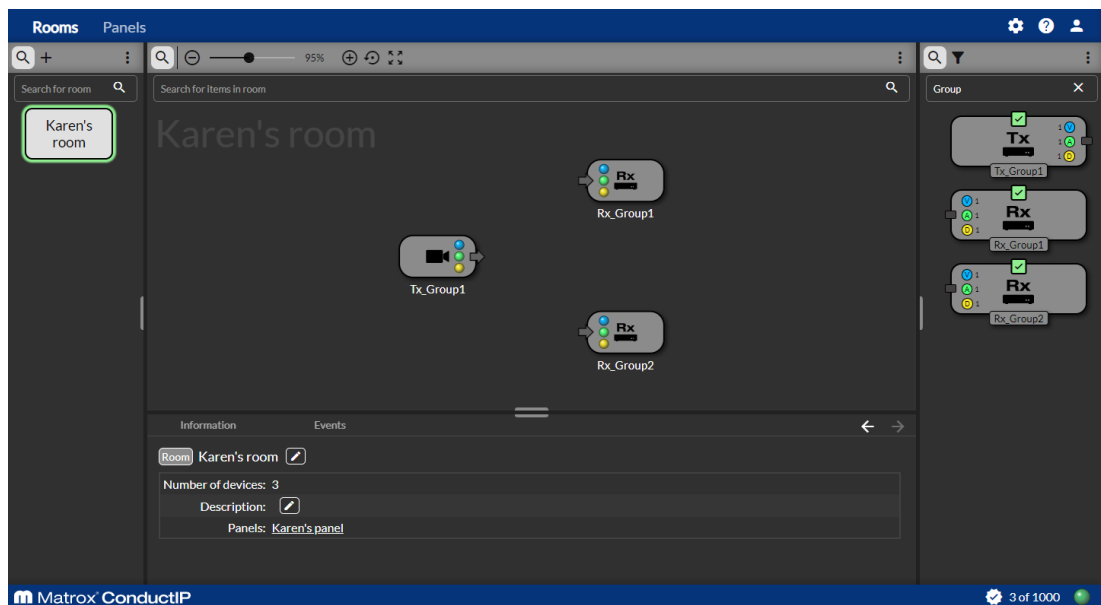
Connecting senders and receivers

The senders and receivers in your **Rooms** must be connected to each other from the **Panels** page for the streaming flows to function.

Although your real-world setup will likely be more complex than what is shown here, this simplified example will help you understand the connection process. After you understand how it works, you can connect as many senders to as many receivers as needed.

In this example, the ConductIP Administrator has created a room called *Karen's room* with one sender group and two receiver groups. Two receiver groups are being used to show the optional queuing feature.

Image C. Karen's room

With Karen's room already created by the Administrator or Super operator, connect your senders and receivers as follows:

Step 1.   Go to the ConductIP **Panels** page. Karen's panel appears in **Matrix mode** or in **Side-by-side mode**.

More info: Both views are shown below, but this procedure will continue to describe the steps using **Matrix mode**. You can switch between modes at any time as needed.

Image D. Karen's panel in Matrix mode
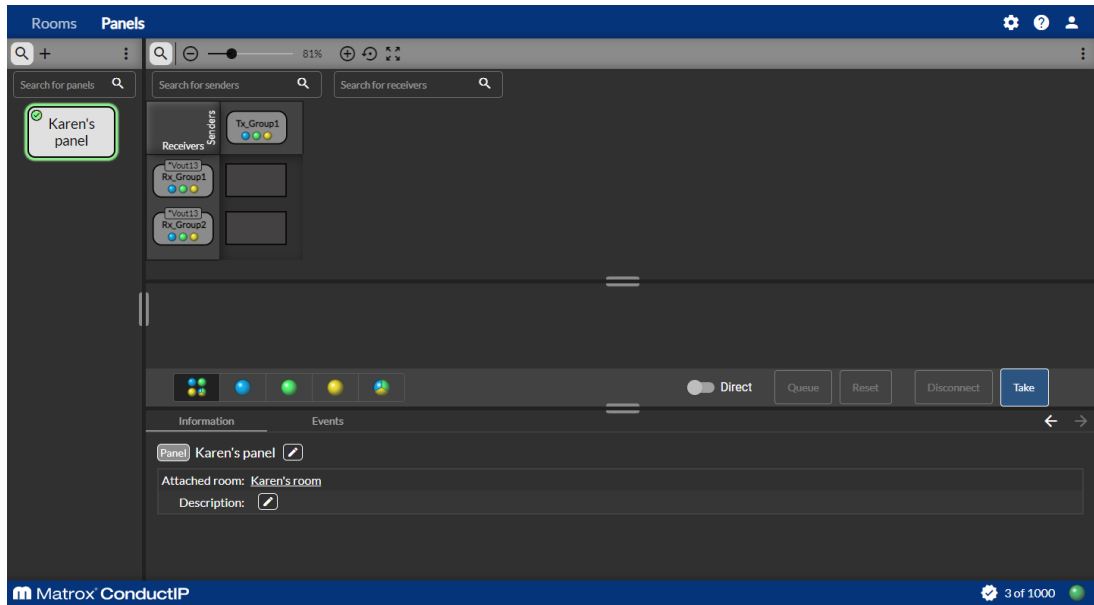
Image E. Karen's panel in Side-by-side mode
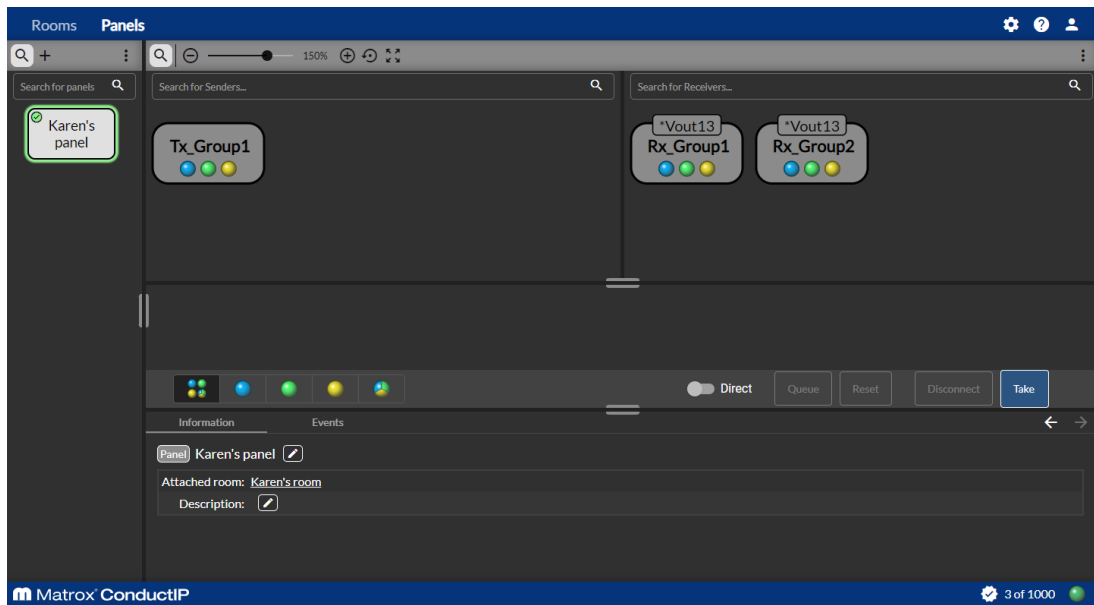
Step 2. In **Matrix mode**, click the crosspoint (i.e. the rectangle that corresponds to the intersection) of *Tx_Group1* and *Rx_Group1*. The senders and receivers will appear in the sub-panel below the main panel area.
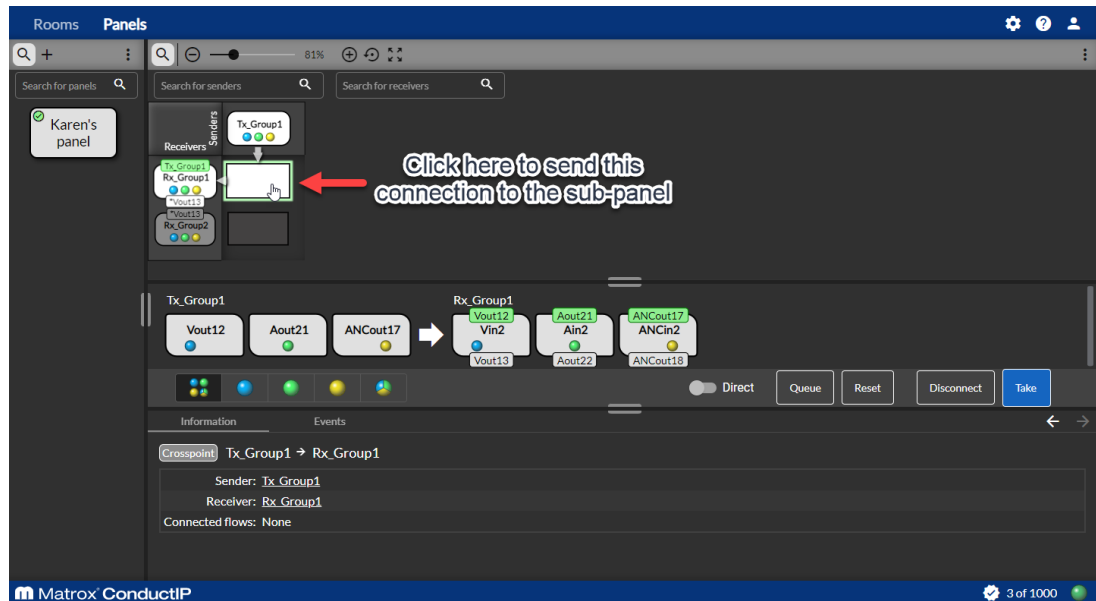
Step 3. Click **Queue** to queue this connection. If you prefer to apply it right away rather than queuing it up, go directly to *Step 6.*

More info: You can also execute takes immediately by toggling **Direct** to the ON position, in which case the take will be applied the moment you click on the crosspoint connection. You will not be able to queue connections if you use this option.

Step 4. Click the crosspoint of *Tx_Group1* and *Rx_Group2*.
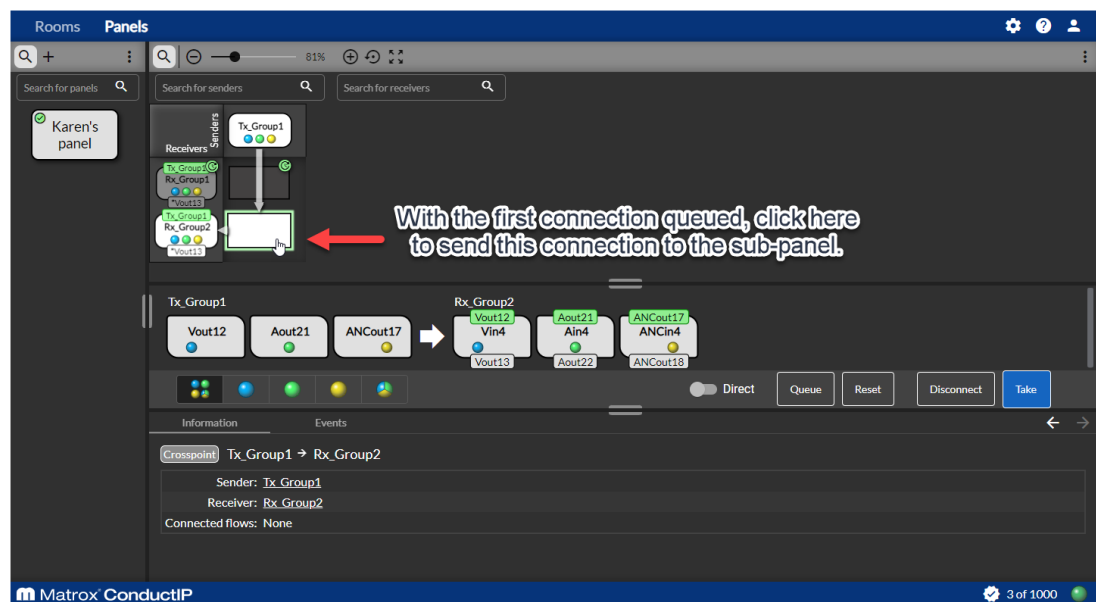
Step 5. Click **Queue** to queue this connection.

Step 6. Click **Take** to apply your connection(s) or click **Reset** to purge all queued connections and start over.

Result of this task: The sender and receiver connections are applied and you can go to Karen's room to see the flows. You can click **Disconnect** at any time to disconnect the sender and receiver flows.

Image F. Karen's room with senders and receivers connected
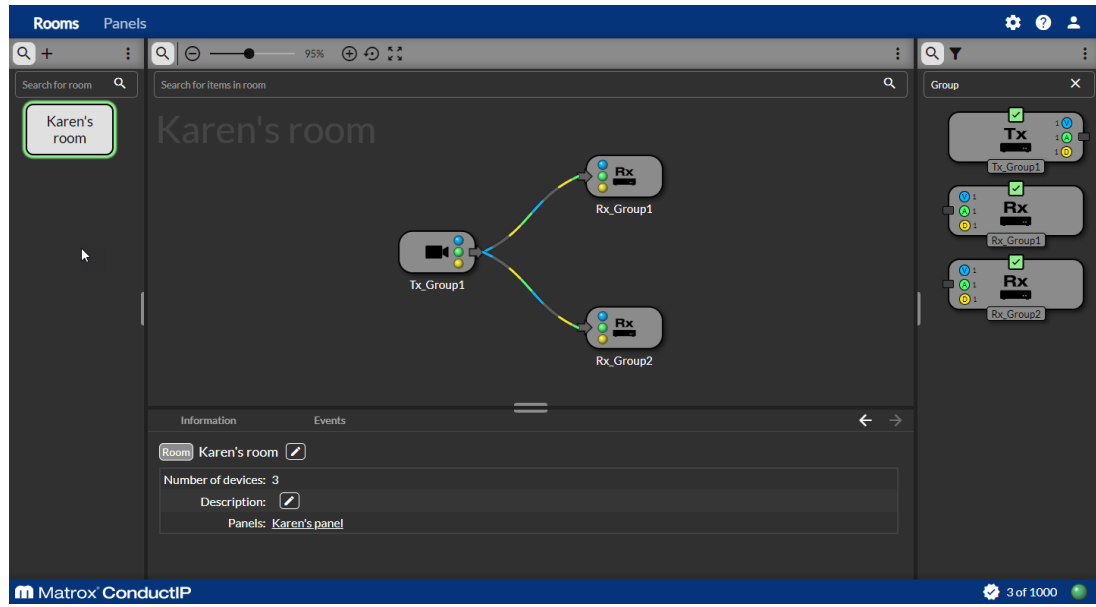
Connecting individual sender and receiver flows

The connection options with ConductIP go beyond connecting sender groups to receiver groups. You can also perform breakaway connections (i.e. send individual flows to different receivers. For example, you can have a typical sender group of video, audio, and ancillary data send each of those individual flows to a different receiver. To illustrate this, we will add an extra receiver group to *Karen's room* and send a flow to each (video to *Rx_Group1*, audio to *Rx_Group2*, and ancillary data to *Rx_Group3*).

Image G. Karen's room with three receiver groups
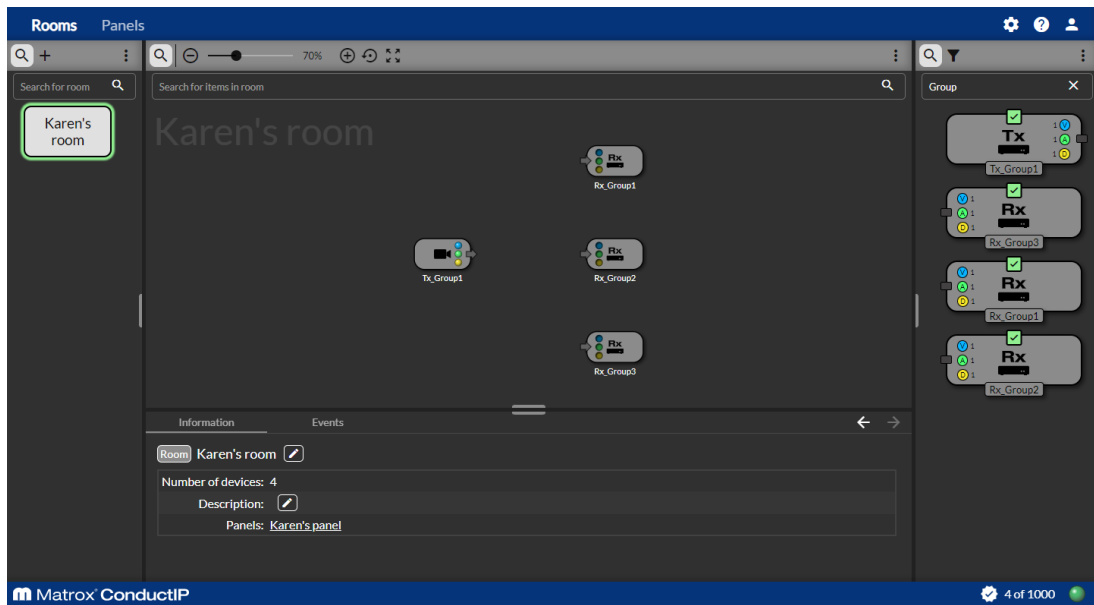
To connect Karen's sender flows to their receivers:

Step 1. Go to the ConductIP **Panels** page.

Karen's panel appears (**Matrix mode** shown).
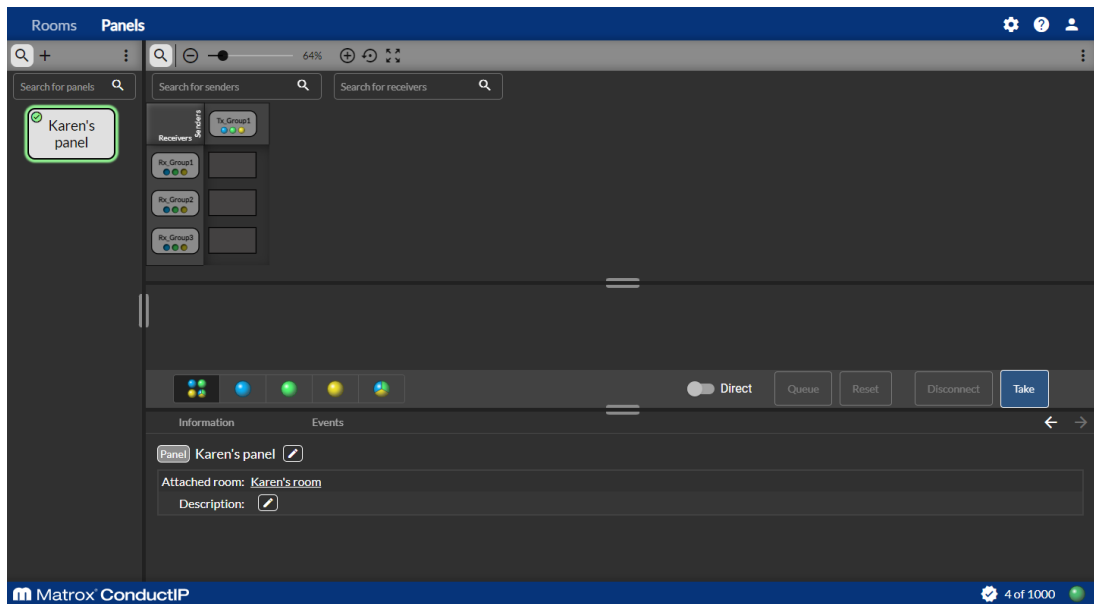
Step 2. Click the crosspoint of *Tx_Group1* and *Rx_Group1*. The senders and receivers will appear in the subpanel below the main panel area.
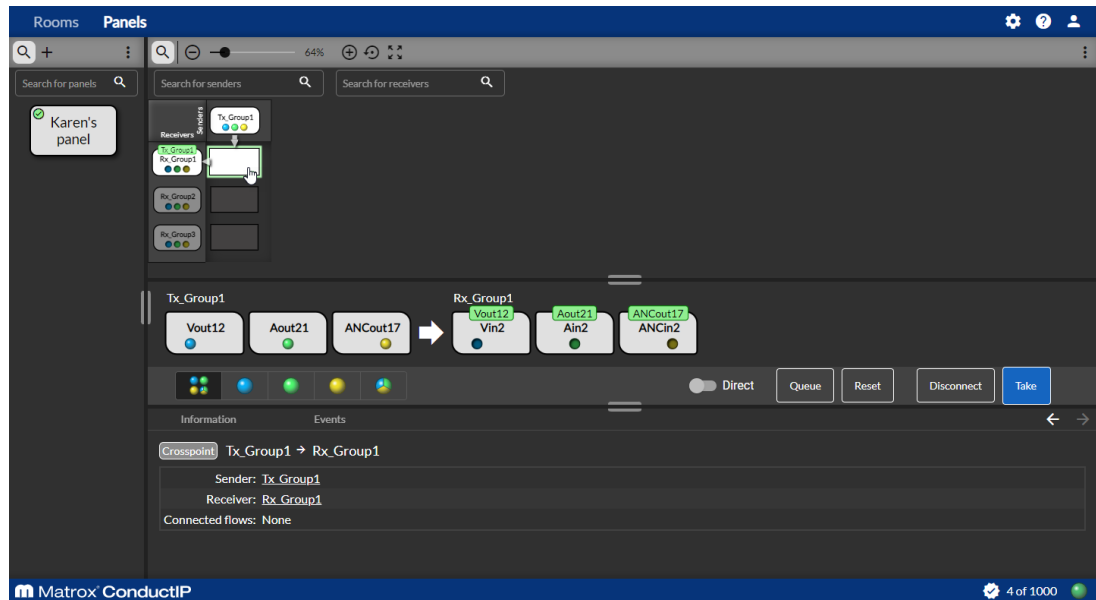
Step 3. In the subpanel, click the video flow under *Tx_Group1*. This will select that individual flow.
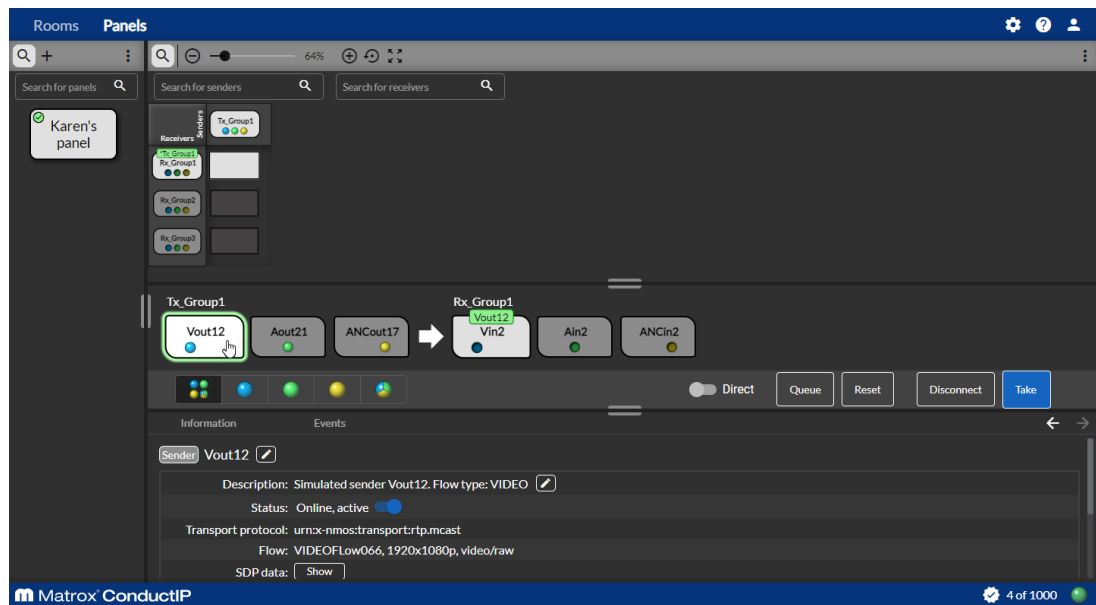
More info: When you click the sender flow, the compatible receiver is automatically selected and a green label will appear above it to show the connection that will be made when you click **Take**.

Step 4. Click **Take**.

The video sender flow from *Tx_Group1* is now connected to the video receiver *Rx_Group1*.
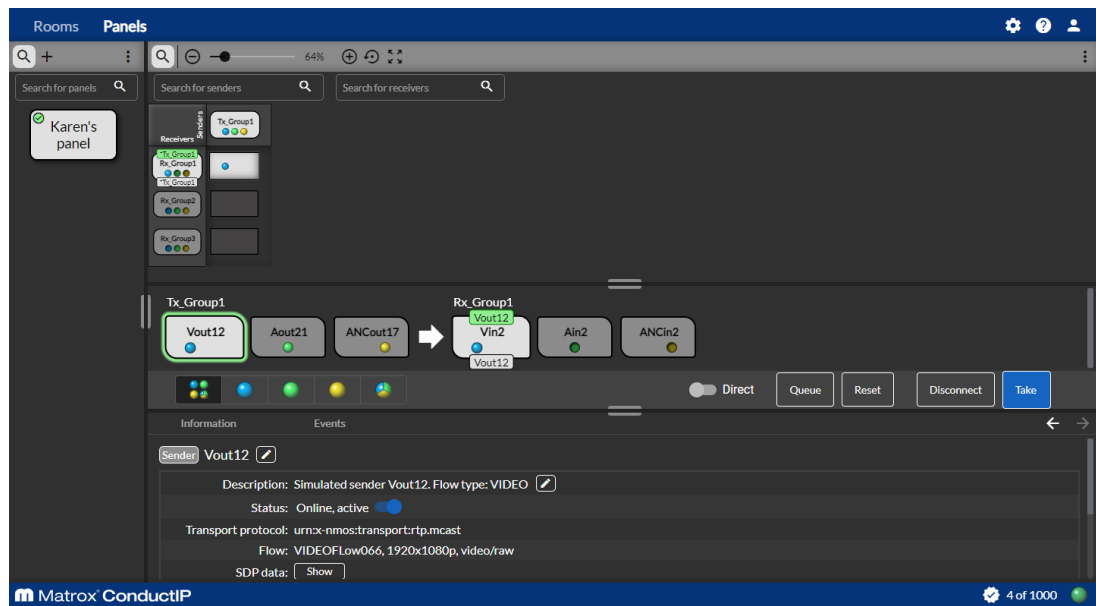
Step 5. As you did with the video flow, connect the audio flow from *Tx_Group1* to *Rx_Group2*, and the ancillary data flow from *Tx_Group1* to *Rx_Group3*.

Karen's panel should now look like this:
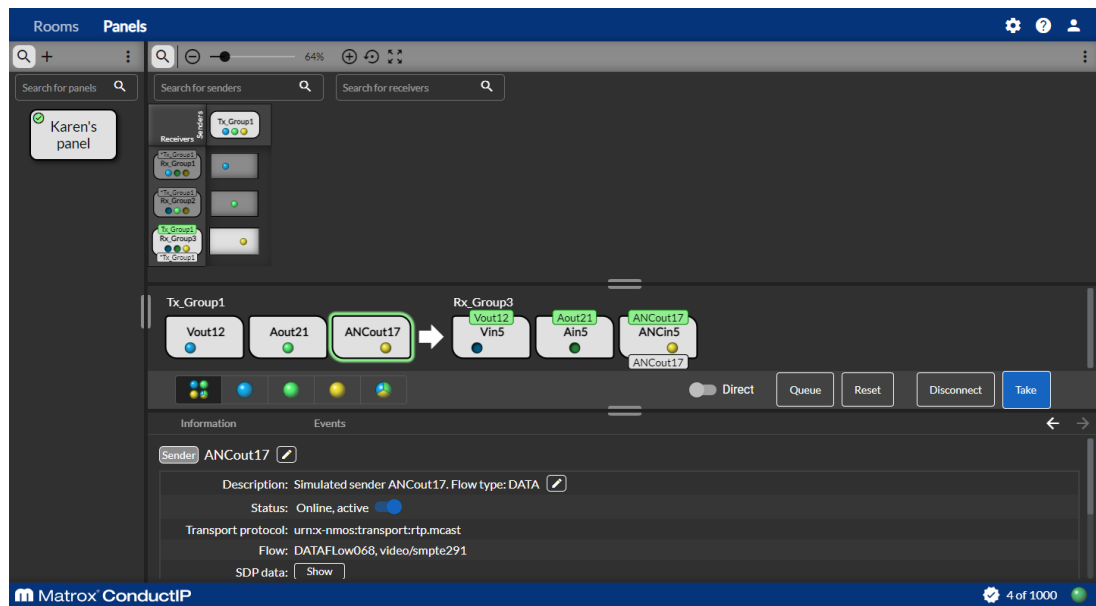
Karen's room should now look like this:
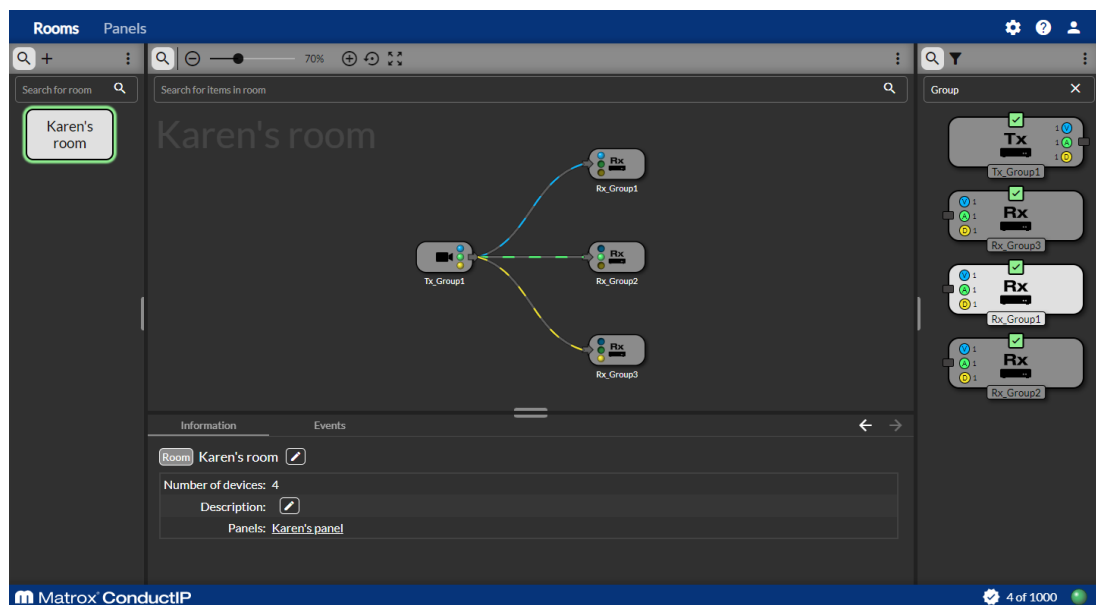
Result of this task: As you can see in Karen's room, each receiver now has its own flow connected to it. Video (blue) is going from *Tx_Group1* to *Rx_Group1,* audio (green) is going from *Tx_Group1* to *Rx_Group2*, and ancillary data (yellow) is going from *Tx_Group1* to *Rx_Group3*.

When done, remember: The flow colors can be changed (see *User interface*), and you can filter your subpanel view according to each type of flow, which will help you view all your individual connections (see *About Panels*). You can also execute takes immediately by toggling **Direct** to the ON position, and **Disconnect** any of your sender/receiver connections at any time.

CHAPTER 4

Matrox ConductIP Settings Reference

This chapter includes the following topics:

- *System*
- *NMOS registry*
- *Security*
- *User management*
- *Application*
- *User interface*
- *Support*
- *About*

System

This section describes the **System** settings in Matrox ConductIP.

Setting	Description
Date and time	
Time zone	Select the time zone of the ConductIP MRA.
Manual	Specify a date and time for the ConductIP MRA. This disables time synchronization with an NTP server.
Automatic (NTP)	Specify a primary and secondary NTP server for time synchronization.
Network configuration	
Current configuration	Display the current network configuration of the ConductIP.
Hostname	Specify a name for the ConductIP. This name will be broadcast on the network. If you choose a name that is already being used on the network, ConductIP will automatically add a numbered suffix to differentiate between them (e.g. ConductIP-1, ConductIP-2, ConductIP-3, etc).
Search domains	Enter the search domain(s) to resolve DNS searches to a Fully Qualified Domain Name. You can use spaces to separate each domain if you enter more than one.
DNS servers	Enter the IP addresses of your DNS server(s). You can use spaces to separate each address if you enter more than one.
DHCP	Select **DHCP** if you are connected to a DHCP-enabled network. The DHCP network will assign the ConductIP's IP address.
Static IPv4	If you use a static IP address instead of DHCP, you must enter the related information (e.g. **IP address**, **Subnet mask**, etc).

Setting	Description
Reboot	
Reboot	Reboots the ConductIP MRA.

NMOS registry

This section describes the **NMOS registry** settings in Matrox ConductIP.

Setting	Description
Registry configuration	
Matrox ConductIP registry	Enable to activate the ConductIP internal NMOS registry. This is enabled by default.
mDNS advertisement	Enable to broadcast the ConductIP internal NMOS registry on the network under the multicast DNS protocol. This resolves host-names to IP addresses within networks that do not include a domain name server. **NOTE** Multicast DNS publication only works with devices on the same subnet.
Protocol	Select the security level of communication that the ConductIP internal NMOS registry will use: HTTP (unsecured) or HTTPS (secured).
Priority	By default, ConductIP is set to 100 as a priority and will function as the redundant NMOS server if other servers become unavailable. Lower values indicate a higher priority (e.g. "1" is the highest priority).
Registry selection	
Connection status	Displays the IP address and connection status of the registry currently in use.
Select the internal registry	Use the internal ConductIP NMOS registry.
Manually select the registry	Specify an NMOS registry to use by selecting the protocol and entering the IP address and query port of the registry server.
Automatically select the registry	Automatically selects a registry that is discovered on the network according to priority. The servers will appear in the **Registry list** where you can see their connection status and expand each for more information. You may need to specify a search domain for the registries to appear in the list.

Security

This section describes the **Security** settings in Matrox ConductIP.

Setting	Description
Server certificate	
Specify server certificate	Specify the certificate to use for secure communication. For more information, see "*Managing ConductIP certificates*" on page *17*.
Download Root CA	Download the ConductIP Root CA certificate to your computer.
Remove certificate	Remove the current certificate installed on the server. An internal Root CA certificate will be used instead. A reboot is required after removal.
Trusted certificates	
Add certificate	Add a certificate that has been previously saved to your computer. This recognizes a secure connection. For more information, see "*Managing ConductIP certificates*" on page *17*.
Remove certificate	Remove the current certificate installed on the server.
Exceptions	Add a list of hosts that ConductIP will ignore when validating trusted certificates.
Disable certificate checking	Disables checking so ConductIP will not validate certificates for any host.

User management

This section describes the **User management** settings in Matrox ConductIP.

Setting	Description
LDAP service	
Search domains	Enter the domain name of your LDAP (Lightweight Directory Access Protocol) server if available.
Default user domain	The default user domain to use when communicating with the LDAP server. This is only used when the user does not specify a domain in the login dialog.
Use detected LDAP servers	Select to allow ConductIP to search the network for LDAP servers automatically, or click **Scan** to perform a search.
Additional LDAP servers	Enter additional LDAP server names, IP addresses, and ports.
Users	
Add user	If you are the Administrator, you can add new users and select their roles. You can also edit user information, change roles, change user passwords, and delete users. For more information, see "*Creating user accounts*" on page *20*.
Search users	Enter the keyword term to search for within the list of current users.

Application

This section describes the **Application** settings in Matrox ConductIP.

Licenses	
Download system token	Downloads the system token file to the download directory of your computer. You send this file to Matrox to get back a license file (*.lic*) to activate the full ConductIP license.
Install license	Select and install the license file obtained from Matrox. The current license usage is also displayed at the bottom-right of the ConductIP application.
Software update	
Update	Browse to an update file to update the ConductIP. You will need to obtain an update file from Matrox. For more information, see "*Updating Matrox ConductIP*" on page *19*.
Web application	
Install	Installs ConductIP as a progressive web application so you can run it from your desktop rather than through your web browser. This option is only available if you have installed the root CA in your web browser.
Database	
Clear all events	Clears all database event messages.
Import database	Imports a ConductIP database file into the database.
Export database	Exports the current database to the download directory of your computer.

User interface

This section describes the **User interface** settings in Matrox ConductIP.

Setting	Description
Date and time	
Date format	Change the way the date is displayed.
Time format	Change the format to 12- or 24-hour clock.
Theme	
Color theme	Change the look of the user interface.
Workspace	
Reset workspace	Reset the look of the user interface to factory default settings.
Colors	
Media colors	Change the colors used for the video, audio, and ancillary data device media components. Click **Default** at any time to reset to factory default settings (i.e. blue, green, yellow).
Connection wire	
Connection wire settings	Change the look of the virtual wires connecting devices in the user interface. Click **Default** at any time to reset to factory default settings.

Support

This section describes the **Support** settings in Matrox ConductIP.

Setting	Description
Download diagnostics file	Exports a snapshot of the system's current configuration to the download directory of your computer. The snapshot includes system logs and is typically used for troubleshooting by Matrox technical support.
Help	Opens the *Matrox ConductIP Installation and User Guide*.
Open debug ports for technical support	Only to be used when approved by Matrox technical support during a support session.

About

This section describes the **About** settings in Matrox ConductIP.

Setting	Description
Version	The current ConductIP version.
Product key	The ConductIP product key.
End-user license agreement	See the end-user license agreement.
Third-party software notices	See the list of third-party licenses for the software packages that ConductIP uses.

Compliance Statements

USA

FCC Compliance Statement
Remark for the Matrox hardware products supported by this guide

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

Changes or modifications to this unit not expressly approved by the party responsible for the compliance could void the user's authority to operate this equipment. The use of shielded cables for connection of equipment and other peripherals to the card is required to meet FCC requirements.

Canada

(English) Innovation, Science and Economic Development Canada
CAN ICES-3 (A)/NMB-3 (A)
Remark for the Matrox hardware products supported by this guide

These digital devices do not exceed the Class A limits for radio noise emission from digital devices set out in the Radio Interference Regulation of Innovation, Science and Economic Development Canada.

(Français) Innovation, Sciences et Développement économique Canada
CAN ICES-3 (A)/NMB-3 (A)
Remarque sur les produits matériels Matrox couverts par ce guide

Ces appareils numériques n'émettent aucun bruit radioélectrique dépassant les limites applicables aux appareils numériques de Classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par Innovation, Sciences et Développement économique Canada.

Europe

(English) European user's information – Declaration of Conformity
Remark for the Matrox hardware products supported by this guide

These devices comply with EC Directive 2014/30/EU for a Class A digital device. They have been tested and found to comply with EN55032/CISPR32 and EN55024/CISPR24. In a domestic environment these products may cause radio interference in which case the user may be required to take adequate measures. To meet EC requirements, shielded cables must be used to connect equipment and other peripherals. These products have been tested in a typical Class A compliant host system. It is assumed that these products will also achieve compliance in any Class A compliant system.

(Français) Informations aux utilisateurs Européens – Déclaration de conformité
Remarque sur les produits matériels Matrox couverts par ce guide

Ces unités sont conformes à la directive communautaire 2014/30/EU pour les unités numériques de classe A. Les tests effectués ont prouvé qu'elles sont conformes aux normes EN55032/CISPR32 et EN55024/CISPR24. Le fonctionnement de ces produits dans un environnement résidentiel peut causer des interférences radio, dans ce cas l'utilisateur peut être amené à prendre les mesures appropriées. Pour respecter les impératifs communautaires, les câbles de connexion entre l'équipement et ses périphériques doivent être blindés. Ces produits ont été testés dans un système hôte typique compatible classe A. On suppose qu'ils présenteront la même compatibilité dans tout système compatible classe A.

(Deutsch) Information für europäische Anwender – Konformitätserklärung
Anmerkung für die Matrox Hardware-Produktunterstützung durch dieses Handbuch

Diese Geräte entsprechen EG Direktive 2014/30/EU für ein digitales Gerät Klasse A. Sie wurden getestet und entsprechen demnach EN55032/CISPR32 und EN55024/CISPR24. In einer Wohnumgebung können diese Produkte Funkinterferenzen erzeugen, und der Benutzer kann genötigt sein, entsprechende Maßnahmen zu ergreifen. Um EG-Anforderungen zu entsprechen, müssen zum Anschließen des ausrüstung und anderer Peripheriegeräte abgeschirmte Kabel verwendet werden. Diese Produkt wurden in einem typischen, der Klasse A entsprechenden, Host-System getestet. Es wird davon ausgegangen, daß diese Produkte auch in jedem Klasse A entsprechenden System entsprechend funktionieren.

(Italiano) Informazioni per gli utenti europei – Dichiarazione di conformità
Nota per i prodotti hardware Matrox supportati da questa guida

Questi dispositivi sono conformi alla direttiva CEE 2014/30/EU relativamente ai dispositivi digitali di Classe A. Sono stati provati e sono risultati conformi alle norme EN55032/CISPR32 e EN55024/CISPR24. In un ambiente domestico, questi prodotti possono causare radiointerferenze, nel qual caso all'utente potrebbe venire richiesto di prendere le misure adeguate. Per soddisfare i requisiti CEE, l'apparecchiatura e le altre periferiche vanno collegati con cavi schermati. Questi prodotti sono stati provati in un tipico sistema host conforme alla Classe A. Inoltre, si dà per scontato che questi prodotti acquiranno la conformità in qualsiasi sistema conforme alla Classe A.

(Español) Información para usuarios europeos – Declaración de conformidad
Observación referente a los productos de hardware de Matrox apoyados por este manual

Estos dispositivos cumplen con la directiva de la CE 2014/30/EU para dispositivos digitales de Clase A. Dichos dispositivos han sido sometidos a prueba y se ha comprobado que cumplen con las normas EN55032/CISPR32 y EN55024/CISPR24. En entornos residenciales, estos productos pueden causar interferencias en las comunicaciones por radio; en tal caso el usuario deberá adoptar las medidas adecuadas. Para satisfacer las disposiciones de la CE, deberán utilizarse cables apantallados para conectar el equipo y demás periféricos. Estos productos han sido sometidos a prueba en un típico sistema anfitrión que responde a los requisitos de la Clase A. Se supone que estos productos cumplirán también con las normas en cualquier sistema que responda a los requisitos de la Clase A.

Korea

A급 기기 (업무용 방송통신기자재)

이 기기는 업무용 (A 급) 전자파적합기기로서 판 매자 또는 사용자는 이 점을 주의하시기 바라 며 , 가정외의 지역에서 사용하는 것을 목적으 로 합니다 .

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