SHURE®

Microflex Ecosystem and Webex devices

Setup guide

SHURE®

webex
by CISCO

Document version: 1.0
Date: 08th October 2021

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Introduction

This setup guide has been developed by Shure and Cisco. The guide provides comprehensive instructions on how to setup Shure's Microflex Ecosystem solutions with a selection of Webex room conference devices, using either the Shure P300 Conferencing Processor or ANIUSB-MATRIX Dante Interface.

For additional information please refer to the latest product documentation, FAQs, and user guides available on the Shure and Cisco websites.

Video conferencing and collaboration devices are used in different rooms and spaces. Optimizing the audio experience is important to ensure a successful online meeting. Cisco has documented best practices how to create effective video-enabled rooms, and we recommend you to download the Best Practices guide from Project Workplace.

Further reading

- Cisco Project Workplace
- Webex Maintain and Operate Guides
- Webex Device Configurations for Room and Desk Devices and Webex Boards
- Webex Desk and Room Devices: USB Microphone Support
- Shure Tech Portal
- Shure Audio Institute
- Shure Microflex Ecosystem
- Shure Knowledge Base – FAQ
- Shure Integrated Systems YouTube Channel
- Shure Technology Partners: Cisco
- Download Shure Designer
- Download Shure Web Device Discovery
- Download Shure Microflex Wireless Software
- Shure Product User Guides
- Shure – Enterprise Network Troubleshooting Checklist
- Shure Ignite Blog – Best Practices for Audio Security

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Devices and software/firmware versions

Cisco Webex devices

The following Webex devices are covered in this document:

Codec Pro based devices
Audio connector type: Euroblock
Cisco Webex Codec Pro
Cisco Webex Room Kit Pro
Cisco Webex Room 70 G2
Cisco Webex Room 70 Panorama
Cisco Webex Room Panorama

Codec Plus based devices
Audio connector type: 3.5 mm mini jack
Cisco Webex Codec Plus
Cisco Webex Room Kit Plus
Cisco Webex Room 55 Dual
Cisco Webex Room 70

Other devices
Audio connector type: 3.5 mm mini jack
Cisco Webex Room Kit
Cisco Webex Room 55

Check for latest Webex device software here.

Webex devices registered to the Webex cloud service get upgraded automatically.

For Webex devices registered on-premises, software version CE9.15 is a minimum requirement for some level of integration. More details on functions enabled on the different software versions are available later in this document.

Shure devices

Check for latest Shure device firmware using Designer software.

Shure	Minimum Firmware/ Software Version
Shure Designer Software	4.4.1
Shure Microflex Wireless Software	1.1.0
Shure P300 Conferencing Processor	4.4.13
Shure ANIUSB-MATRIX Dante Interface	4.4.14
Shure MXA910 Ceiling Array Microphone	4.4.11
Shure MXA710 Linear Array Microphone (2-foot and 4-foot models)	1.2.1
Shure MXA310 Table Array Microphone	4.4.9
Shure MXN5 Networked Ceiling Loudspeaker	1.2.1
Shure MXA-MUTE Networked Mute Button	1.2.4
Shure Microflex Wireless (MXWAPT2, MXWAPT4, MXWAPT8, MXWNCS2, MXWNCS4, MXWNCS8, MXW1/O, MXW2, MXW6, MXW8)	9.0.4

Audinate	Minimum Firmware/ Software Version
Dante Controller	4.4.0.8

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Webex Devices and recommended audio connectivity

This guide describes how to set-up Shure's Microflex Ecosystem solutions with Webex room devices using:

- Bi-directional audio support over analog audio connections, and
- Mute sync over USB.

The Webex devices are grouped based on the connector type used for audio I/O, refer to the table below:

- 3.5 mm mini-jack connectors
- Euroblock balanced audio connectors

For the first category, you should use the Shure VCC3 Video Conference Cable Kit, which is pre-wired to interface with Webex devices without adversely affecting the mute control. Modification to this cable is not required.

For the second category, you must make a custom cable according to the specification in the "Pin-outs" chapter.

Webex devices with 3.5 mm mini-jack connectors	Webex devices with Euroblock connectors
Shure VCC3 Video Conference Cable Kit	*Custom 3-pin Euroblock balanced audio cable*
Room Kit	Codec Pro based devices
Room 55	
Codec Plus based devices	

Shure and Cisco have tested at least one product in each category. Exhaustive testing on every product has not been carried out. Functionality is expected to be consistent across products in the same categories unless explicitly noted.

Shure's tests were carried out with the following hardware and software versions:

Hardware	Software
Room Kit Plus	RoomOS 10.4.1.1
Codec Pro	RoomOS 10.4.1.1

Cisco's tests were carried out with the following Shure hardware and software version.

Hardware	Firmware/Software Version
Shure P300 Conferencing Processor	4.4.13
Shure ANIUSB-MATRIX Dante Interface	4.4.14
Shure MXA910 Ceiling Array Microphone	4.4.11
Shure MXA310 Table Array Microphone	4.4.9

* For an optimal set-up, we recommend to integrate the Shure Microflex Ecosystem with analog connections, as described in this document.

However, from RoomOS 10.8 onward, you can integrate third-party USB microphones with Webex devices by configuring the USB port as a USB input.

A few Webex devices, e.g. Room Kit Mini, don't have analog microphone inputs. Hence, USB is the only option for connecting external microphones to these devices.

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Pin-outs

Note that the Webex devices use four-pin microphone inputs: signal +; signal –; ground; and mute control (marked with a microphone symbol). The mute control is for Cisco's own-brand microphones only, and shall not be connected. This is particularly important to note when using a bespoke balanced audio cable with the Webex devices.

The connection must be done to the first microphone input and the first loudspeaker output connector.

3.5 mm mini-jack, male connector		
	Microphone input	*Line output*
Connector pin out	Tip = Hot Ring 1 = Cold Ring 2 = Mic Control (do not connect) Shield = GND	Tip = Left channel Ring = Right channel Shield = GND
Signal type	Balanced	Unbalanced
Connector (codec)	Mini-jack 3.5 mm, 4-conductor	Mini-jack 3.5 mm, 3-conductor
Input impedance	900 Ohm/leg	N/A
Output impedance	N/A	470 Ohm
Maximum input level	-18.3 dBu ±2 dB	N/A
Maximum output level	N/A	8.2 dBu ±2 dB
Phantom power	10 V ± 0.5 V	N/A
Phantom power resistor pin "tip"	1.0 kOhm	N/A
Phantom power resistor pin "ring 1"	1.0 kOhm	N/A
Frequency response	20 Hz-20 kHz ±1 dB	20 Hz-20 kHz ±1 dB
Signal to Noise Ratio	-95 dB	-100 dB

Euroblock type male header, 3.5 mm pitch		
	Mic/Line input	*Line output*
Signal Type	Balanced	
Pin-out	Pin 1 = Hot Pin 2 = Cold Pin 3 = GND Pin 4 = Mic Control (do not connect)	Pin 1 = Hot Pin 2 = Cold Pin 3 = GND
Impedance	2.5 kOhm/leg	200 Ohm/leg
Recommended Load Impedance	N/A	>6 kOhm
Signal Level	Max 24 dBu with 0 dB input gain Input gain adjustable from 0 to +70 dB, default +58 dB	0 dB output gain: 18 dBu +/- 1 dB Output gain adjustable from 0 to -24 dB

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Installation and configuration

Connectivity

Connect the components as shown in the illustration.
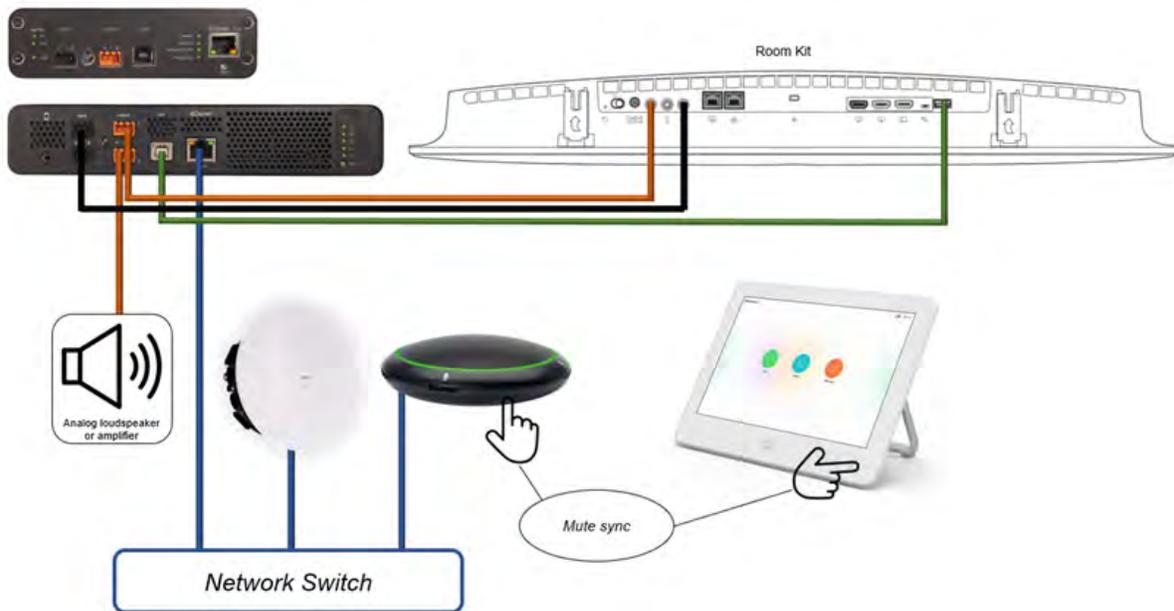
Although shown without connections, ANIUSB-MATRIX is included for illustration and is interchangeable with P300 where possible, depending on overall system requirements.

MXA310 is used to illustrate microphone with in-built mute button and LED ring. MXA910 and MXA710 are interchangeable for illustration, but they do not include an in-built mute button but will reflect mute status with their respective LED indicators. If you wish to include independent muting while using MXA910 or MXA710, use the MXA-NMB Network Mute Button.

Only Room Kit is shown in the illustration, but a similar set-up also applies to the other Webex products. The connector placement for the Webex products is shown on the next page.

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Webex devices: Connector placement

Codec Plus based devices
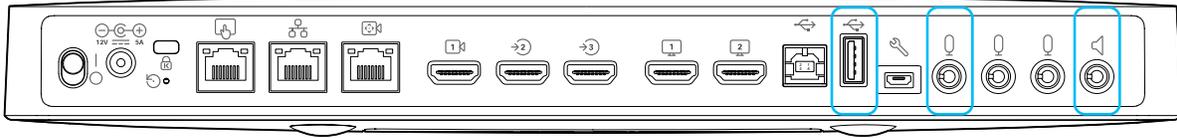
Room 55 Dual and Room 70 use the USB port for internal purposes. To connect audio equipment,a small USB2 hub needs to be inserted.

Room Kit
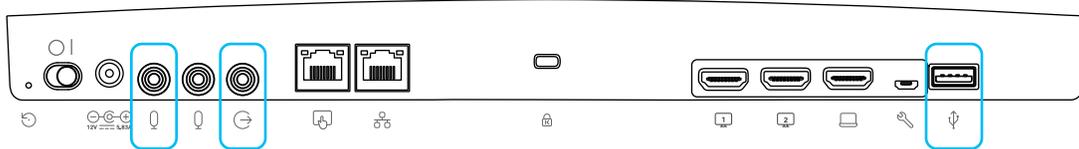
Room 55

Codec Pro based devices

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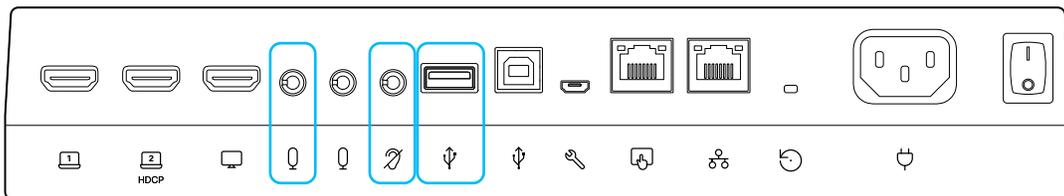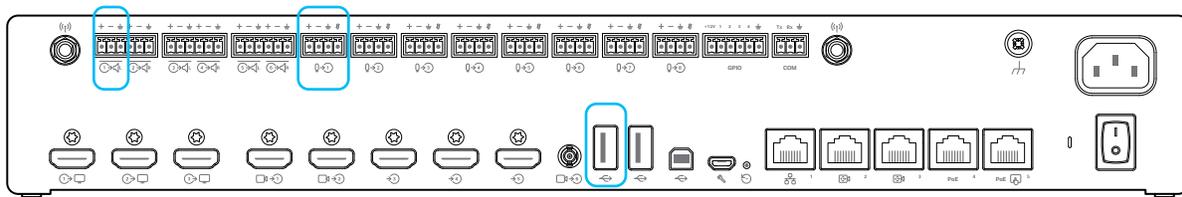
Audio signal processing

The following audio signal processing options applies when deploying the Microflex Ecosystem with Webex devices.

In many cases both approaches can give a working solution. Since the resulting audio quality is impacted by many factors, it may be valuable to set up and test both approaches to find the best solution in your environment.

IntelliMix DSP on-board the Shure microphones and/or the P300-IMX processor

In this case all audio signal processing, including echo cancellation, noise reduction, microphone auto-mixing and time-variant processing, is performed by the Shure products.

We recommend you to turn off similar processing in the Webex device, because doing it in two places may cause artifacts and quality reduction.

This is an effective approach for many deployments of Microflex Ecosystem with Webex devices. It allows for more microphone channels than the Webex device can handle natively, special signal routing, and integration of products that allow non-linear processing, beamforming, and auto-mixing.

Audio signal processing in the Webex device

In this case audio signal processing, including echo cancellation, noise reduction, microphone auto-mixing and time-variant processing, is performed by the Webex device to the largest extent.

We recommend you to turn off similar processing in the Shure equipment, because doing it in two places may cause artifacts and quality reduction.

Consider this approach in set-ups that require stereo or spatial audio. Such set-ups require multiple AEC references to perform adequately.

Currently, the IntelliMix DSP on the P300 Conferencing Processor and in the MXA910 and MXA710 array microphones only accepts one AEC reference. This limits the potential to deploy a spatial audio system with variable sound sources in the room.

Loudspeaker options

The term "networked loudspeaker(s)" refers to Shure's MXN5C-W or any other suitable loudspeaker in the same product range operating on DANTE or AES67.

When using P300 with any of the named Webex devices, you can use external analog loudspeakers, networked loudspeakers, and/or the internal loudspeaker on the Webex device. This is because the P300 has 2 analog audio inputs and 2 outputs, so even if an analog audio connection is required for mic input to the Webex device, there is another output available to connect to an analog loudspeaker or amplifier.

When using ANIUSB-MATRIX with any of the named Webex devices, it is recommended to use only networked loudspeakers, and/or the internal loudspeaker on the Webex device, and not external analog loudspeakers or amplifiers. This is because the analog output on the ANIUSB-MATRIX is used to carry the microphone signal to the Webex device, and there are no additional analog outputs to connect to an analog loudspeaker of amplifier.

Switching between loudspeaker modes on the Webex devices is typically done via the Webex device's local web interface under **Settings > Configurations > Audio**, or by accessing the command line API and performing steps using **xConfiguration Audio**. This requires an admin or integrator user role.

For the Codec Pro based products, settings can be changed via the web interface's Audio Console.

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Network security considerations

To strengthen the protection of media and other networking services, precautions must be taken to minimize these risks. Encrypted and authenticated media streams as well as control signaling are important to protect sensitive data.

We recommend precautions such as isolation of the networked audio components from the corporate network and enabling encryption and authentication. Shure has published several documents on this topic:

- Product user guides related to Network Audio Encryption, e.g., https://pubs.shure.com/guide/P300 and https://pubs.shure.com/guide/MXA910

- Best Practices for Audio Security

Keep software and firmware of all devices up-to-date to benefit from functional and security related fixes and improvements.

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Configuration of the Shure devices

Your Microflex Ecosystem should be setup and configured in the normal way, following best practices and latest guidance from Shure.

Below are some notes on best practices.

1. Install the Shure and Webex devices based on the schematics and use cases described earlier in this document.

2. Use the Optimize feature in Shure Designer software to automatically configure the following settings:

   a. Creation of audio routes between devices

   b. Turn on mute synchronization

   c. Adjust audio settings

   Note: Mute/LED synchronization and call status can be manually enabled/disabled as follows:

   In Shure Designer:

   When using MXA310:
   - Open the Settings page (cog icon) for the MXA310.
   - Under the Logic Control heading and page, look for Mute Control Function and select Logic Out.
   - For the given interface (P300, ANIUSB-MATRIX), open the Inputs page, and select the Logic Enable tick-box on any channel. This will enable logic on all channels.
   - LED/mute sync will now be active.
   - Open the Settings page (cog icon) for the Shure interface.
   - Under the Settings header, find the Call Status section.
   - Select Enable Call Status.
   - Call status will now be enabled.

   MXA710 and MXA910 do not include a mute button, so only the interface (P300/ANIUSB-MATRIX) requires logic enablement when using those microphones.

Add Shure's MXA-NMB Networked Mute Button to the system if you wish to include additional physical mute/LED interfaces when using the Microflex Ecosystem.

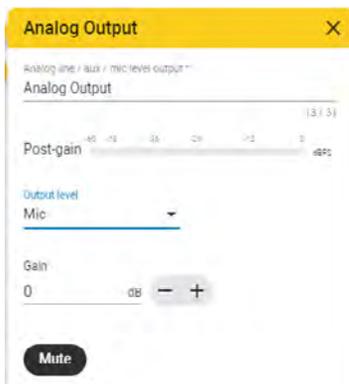3. When using P300: After using Optimize, all audio routing paths should be made. Now go to Step 5.

4. When using ANIUSB-MATRIX: After using Optimize, open the Matrix Mixer. Map cross points for Dante Audio Input 1-4 > Analog Output.

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5. Set input and output levels on the Shure interface.

    If using analog audio I/O: In the Schematic page of either P300 or ANIUSB-MATRIX:

    a. Set Input Level on Analog Input to "Aux".

    b. Set Output Level on Analog Output to "Mic".

- If using loudspeaker(s) other than the MXN5W-C, you may need to manually adjust the matrix mixer routing in the P300 or ANIUSB-MATRIX to ensure program and conference audio are fed to the loudspeakers appropriately.

- If using additional audio input or output devices (networked or analog) you may need to manually adjust matrix mixer routing and other audio settings in the P300 or ANIUSB-MATRIX to ensure satisfactory performance from all devices.

6. Configure and aim microphone lobes and remaining items as per product and system guidance.

7. If you are using Shure DSP, skip this step and continue setting up the Webex system.

    If deploying a system with Webex audio DSP, you should turn off AEC processing in the IntelliMix-enabled microphone or P300 processor.

    a. On the MXA910 or MXA710 product config windows in Designer, find the IntelliMix window. Select the AEC block in the IntelliMix Channel strip and flip selector to OFF. Now AEC will not occur in the microphone. (This step does not apply to MXA310 as there is no on-board AEC processing offered).

    b. On the P300, open the Schematic window. Open the AEC block on Chanel 1 and flip selector to OFF. Repeat for all channels. No AEC will occur in the P300.

Note, when using Microflex Wireless:

- When deploying a Microflex Wireless system in conjunction with P300 or ANIUSB-MATRIX, you must manually create audio routes between devices – using Dante Controller – and manually adjust audio settings using the respective MXWAPT, P300, or ANIUSB-MATRIX configuration tabs. Call status and LED/mute sync will not be available.

Configuration of the Webex devices

As explained previously, audio signal processing, including echo cancellation (AEC), may be done either in the Shure products, or in the Webex device. The next sections explain how to configure the Webex device in both cases.

Echo cancellation using the Shure products

Room Kit, Room 55, and Codec Plus based devices

Configuration can typically be done using the Webex device's local web interface (**Settings > Configurations > Audio**), the command line API (**xConfiguration Audio**), or via a management system such as Control Hub or Cisco UCM. Access to the relevant configurations requires an Admin or Integrator role.

Audio setting	Room Kit, Room 55	Codec Plus based devices
Input Microphone [n] level [1]	Mic 2 = 14	Mic 1 = 14
Input Microphone [n] Mode [1]	Mic 1 = Off	Mic 1 = On
	Mic 2 = On	
Input Microphone [n] EchoControl Mode [1]	Mic 2 = Off	Mic 1 = Off
Microphones AGC	Off	Off
Microphones Mute Enabled	True	True
Microphones PhantomPower	Off	Off
Output InternalSpeaker Mode	[2] See note 2	[2] See note 2
Output Line 1 Mode	On	On
Output Line 1 OutputType	Loudspeaker	Loudspeaker

[1] **Note 1:** In Room Kit and Room 55, "Microphone 1" is the Webex device's built-in microphone. Settings for the external microphone connection are "Microphone 2".

[2] **Note 2:** Options for the InternalSpeaker Mode are: Off / On / UltrasoundOnly. If you have designed the system to use external loudspeakers only, we recommend selecting "UltrasoundOnly". If you have chosen not to use external loudspeakers, then you should select the "On" setting for the InternalSpeaker Mode.

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Codec Pro based devices

We recommend that you use the Audio Console application, which is part of the Webex device's local web interface to set up the audio inputs and outputs.

- Navigate to **Audio Console** and click **Confirm** to open the application and disable automatic configuration. Then configure as required.

Input groups	Output groups
Microphone	Loudspeaker > Line 1
Direct: Off	Mode: On
Mixer Mode: GainShared	Level (dB): –4
Sharing Mute: Off	Channel: Mono
AGC: Off	Delay (ms): 0
Channels: 1	Delay Mode: Fixed
	Equalizer: Off
Microphone 1	
Mode: On	
Level (dB): 58	
Channel: Mono	
Phantom Power: Off	
Echo Control: Off	
Noise Reduction: N/A	
Mute on Inactive Video: Off	
Video Input Source: 1	
Equalizer: Off	

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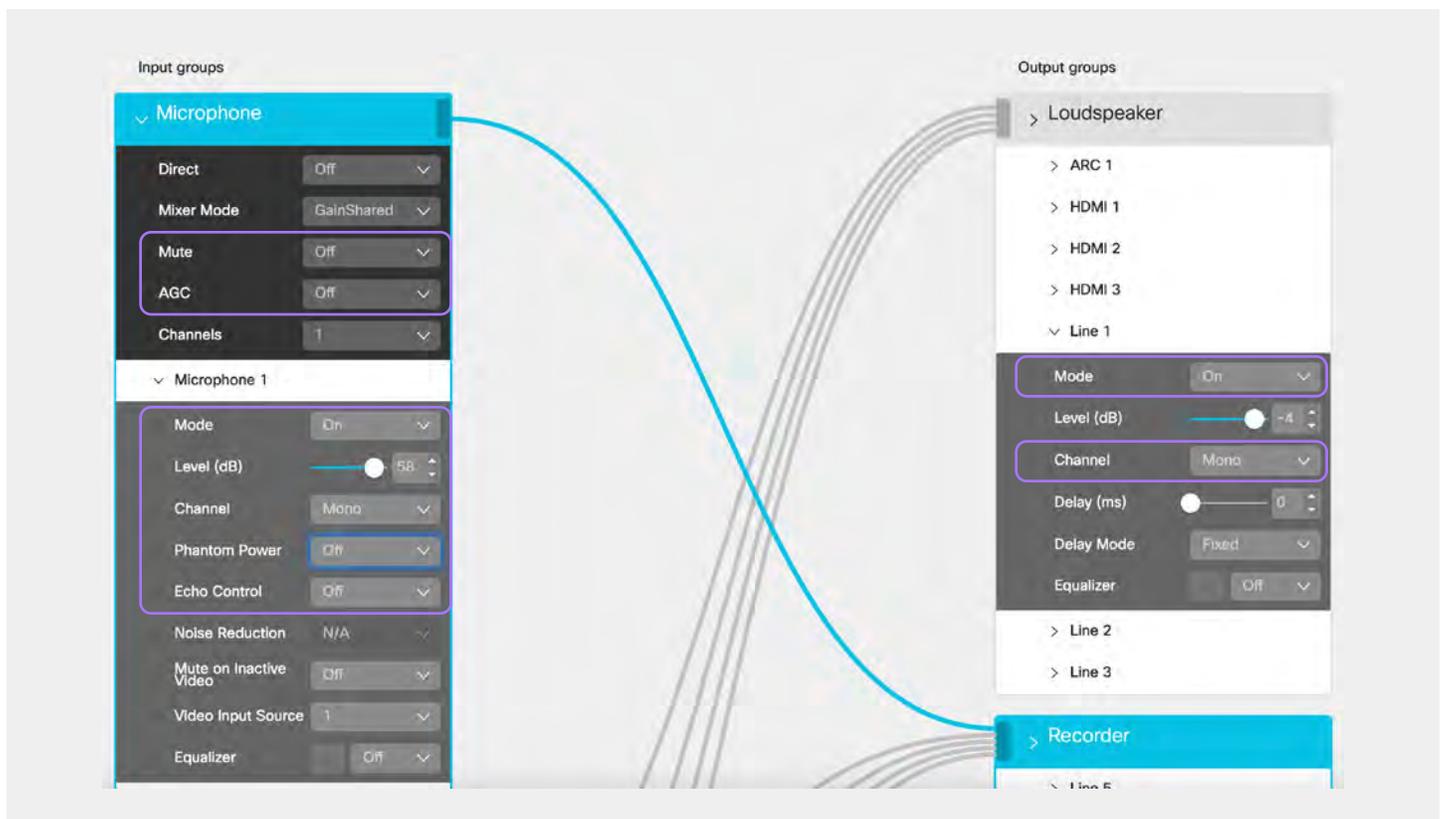
Echo cancellation using the Webex device

Configuration can typically be done using the Webex device's local web interface (**Settings > Configurations > Audio**), the command line API (**xConfiguration Audio**), or via a management system such as Control Hub or Cisco UCM. Access to the relevant configurations requires an Admin or Integrator role.

For Codec Pro based devices, we recommend that you use the Audio Console application, which is part of the Webex device's local web interface to set up the audio inputs and outputs.

- Navigate to **Audio Console** and click **Confirm** to open the application and disable automatic configuration. Then configure as required.

Audio setting	Room Kit, Room 55	Codec Plus based devices	Codec Pro based devices
Input Microphone [n] level [1]	Mic 2 = 14	Mic 1 = 14	Mic 1 = 56
Input Microphone [n] Mode [1]	Mic 1 = Off Mic 2 = On	Mic 1 = On	Mic 1 = On
Input Microphone [n] EchoControl Mode [1]	Mic 2 = On	Mic 1 = On	Mic 1 = On
Microphones AGC	On	On	N/A, default is On
Microphones Mute Enabled	True	True	True
Microphones PhantomPower	Off	Off	Microphone 1 Phantom Power: Off
Output InternalSpeaker Mode	[2] See note 2	[2] See note 2	[2] See note 2
Output Line 1 Mode	On	On	On
Output Line 1 OutputType	Loudspeaker	Loudspeaker	N/A

[1] **Note 1:** In Room Kit and Room 55, "Microphone 1" is the Webex device's built-in microphone. Settings for the external microphone connection are "Microphone 2".

[2] **Note 2:** Options for the InternalSpeaker Mode are: Off / On / UltrasoundOnly. If you have designed the system to use external loudspeakers only, we recommend selecting "UltrasoundOnly". If you have chosen not to use external loudspeakers, then you should select the "On" setting for the InternalSpeaker Mode. All Codec Plus based devices except Codec Plus itself, have the UltrasoundOnly option.

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Audio tests

There is currently no simple automatic and/or objective test to determine the audio quality of the overall system.

Below are some suggestions for test call evaluation. We recommend making several calls, and wherever possible use multiple participants in the meeting room being tested and use multiple far end participants to gauge a range of responses.

Check the following (not exhaustive):

- Your microphone volume, tone, and speech quality are received fully and perceived by far end participants as satisfactory.

- Maximum loudspeaker volume in your meeting room is set to a reasonable level which cannot be exceeded by an in-room participant.

- Mute sync, LED, call status and their relevant feedback indicators work as described and without noticeable latency or lag between the touch controller (Touch 10 or Room Navigator) and/or Shure device(s).

- Audio does not pass when system is muted, and you cannot be heard by the far end in the mute state.

- Audio passes when system is not muted, and the far end hears you clearly in this state.

- The far end participant does not hear themselves back when talking. This proves AEC is working.

- Participants on both far end and in the meeting room are able to hear each other clearly if they momentarily talk over each other.

- System operates as normal following a power cycle of meeting room devices.

- System operates as normal following a power cycle of the network switch providing power to the Shure Audio Ecosystem.

There may be times when during setup it becomes clear the microphone gain or loudspeaker output levels require altering. Use your best judgment and change settings in as few points in the signal chain as possible, as little as possible.

Once configured, the analog audio signal generated by the system and input to Webex must not exceed a maximum signal level of -32 dBu.

Microphone inputs on Webex devices can easily be overloaded if the output gain from Shure IntelliMix P300 or ANIUSB-MATRIX is not set to mic level (-46 dB) analog gain. This may result in microphone signal clipping and distortion.

Legacy devices

Wherever possible, Shure and Cisco recommended using the latest software and firmware versions for all devices.

When using earlier software versions than CE9.15, the mute and LED sync functionality – while using analog audio connections – cannot be guaranteed.

If using a earlier software version than CE9.15, connecting the ANIUSB-MATRIX or P300 to one of the named Webex devices will cause it to present itself as a USB Headset. The user is then presented with options on the Touch 10 / Room Navigator to use "USB Headset" mode, or "Speaker mode". Even if analog audio connections are in place, there is no guarantee of consistent mute sync functionality over USB regardless of which audio mode is selected.

October 2021

For more information
Please visit www.shure.com

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