

Waves Cloud MX

Audio Mixer

Deployment and User Guide (v2.3)



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Waves Cloud MX Product Overview

Waves Cloud MX is a cloud-based professional audio mixer for broadcast and media organizations using cloud production workflows on AWS. Cloud MX offers pristine audio, high-precision mix control, and creative processing capabilities with full Waves plugin integration, in a scalable, broadcast-ready cloud workflow.

Waves Cloud MX is deployed by customers on Amazon Elastic Compute Cloud (Amazon EC2) within the customer's Virtual Private Cloud (VPC) to ensure that secure, reliable, high-performance and cost-effective compute infrastructure is available throughout an event. Customers can also deploy the mixer on instances on any of the available Amazon EC2 geographical locations to optimize network performance between the cloud, remote operators, and on-premise equipment.

Waves Cloud MX is NDI®-compatible, fitting easily into NDI-based cloud network environments. An intuitive control panel is included to provide easy patching and routing of NDI® audio streams processed by the mixer.

Waves Cloud MX features include:

- 100% cloud-based audio mixing solution

- Easily scalable to any broadcast requirement

- NDI-compatible with easy routing of NDI® audio for all ingress/egress streams

- Easy deployment on AWS

- 32-bit floating point mix engine

- 64 stereo/mono input channels, 44 bus/return channels

- 16 monitor auxes and 8 FX auxes (stereo/mono), 8 audio groups, L/R/C/Mono, 8 matrixes (stereo/mono)

- 16 DCA faders, 8 mute groups, 8 user-assignable shortcut keys

- Channel strip eMo plugins (EQ, filter, dynamics) included in all Cloud MX packages

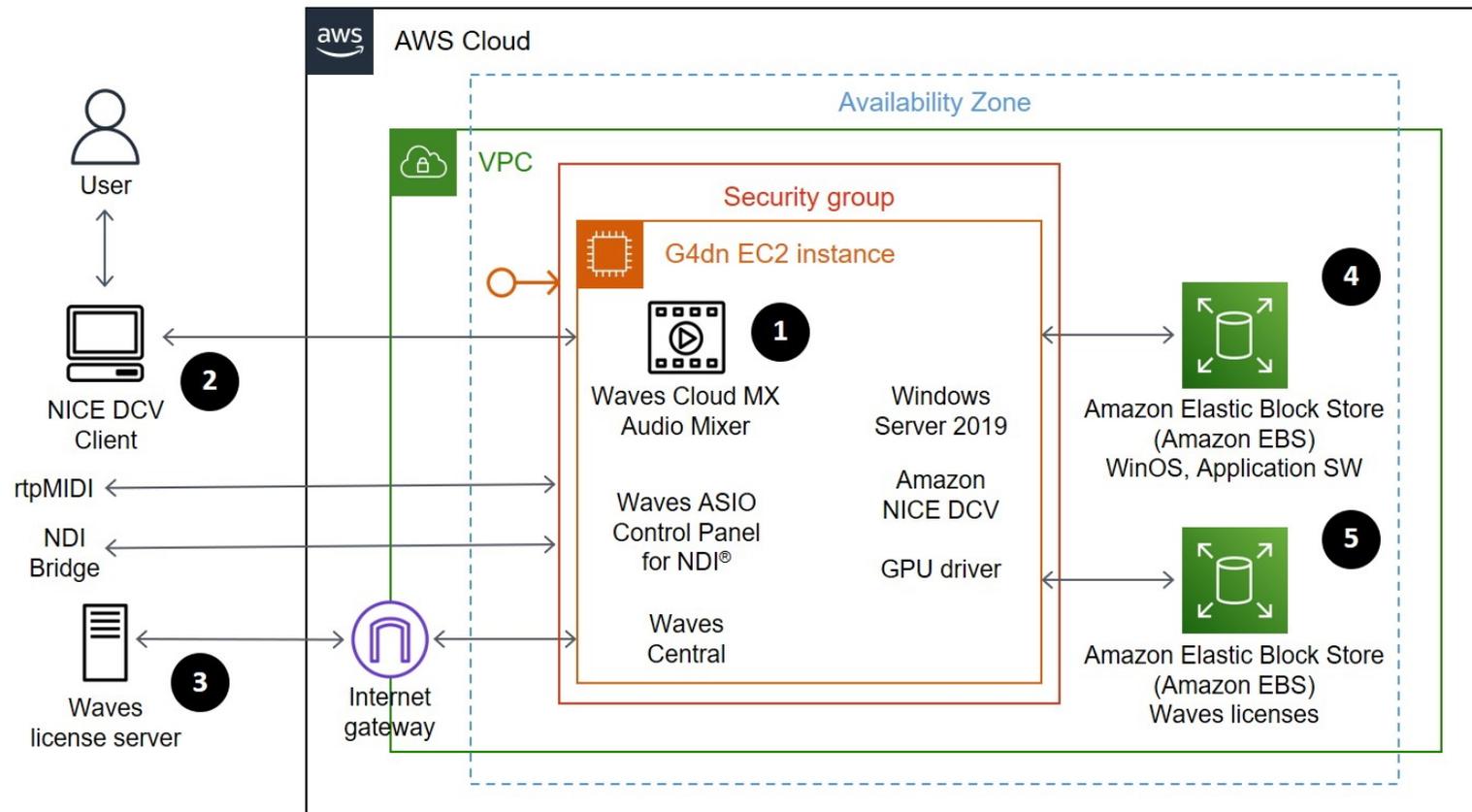
- Full operator-control with tactile Waves FIT controller and/or up to 4 touchscreens connected via industry-standard remote protocols



Deployment Overview

Waves Cloud MX is deployed on an Amazon EC2 instance owned and managed directly by the user on their AWS account. This guide assumes that the user has a basic understanding of setting up, launching, and using Amazon EC2 Windows instances. Detailed documentation for AWS can be referenced here: docs.aws.amazon.com.

Waves Cloud MX Audio Mixer AWS Architecture



1. An Amazon Elastic Compute Cloud (Amazon G4dn EC2) instance for Windows Server 2019 (or later), with NICE DCV and GPU drivers, are used to run the Cloud MX Audio Mixer, the Waves ASIO Control Panel for NDI®, and the Waves Central application within the customer's VPC.
2. Amazon NICE DCV remote display protocol is used for high-performance remote access to the Cloud MX Audio Mixer application.
3. An Internet Gateway allows communication between the instance in the VPC and the Waves license server, to authorize and activate Waves software licenses.
4. Waves Cloud MX application software is installed on an Amazon EBS Volume that stores the Windows Server OS and related software.
5. Waves software licenses are stored on an Amazon EBS Volume to easily move and re-activate licenses between instances in the VPC.

Waves and Third-Party Software

Waves Cloud MX and the Waves ASIO Driver for NDI® are installed and activated on the Amazon EC2 instance using Waves Central. Instructions for installing Waves Central and installing and activating Waves software is included in “Step 3” below.

Additional third-party software will also need to be installed by the user to use all features of the product.

The list below summarizes the third-party software that should be installed by the user as referenced in the setup instructions. Links to the relevant software and/or documentation is included in the instructions.

GPU Drivers for Amazon EC2

AWS NiceDCV (or other user-supplied PCoIP remote display application)

NDI® Tools

rtpMIDI



Deployment Considerations

Quotas

Before deploying Waves Cloud MX, it may be necessary for you to request a vCPU limit increase based on the G4dn instance size you want to run. For details about submitting a limit increase, refer to [How do I request an EC2 vCPU limit increase for my On-Demand Instance?](#)

Technical Prerequisites and Requirements to Complete Deployment Process

AWS Regions / Data Centers	Waves Cloud MX can be installed on any AWS data center/region that provides the required Amazon EC2 instance type. We recommend that you choose a region closest to you for faster service and lower latency.
AWS Instance Type	The recommended GPU instance type is g4dn.4xlarge. You can also use a smaller instance (g4dn.2xlarge) or larger instance like g4dn.8xlarge. The size depends on the total number of channels, mix buses and plugins used for audio processing. If the instance cannot be launched in the selected Availability Zone (AZ), you can try to use another AZ.
OS	Microsoft Windows Server 2019 or later
GPU	NVIDIA GPU drivers for Amazon EC2
Storage	Amazon EBS volume (General Purpose SSD) for OS and application installation, and a separate Amazon EBS Volume (minimum size; i.e. 1GB) for Waves license management
Remote Display	AWS NiceDCV or other PCoIP (Teradici, RealVNC, etc.)
Remote Controller (optional)	Waves FIT Controller via rtpMIDI
Other Required Software	NDI® Tools



Skills or Specialized Knowledge Needed by the User

Users that deploy Waves Cloud MX on AWS should possess sufficient knowledge and skills on AWS to log on to an account, launch an instance, attach an EBS Volume, configure security groups, and install required software as described in this document.

Time to Complete Deployment

This document describes all steps necessary to complete deployment of Waves Cloud MX on AWS. For typical deployments, experienced users should be able to install all required software and drivers, and activate licenses, in less than one hour.

Security Considerations

When you build systems on AWS infrastructure, security responsibilities are shared between you and AWS. This [shared responsibility model](#) reduces your operational burden because AWS operates, manages, and controls the components including the host operating system, the virtualization layer, and the physical security of the facilities in which the services operate. For more information about AWS security, visit [AWS Cloud Security](#).

Root User Privileges are Not Required

The user deploying Waves Cloud MX on AWS **does not require the use of root privileges** for deployment or operation. Users should not use root access for any deployment or operation of Waves Cloud MX.



Least Privileges Principal

Waves Cloud MX software is deployed on a single EC2 instance. Provisioning of the instance and of its EBS storage is done through AWS Console using an IAM user access of the customer. Installation of software components is done using Windows Remote Desktop.

Users of the tool can only operate on audio content and cannot change any administrative configuration of the tool. Access to users is additionally limited by whitelisted IP addresses – a block of source IP addresses defined in the AWS Security Group.

Security groups

The security groups created in this solution are designed to control and isolate network traffic between specified public IP ranges and the Waves Cloud MX instance. Security groups are also used to control access between instances to send and receive media streams using NDI®.

You can configure the Security Group at the VPC level or at the EC2 instance level. Additional information about Security Groups is available at https://docs.aws.amazon.com/vpc/latest/userguide/VPC_SecurityGroups.html.

Details for configuration of Security Groups are listed in the section “Configure Additional AWS Security Settings” on page 12.



Costs

There are two components to customer costs associated with deploying Waves Cloud MX on AWS. Each are described below:

AWS Resource Costs

The AWS costs to consider are:

1. EC2 instance costs
2. Elastic Block Storage (EBS) costs
3. Data Transfer Out (DTO)
4. Elastic IP costs

General information for each of these cost considerations is below.

1. Customers must license an Amazon EC2 instance (g4dn.4xlarge) in order to deploy Waves Cloud MX. Costs associated with each AWS billable service is owned and maintained solely by AWS and is separate from costs associated with licensed Waves software.

The default EC2 this solution deploys is a g4dn.4xlarge EC2 instance for running Windows. As of November 2022, the cost of running this EC2 with the default settings in the US East (N. Virginia) Region is \$1,396.80 per month (\$1.94/hour) based on the On-Demand hourly rate. Prices are subject to change. To save money, consider turning off your Windows EC2 instance when not in use.

2. Waves Cloud MX uses also EBS storage. The minimum required storage is 1GB. Cost of the storage in US East (N. Virginia) region for the Throughput Optimized HDD (st1) Volumes is \$0.045 per GB/month of provisioned storage. The cost of snapshot storage shall also be considered.

3. Another component to consider is the Data Transfer Out (DTO). There are two options to use:

- Data Transfer Out to Internet shall be considered at \$0.09 per GB for the first 10 TB/month.
- If the traffic goes over AWS Direct Connect (<https://aws.amazon.com/directconnect/>) the cost to consider will be \$0.02 per GB
- Details of the costs can be estimated using AWS Pricing Calculator. (<https://calculator.aws/#/>)



4. One Elastic IP address is free to use with an EC2 Instance. However, there is a charge of \$0.005 per every hour the instance is not running (for example, stopped overnight).

For full details, refer to the pricing webpage for each AWS service you will be using, or contact your AWS account manager.

Waves Cloud MX Software License Costs

Waves Cloud MX is offered as a Bring Your Own License (BYOL) model that is installed and activated on the Amazon EC2. There are three options for license duration (one-week, one-month, and one-year) and three options for audio processing plugins included with the Cloud MX audio mixer application. Pricing is based on the choice of these options and can be found on the Waves website (<https://www.waves.com/cloud-mx>).

Cost and payments for the Waves software is managed directly between Waves and the customer. Charges and payment options are not supported within the AWS payment process.



Step 1: Configure the Amazon EC2 Instance

The following instructions provide important information regarding the configuration of the Amazon EC2 instance that will be used for the Waves Cloud MX audio mixer.

Initial EC2 Configuration Instructions

1. Create a Windows EC2 Instance with Windows Server 2019 (or newer). Note: A g4dn.4xlarge type is recommended, depending on total number of channels, mix buses and plugins that will be used with the mixer. To streamline configuration, it is also preferable to use an EC2 image (AMI) with GPU drivers preinstalled. For more information, refer to: https://docs.aws.amazon.com/AWSEC2/latest/WindowsGuide/EC2_GetStarted.html
2. Connect to the instance using Remote Desktop Client. If not already installed, download and install the Microsoft Edge or Google Chrome browser to simplify downloading of other software.
3. Install GPU Drivers if not using an image (AMI) with pre-installed GPU Drivers. For more details, see: <https://docs.aws.amazon.com/AWSEC2/latest/WindowsGuide/install-nvidia-driver.html>
4. Install the AWS NiceDCV Client and Server (using default options). The files can be downloaded from the AWS website using these links.
NiceDCV Windows Server Installation Instructions:
<https://docs.aws.amazon.com/dcv/latest/adminguide/setting-up-installing-windows.html>
For lowest latency, the QUIC UDP configuration is recommended:
<https://docs.aws.amazon.com/dcv/latest/adminguide/enable-quic.html>
NiceDCV Client Installation Instructions:
<https://docs.aws.amazon.com/dcv/latest/userguide/client.html>
(For more information about AWS NiceDCV, refer to: <https://docs.aws.amazon.com/dcv/latest/adminguide/setting-up-installing-windows.html>)
5. Configure the AWS security settings to open TCP port 8443 for connecting to the instance using AWS NiceDCV from your remote location. Also open UDP port 8443 if using the NiceDCV QUIC UDP configuration.



You should be now able to connect to the instance with the NiceDCV Client of your choice (using the application or within a browser). It is no longer necessary to use the Microsoft Remote Desktop.

6. Next, create a second EBS Volume (1 GB, Standard/Magnetic) to store the Waves software licenses. For more details, see: <https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ebs-creating-volume.html>
7. Attach the EBS Volume for licenses to the EC2 instance and prepare it for use. Note that if you have created a new EBS Volume, you will need to initialize and mount the volume. The license volume should be assigned to the next logical letter to the volume containing the application software (typically "D:", if "C:" is the primary drive). For details, see: <https://docs.aws.amazon.com/AWSEC2/latest/WindowsGuide/ebs-using-volumes.html>

Configure Additional AWS Security Settings

Configure Instance Metadata System Version 2 (IMDSv2) when you launch the EC2 instance. This is described at <https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/configuring-IMDS-new-instances.html>.

Configure Security Group of the instance or of the VPC to allow Remote Desktop Protocol (RDP) – port 3389.

Define CIDR block to limit access only to users from authorized blocks of IP addresses:
https://docs.aws.amazon.com/vpc/latest/userguide/VPC_SecurityGroups.html.

We advise to close the access to RDP after the installation is completed.

In addition to the ports required for RDP Connection and AWS NiceDCV, a few more ports need to be opened to allow communication from the EC2 instance to other production elements.

Waves Cloud MX is deployed within the customer's VPC. The following list summarizes the ports typically used in the cloud production environment to allow NDI transport of audio inputs and outputs between production tools.

- NDI: The following ports need to be opened between machines that will be sending and receiving NDI data.
TCP: 5960 to 6024
UDP: 5960 to 6024



- NDI Bridge: If ground-to-cloud or cloud-to-ground (on-premise) streaming is needed, then UDP port 5990 should be opened for the corresponding route(s).
- NDI Discovery Server: Requires TCP port 5959 be opened on all machines participating in the NDI network.
- Note: if using NDI 4 devices, consult the NDI® documentation for specific port details.

If a fader controller, such as Waves FIT Controller (<https://www.waves.com/hardware/fit-controller-for-emotion-lv1>), will be used for remote control of Cloud MX, it is also necessary to open ports between the client and EC2 for rtpMIDI control.

- rtpMIDI: Open two ports per MIDI device, starting from UDP 5004:
UDP 5004-5005 (for one device)
UDP 5004-5007 (for two devices), etc.

For all NDI Bridge and rtpMIDI ports, define the CIDR of the connected sources to limit the access only to desired sources and destinations.

Step 2: Install 3rd Party Software

Most deployments will need to utilize tools from NDI for network configuration and management, and also connect a remote controller (such as the Waves FIT or other Mackie/MIDI controller). This section provides information to install these 3rd party software tools.

1. Install the NDI 5 Tools to the Windows EBS Volume using the installer – with default options. NDI Tools can be downloaded here: <https://downloads.ndi.tv/Tools/NDI%205%20Tools.exe>
2. Install rtpMIDI Setup to the Windows EBS Volume using the installer – with default options. rtpMIDI can be downloaded here: https://www.tobias-erichsen.de/wp-content/uploads/2020/01/rtpMIDISetup_1_1_14_247.zip

Note: if you are using rtpMIDI, you will need to complete additional setup on the local “ground” PC where the Waves FIT or another MIDI controller is connected. For more information, see:

<https://www.tobias-erichsen.de/software/rtpmidi/rtpmidi-tutorial.html>



(Also note that contrary to the documentation provided by rtpMIDI, it is not necessary to enable port forwarding on the local/ground side. Just opening the ports on the AWS side is adequate for proper communication.)

See “Step 7” in this document for additional information to configure rtpMIDI and the Waves FIT Controller.

Step 3: Install and Activate Waves Software

Waves software installation and activation for **Cloud MX** is accomplished using Waves Central. Follow the instructions in this section to complete the software installation.

IMPORTANT: All Waves licenses must be activated on a separate Amazon EBS volume to avoid losing the licenses if the Amazon EC2 instance is terminated. Be sure to create, initialize and mount the separate EBS Volume to the instance before installing and activating the Waves software.

1. Create a free Waves account if you don't already have one (www.waves.com/create-account). This account is used to manage your Waves products and licenses and will be setup when purchasing the Cloud MX product from the Waves.com website.
2. Install Waves Central on the Amazon EC2 instance and log in with your Waves Account. The Waves Central Installer for Windows can be downloaded here: <https://www.waves.com/downloads/central>
3. Using Waves Central, install Waves Cloud MX **on the EBS Volume that stores Windows** and applications (do not install the software on the second Windows EBS Volume). Select “Don't Activate License” so that only the software is installed on the instance.
4. Using Waves Central, activate the Cloud MX and plugins licenses **on the second EBS Volume** prepared earlier for Waves licenses (Step 1, item 6). (The licenses you own can be found and activated in Waves Central: “Licenses > Not Activated”).



Note: It is possible to install Waves Cloud MX on multiple Amazon EC2 instances, and detach/attach the EBS Volume (that includes the licenses) when you wish to run Cloud MX for a production. Similarly, an instance image can be created to quickly spin up new instances, with the Waves license retained on this EBS Volume.

Step 4: Configure NDI[®] Utilities

At this point the software installation is complete. Depending on your cloud environment, you may also need to use the NDI utilities for NDI device discovery and network access management. This section outlines some of the additional configuration or setup steps you may need to complete for your cloud production environment.

- **NDI Discovery:** The NDI Discovery server needs to be run on any one machine which is reachable from all Amazon EC2 instances that need to participate in discovery. Note: After installing NDI Tools, the NDI Discovery utility is located here: Local Disk (C:) > Program Files > NDI > NDI 5 Tools > Discovery
- **NDI Access Manager:** The NDI Access Manager needs to be configured on each machine to point to the IP address of the machine running NDI Discovery. Note that all systems using NDI Discovery will need to have the appropriate security rule configured to open the associated port for NDI Discovery.

Please refer to the NDI[®] documentation for detailed information.



Step 5: Using the ASIO Control Panel for NDI®

The following instructions provide an overview of the Waves ASIO Control Panel for NDI® that used to assign NDI audio streams to ASIO channels on the Waves Cloud MX audio mixer.

Control Panel Overview

The Waves ASIO Control Panel for NDI® can be launched using the desktop icon or by selecting the application using the Windows Start button. It can also be launched from the SETUP tab of the mixer, by clicking the “Open Control Panel” button.

The Control Panel enables you to “map” any available NDI audio stream to an ASIO channel and assign a name that can be easily identified for each stream.

The Waves Cloud MX Audio Mixer uses the ASIO channels for input and output patches. Up to 128 inputs and 128 outputs (total) can be assigned. For example, if 10 stereo streams from NDI audio sources are assigned, they will use 20 (10x2) ASIO channels.

The Control Panel includes two tabs: INPUT and OUTPUT. The top section of both tabs includes the global setting for the ASIO Buffer Size, and IMPORT and EXPORT buttons for the mapping configuration.

ASIO Buffer Size (can be set on either INPUT and OUTPUT tab)



1	ASIO Buffer Size	Select buffer size: 512, 1024, or 2048 (using a larger buffer may help prevent audio dropouts for connections with higher latency).
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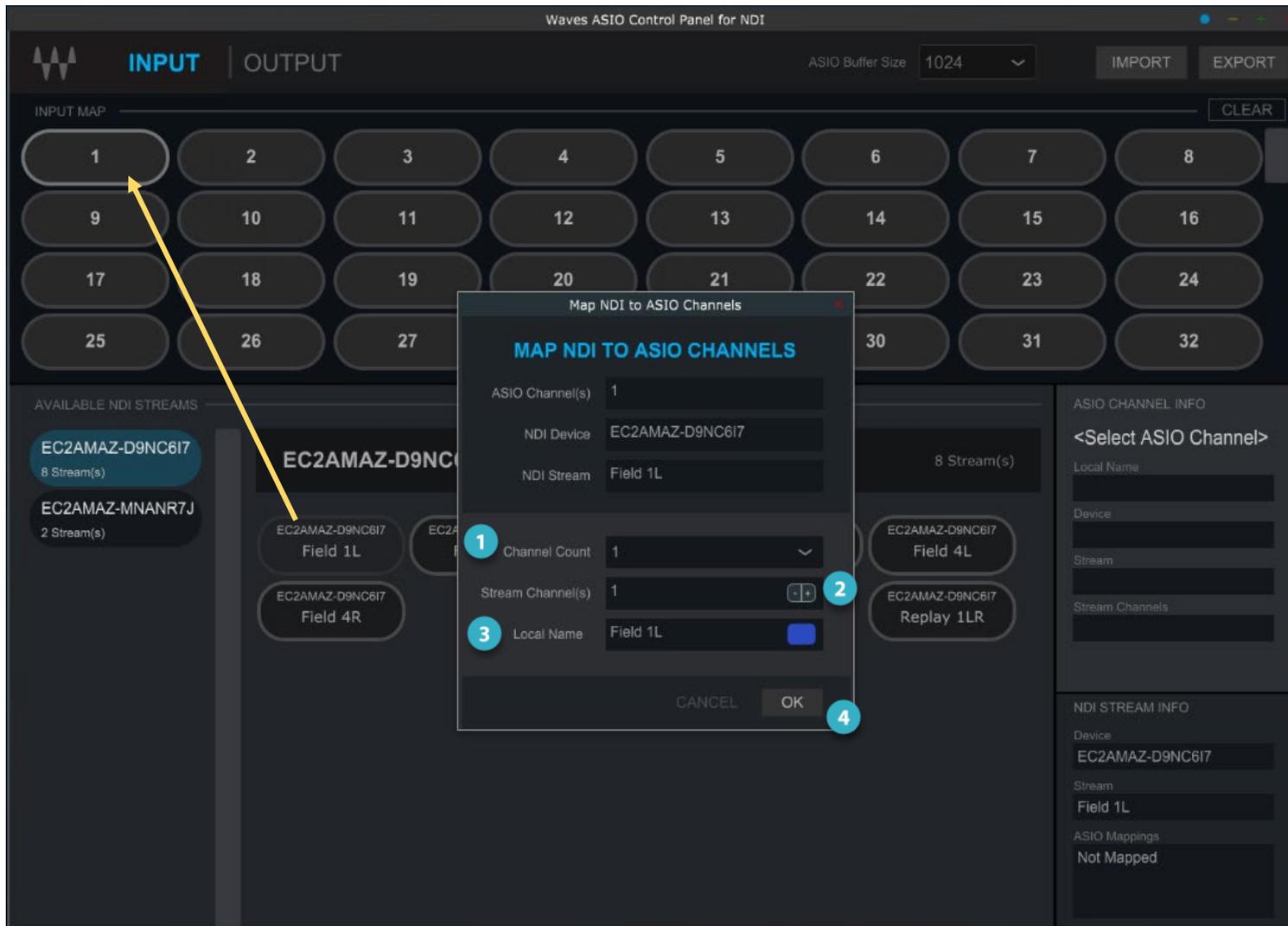


INPUT Tab Overview

1	Input Map	ASIO view for all mapped NDI streams (128 channels total)
2	Available NDI Devices	Displays all NDI devices on the network and also devices that were previously mapped but currently not available
3	Available NDI Streams	Displays available NDI streams for a selected NDI Device



INPUT Tab: Map Input to ASIO Channel



To map an audio channel, first drag an available NDI stream to an ASIO channel to open the configuration dialog box.



1	Channel Count	Select the number of audio channels to be mapped from selected NDI stream to ASIO channels.
2	Stream Channel(s)	Select the stream channel “offset” if the desired audio stream(s) do not start with the first stream on the selected NDI stream.
3	Local Name	Use this field to rename the NDI stream name as you want it to be displayed on the mixer I/O selection areas. A color can also be selected to display on the ASIO channel map.
4	OK (or Cancel)	Click OK to assign the channel(s) to the map. The setting is automatically saved.



INPUT Tab (Example – Stream Not Connected)

If a previously mapped audio stream is not connected, the NDI stream and associated mapped channel(s) will be displayed with a dashed-line border as shown.

The screenshot displays the 'INPUT' tab of the 'Waves ASIO Control Panel for NDI'. The interface is divided into several sections:

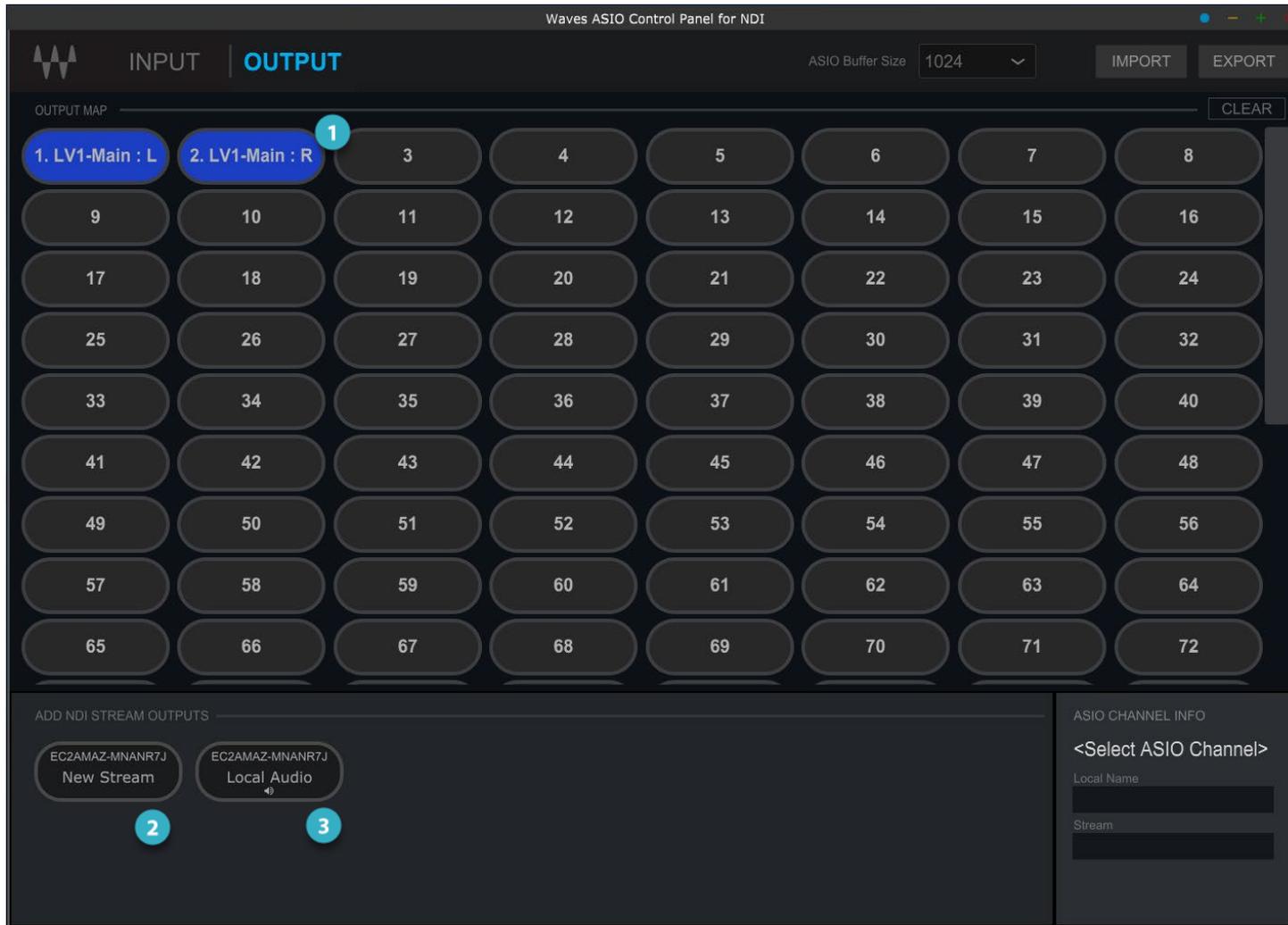
- INPUT MAP:** A grid of 32 buttons representing ASIO channels. Buttons 1 through 10 are labeled with stream names: '1. Field 1L : 1', '2. Field 1R : 1', '3. RealSlow 8ch : 1', '4. RealSlow 8ch : 2', '5. RealSlow 8ch : 3', '6. RealSlow 8ch : 4', '7. RealSlow 8ch : 5', '8. RealSlow 8ch : 6', '9. RealSlow 8ch : 7', and '10. RealSlow 8ch : 8'. Buttons 11 through 32 are numbered. Button 2, '2. Field 1R : 1', is highlighted with a dashed-line border. A yellow arrow points from this button to the 'Field 1R' stream in the 'AVAILABLE NDI STREAMS' section.
- AVAILABLE NDI STREAMS:** A list of available NDI streams. Two streams are listed: 'EC2AMAZ-D9NC6I7' (8 Stream(s)) and 'EC2AMAZ-MNANR7J' (2 Stream(s)). The 'EC2AMAZ-D9NC6I7' stream is expanded, showing a grid of 8 streams: 'Field 1L', 'Field 1R', 'Field 2', 'Field 3', 'Field 4L', 'Field 4R', 'Field 5', and 'Replay 1LR'. The 'Field 1R' stream is highlighted with a dashed-line border. A yellow arrow points from this stream to button 2 in the 'INPUT MAP'.
- ASIO CHANNEL INFO:** A panel showing details for 'ASIO: 1 - 1'. It includes fields for 'Local Name' (Field 1L), 'Device' (EC2AMAZ-D9NC6I7), 'Stream' (Field 1L), and 'Stream Channels' (1 - 1).
- NDI STREAM INFO:** A panel showing details for the selected NDI stream. It includes fields for 'Device' (EC2AMAZ-D9NC6I7), 'Stream' (Replay 1LR), and 'ASIO Mappings' (003 - 010 | RealSlow 8ch).

All streams on a previously mapped NDI device will have the dashed-line border if the device is no longer available on the network.



OUTPUT Tab

The OUTPUT tab is used to assign NDI streams to mixer output channels, including a Local Audio stream.



1	Output Map	ASIO view for all mapped NDI streams (128 channels total).
2	Add New NDI Stream	Drag to an available ASIO channel to create an NDI output stream.
3	Map Local Audio	<p>Drag to an available ASIO channel to assign the Local Audio function to the selected ASIO channels (note: default configuration as stereo).</p> <p>When selected, the Local Audio provides audio routing through Windows system audio, so that the corresponding audio can be monitored remotely using a PCoIP application such as AWS NiceDCV. This is an easy way to remotely listen to the output mix or cue bus of the mixer without using an NDI stream.</p> <p>See “Step 6” of this document for example patching of this feature.</p>

To map an NDI output stream to an audio mixer output channel, first drag the “New Stream” or “Local Audio” selectors to an ASIO channel to open the configuration dialog box.



OUTPUT Tab (Example: Map Output to Local Audio)

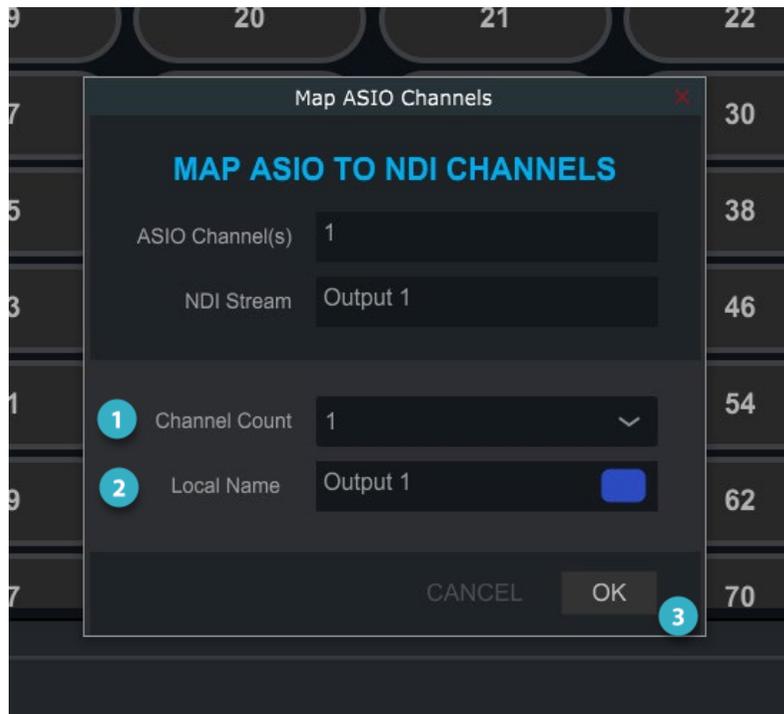
The screenshot displays the 'Waves ASIO Control Panel for NDI' in the 'OUTPUT' tab. The 'OUTPUT MAP' section shows a grid of 72 channels (1-72). Channels 1 and 2 are highlighted in blue and labeled '1. LV1-Main : L' and '2. LV1-Main : R'. A 'Map ASIO Channels' dialog box is open, titled 'MAP ASIO TO LOCAL CHANNELS'. It shows 'ASIO Channel(s)' set to '63 - 64', 'NDI Stream' set to '<System Sound Output>', 'Channel Count' set to '2', and 'Local Name' set to 'Studio Monitor'. A yellow arrow points from the 'Local Audio' stream in the 'ADD NDI STREAM OUTPUTS' section to the 'Map ASIO Channels' dialog. The 'ADD NDI STREAM OUTPUTS' section shows two streams: 'EC2AMAZ-MNANR7J New Stream' and 'EC2AMAZ-MNANR7J Local Audio'. The 'ASIO CHANNEL INFO' section shows '<Select ASIO Channel>' and fields for 'Local Name' and 'Stream'.



1	Select and Drag	Drag "Local Audio" to the desired channel pair for a stereo monitor (ASIO channels 63-64 in this example).
2	Local Name	Enter a name to identify the Local Audio channels on the mixer. A color may also be selected.
3	OK Button	Click OK to assign the output and save changes to the ASIO driver setup.



OUTPUT Tab (Example: Output Configuration Settings)



Note: The configuration dialog box appears after dragging the “New Stream” selector to the ASIO channel map.

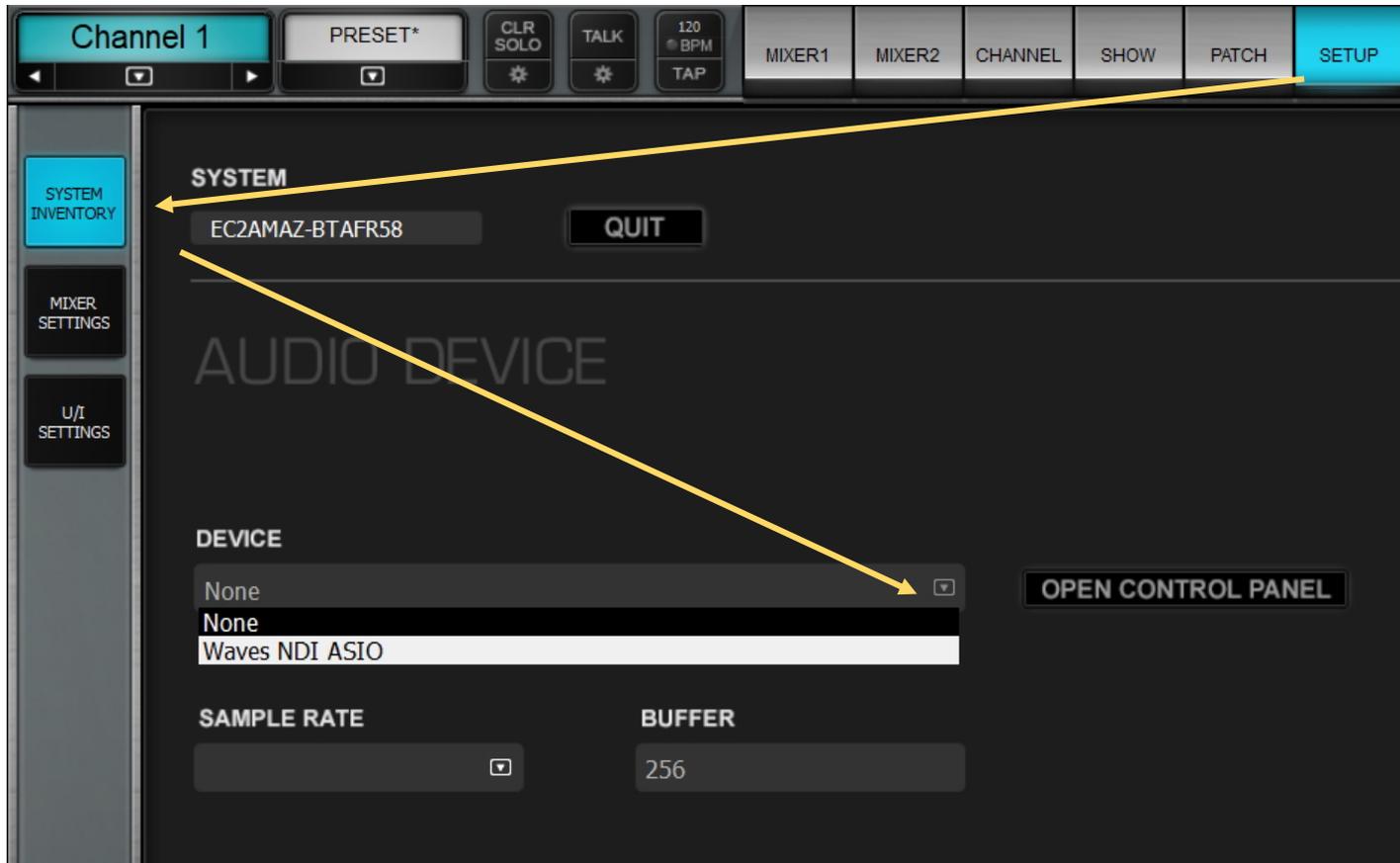
1	Channel Count	Select the number of consecutive audio streams that should be contained on the NDI stream.
2	Local Name	Enter a NDI stream name. This name will be visible through NDI Discovery to other NDI devices on the network in addition to the mixer outputs. A color can also be selected to display on the ASIO channel map.
3	OK Button	Click OK to assign the output and save changes to the ASIO driver setup.



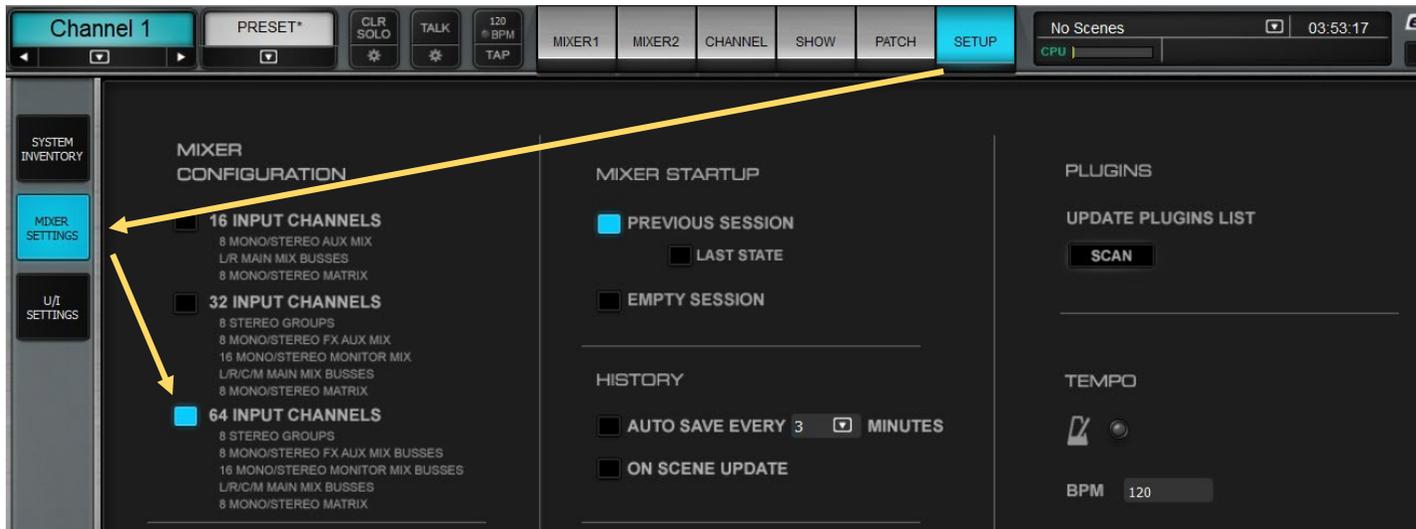
Step 6: Initial Setup of Cloud MX Audio Mixer

This section provides important configuration information to use the Waves Cloud MX audio mixer.

1. Select Waves NDI ASIO on System Inventory Page



2. Select 64-channel Mixer Configuration on Mixer Settings Page



2. Patch Audio Feed to CloudMX Input Channels

There are two ways to patch audio from NDI audio feed channels to CloudMX input channels.

Mixer Window



1. Click on the Input Patch box at the top of the channel to open the drop-down menu.
2. Select the audio input device.
3. Choose the input channel.

From here you can also flip the channel from mono to stereo, and vice versa. When you flip a channel from mono to stereo, the mono patch becomes the left channel of the stereo signal. Patch the right channel manually. When you flip a channel from stereo to mono, the left channel becomes the mono patch.



Patch Window



The Patch input page is a grid: NDI audio source channels on the top, and Cloud MX input channels on the left. Select the Input Patch View to patch between the two.

1. Click on the intersection of an audio source and a CloudMX input to form a patch. Drag a straight to patch contiguous channels (see example on the left).
2. Click again on a patch to cancel it.
3. Click on the device channel number to reveal the local name of the NDI input feed

To flip a channel between mono and stereo in the Patch window, double-click on the small “M” on the left side. The single line M will become two lines, “L” and “R.” This enables you to patch left and right separately. Double-click on the L or R button to return to mono.



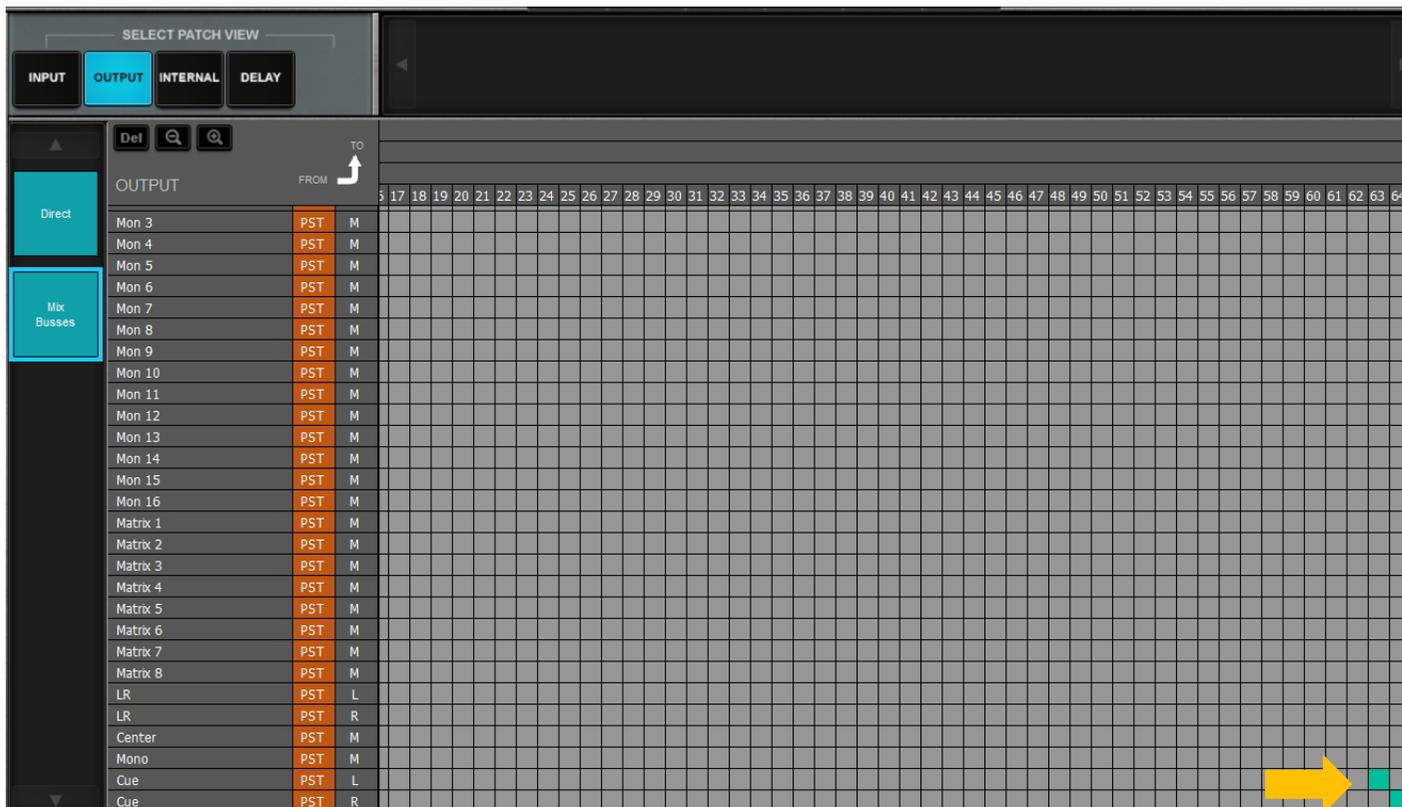
3. Patch Local Audio for Remote Monitoring via PCoIP

The “Local Audio” option in the Waves ASIO Control Panel for NDI® allows for audio to be monitored remotely using a PCoIP application such as AWS NiceDCV. This is an easy way to remotely listen to the output mix or cue bus of the mixer without using an NDI stream.

The Local Audio monitor can be patched to any available ASIO channels, as a stereo pair.

The following example assumes that the Local Audio selector was mapped to ASIO channels 63-64 in the Control Panel (see the output mapping example in Step 5 above).

The image below shows how to patch the Cue bus outputs to ASIO output channels 63-64, so that audio will be routed to the remote client computer via PCoIP. In this configuration, the main LR mix can be monitored in addition to any channel(s) selected for the Cue (or Solo) bus.



4. Add eMo Plugins to Channel Strip

Use these instructions to populate the input and output channel strips with the eMo plugs (F2 Filter, D5 Dynamics, and Q4 Equalizer).



Click small arrow above the channel plugin rack, select “Factory Presets”, then Select “Reset”.



The channel plugin rack will be populated with the three eMo channel strip plugins as shown below.



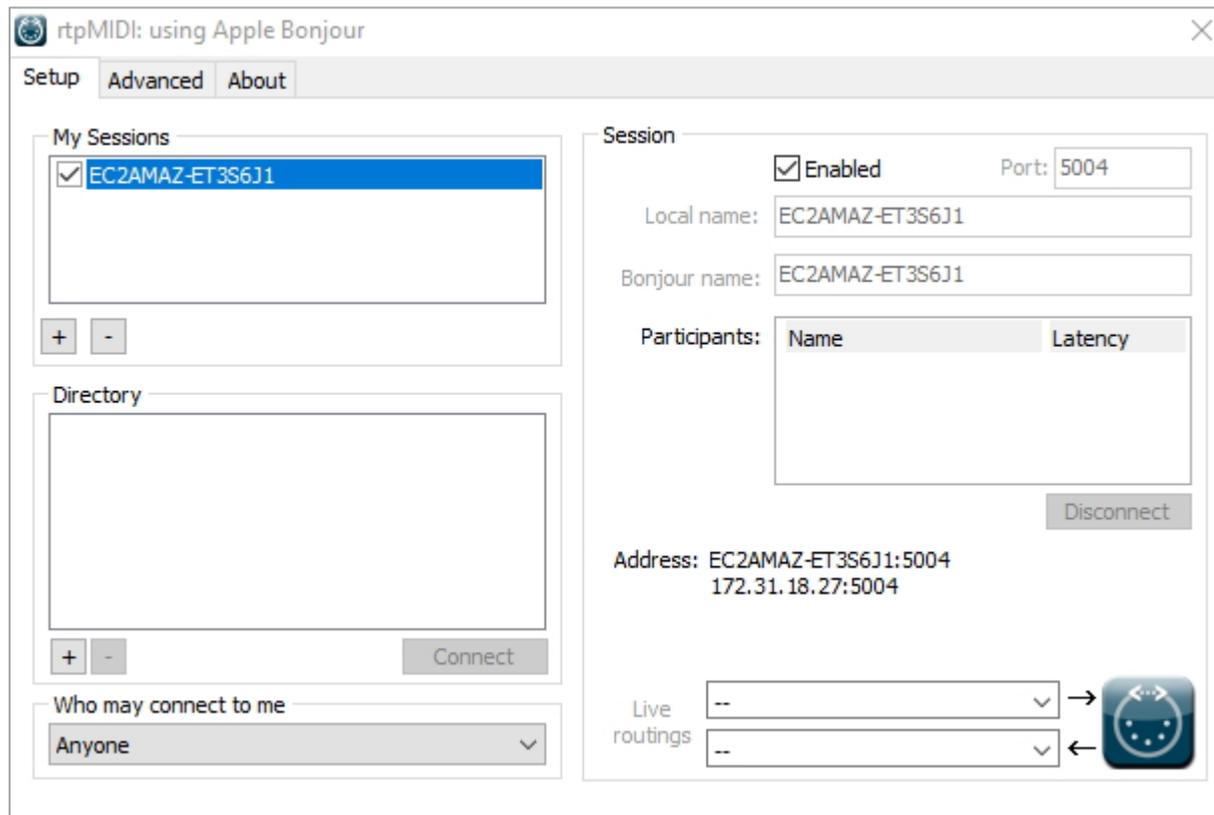
Detailed documentation for the audio mixer features and functionality can be accessed by clicking on the Waves logo at the top right side of the mixer window. Clicking on the logo will open a window showing the software version and provide a link to open the user guide for the audio mixer.



Step 7: Connect FIT Controller with rtpMIDI

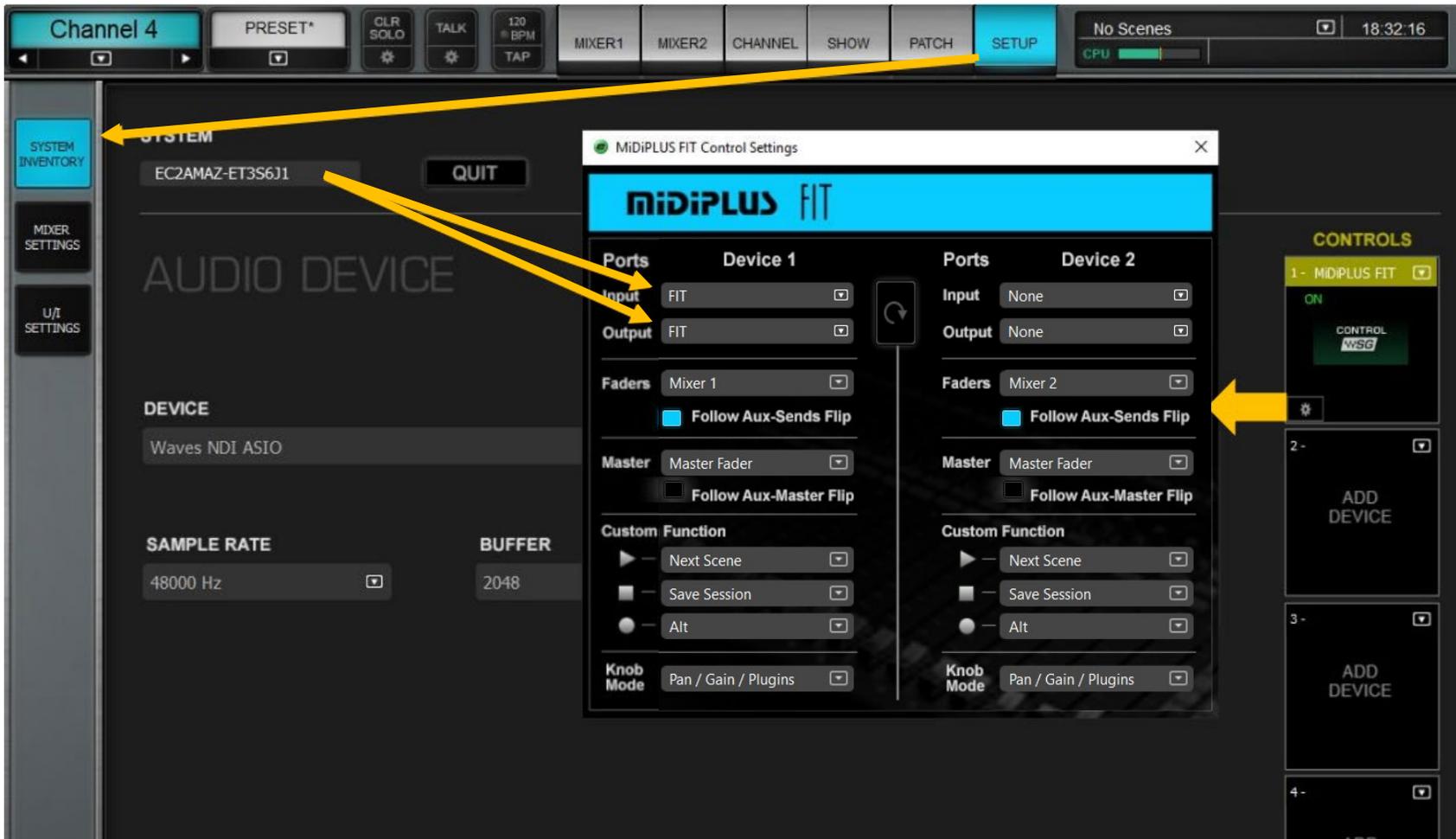
Use these instructions to connect the Waves FIT Controller to Cloud MX from a remote client using rtpMIDI.

1. Install rtpMIDI on the Amazon EC2 instance (see also "Step 2" of this document). The installation utility will install Bonjour and the rtpMIDI driver. Confirm that the EC2 security settings have been opened for the appropriate ports (UDP ports 5004-5005 should be opened if using one FIT Controller).
2. Launch rtpMIDI on the EC2 instance and add the server to "My Sessions". See image below for details.



3. If using a Windows client, install rtpMIDI on the client computer. The installation utility will install Bonjour and the rtpMIDI driver. Also confirm that the rtpMIDI driver is not blocked by any firewall.
4. Launch rtpMIDI on the client computer and add your client session. In the “Directory” add a name for the AWS instance running Cloud MX, the public IP address and port (5004).
5. Connect the FIT Controller using a USB cable to the client computer and power on the FIT.
6. On the client computer, select the FIT from the dropdowns in the “Live Routings” section of rtpMIDI.
7. Connect the FIT from client to EC2 by clicking on the “Connect” button under the Directory. Be sure that the “Enabled” box is checked under the “Sessions” section on right side of panel.
8. After connecting via rtpMIDI, you can configure the FIT Controller in the SETUP tab on the mixer under System Inventory > Controls. See the image below for details.





It is possible to use two Fit controllers working together, but this requires specific settings. For assistance setting two FIT controllers with CloudMX, contact our [customer support team](#).



Troubleshooting Guidelines for Cloud MX

This section provides some guidance for issues that may occur when deploying Waves Cloud MX.

Issue	Potential Steps to Solve
NDI streams do not appear on the Waves ASIO control panel for NDI®	<p>Check that NDI Tools have been installed on the instance.</p> <p>Check that all ports for NDI are open between instances using NDI in the security groups.</p> <p>Check that the NDI Discovery Server is running on at least one instance in the NDI network.</p> <p>Check that the NDI Access Manager is running on the instance running Waves Cloud MX and that it points to the proper IP for the NDI Discovery Server.</p>
Waves Cloud MX displays a missing license error when launched	<p>Check that the Amazon EBS Volume is attached to the instance.</p> <p>Check that the EBS Volume includes the Waves licenses (using the Waves Central application).</p>
Screen displays and plugin windows appear very sluggish or pixelated	<p>Check that the proper GPU drivers have been installed on the EC2 instance.</p>
Waves NDI ASIO driver cannot be loaded on the Cloud MX setup tab	<p>Check that NDI Tools have been installed on the instance.</p>



Waves Cloud MX Health Check

Waves Cloud MX includes built-in diagnostics and logging functions that can be used to diagnose issues that you may have with the mixer.

Diagnostics

Complete diagnostics are accessed through the Setup tab. Select “Mixer Settings”, and then select the “Diagnostics” button in the “Troubleshooting” section of the screen.

A privacy notice will appear. If you agree to its conditions, the diagnostics file will be placed on the instance desktop.

Logging

Waves Cloud MX constantly logs its activity with comprehensive logging. This information can assist you and Waves technical support in identifying and resolving issues.

To enable verbose logging for troubleshooting purposes on Cloud MX, select the Setup tab, then select “Mixer Settings”. Select “Enable Logging” in the “Troubleshooting” section of the screen.

Log files can be viewed or downloaded by clicking the “Logs” button in the Troubleshooting section of the screen.



Backup and Recovery

Waves recommends that periodic snapshots are taken of the EBS Volumes attached to the EC2 instance(s) running Cloud MX in the event of an instance or service failure.

EBS Snapshot configuration is described at <https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ebs-creating-snapshot.html>

In addition to utilizing the snapshot and backup capabilities in AWS, it is also possible to save and download the Cloud MX mixer session files. The session files do not include any information specific to the Amazon EC2 instance or other AWS resources.

Refer to the Cloud MX User Guide for more information about saving session files, by clicking the Waves "W" logo at the top left of the mixer console screen.



Application and Software Management

All Waves software and plugins used by the Waves Cloud MX audio mixer are managed by Waves Central. Waves Central is an installation and license activation application that is accessed from the Cloud MX instance via the Internet, and is installed during the deployment of the Cloud MX application on the Amazon EC2 instance (see Step 3, “Install and Activate Waves Software”, in this document).

Waves Central provides an intuitive interface for the user to have complete control of the Waves software licenses they have purchased. Use Waves Central to:

- Install software on the Amazon EC2 instance(s)
- Install and activate software licenses on the Amazon EBS Volume(s)
- Check for patches and upgrades for installed software
- Move licenses from EBS Volume(s) to the Waves Central account, to be re-activated on different instances or EBS Volumes



Emergency Maintenance and Support

Waves Cloud MX is supported directly by Waves Technical Support for licensed customers. Contact information for Waves Technical Support is provided with the license purchase and is available 7 days per week.

Waves also maintains a user-accessible product knowledge base on the Waves Technical Support website, with self-guided assistance for the audio mixer and processing plugins.

