

# Integrating Polycom EagleEye Director with an HDX and SoundStructure System

This application note describes how to use Polycom's EagleEye Director with an HDX Video conferencing system that is integrated with a SoundStructure system and details the steps for creating a SoundStructure project.

## Integrating the HDX codec and the EagleEye Director

The Polycom EagleEye Director for HDX delivers an affordable, personalized telepresence experience in group meetings by intelligently emulating professional video production techniques enabling better communication and more productive meetings – no remote control or user intervention is required. SoundStructure solutions offer the ultimate in audio quality and flexibility for any size room. Combining these components together is a natural extension of the HDX codec and improves the overall audio experience.

As shown in Figure 1, when the EagleEye Director is used with an HDX codec, the two systems are connected together with a custom cable included with EagleEye Director that connects the audio outputs (1L and 1R) from the HDX codec to the EagleEye Director and connects the same audio to the Amplifier via additional balanced audio cables. In addition to the audio cables, there is a video cable (red in this figure) for taking the video output from the EagleEye Director into the HDX codec.

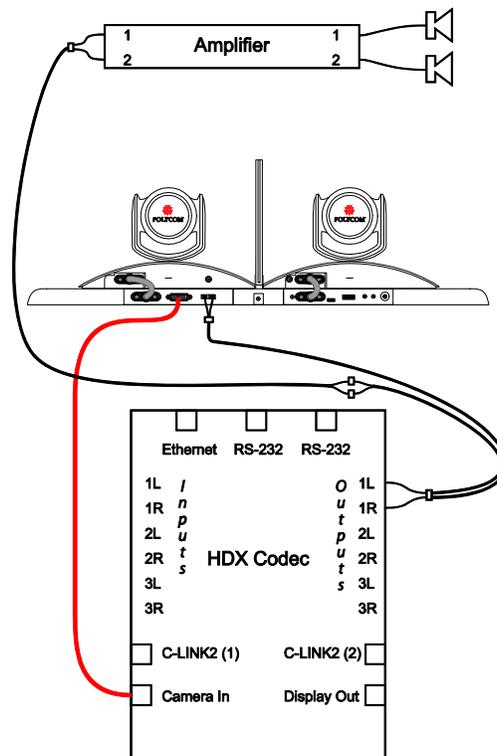


Figure 1 - Signal connections for EagleEye Director and HDX system showing the audio connections (black) and the video signal (red).

EagleEye Director needs the mix of all the remote audio so that the EagleEye Director can properly discern between audio played into the room from the remote sites (i.e., remote talkers) and the local talker audio in the local room when determining camera positioning.

### Integrating the SoundStructure with the HDX codec and EagleEye Director

The HDX codec / EagleEye Director solution can be upgraded with one or more SoundStructure devices by replacing the analog outputs 1L and 1R from the HDX codec with two analog outputs (outputs 1 and 2) to the Amplifier and two more outputs (outputs 3 and 4) to the EagleEye Director as shown in Figure 2.

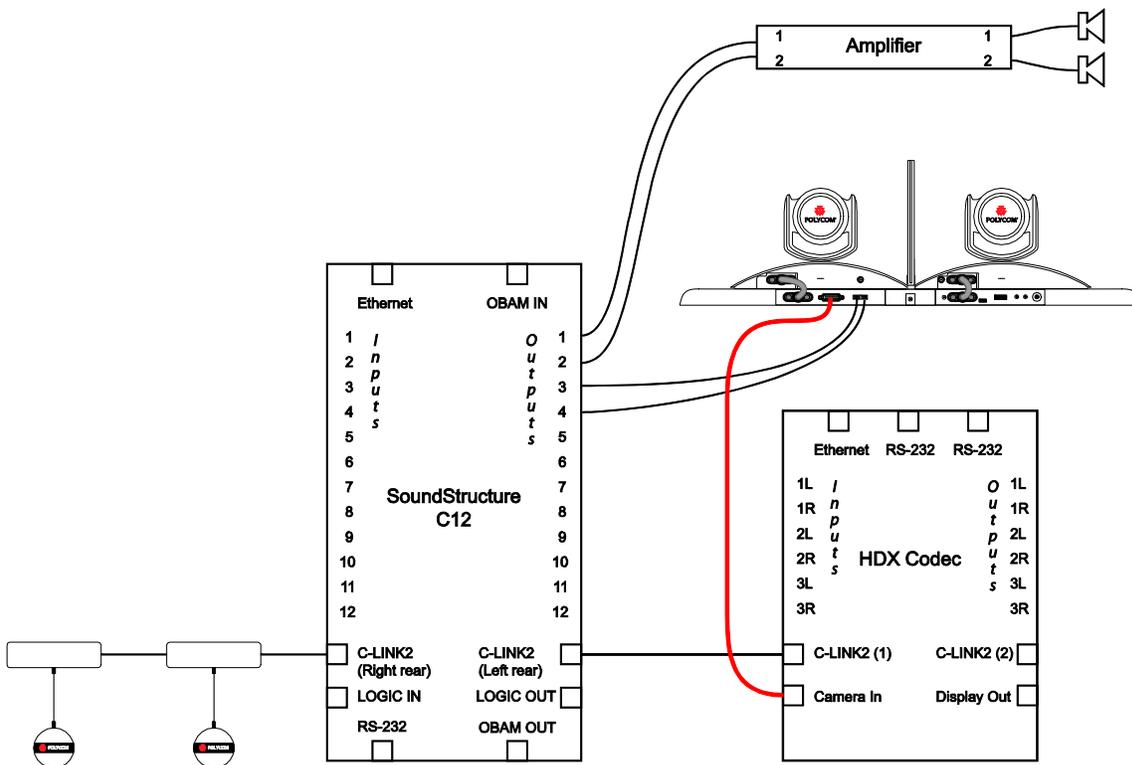


Figure 2 - Integrating SoundStructure with an EagleEye Director uses four balanced audio cables and one conference link interface to the HDX codec.

The four balanced audio cables used are connected straight-through with pin 1 connected to pin 1, pin 2 connected to pin 2, and pin 3 connected to pin 3 as shown in Figure 3.

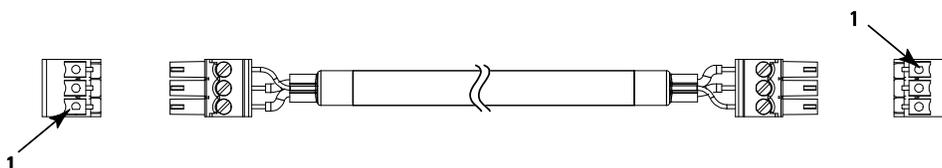


Figure 3 - A standard balanced audio cable with 3.5mm terminal block connectors.

Before connecting the SoundStructure system to the HDX codec, it is recommended that you enable LiveMusic mode in the HDX codec. To do this navigate the HDX UI from Admin Settings > Audio Settings and select **LiveMusic** mode. This



setting will disable any audio processing with the HDX and minimize any audio suppression that may occur in the HDX codec. It is important to make this change before connecting the HDX to the SoundStructure system because the LiveMusic mode option is not visible once the two devices are connected over Conference Link.

The SoundStructure system is connected to the HDX codec using the Conference Link connection. When the SoundStructure system is integrated with the HDX 900x codec, the 18" RJ45-male to RJ45-male Conference Link cable, 2457-23574-001, which is included with every SoundStructure device should be used to connect directly to the HDX codec.

If the SoundStructure system is integrated with an HDX 800x, HDX 700x, or HDX 600x codec, the RJ45 female to Walta male dongle, 2457-25646-001, should be used with the 18" RJ45-male to RJ45-male Conference Link cable to connect the RJ45 connection on the SoundStructure device to the Walta connector on the HDX800x/700x/600x codec. See the Best Practices Guide Polycom SoundStructure and HDX Microphones on Polycom.com for detailed information, pin-outs, and connection diagrams.

### **SoundStructure Studio Configuration File**

The SoundStructure configuration file can be easily customized to support the additional output channel required to drive the input to the EagleEye Director. To complete this integration, the following steps are required:

1. Add a new Stereo output from SoundStructure to the input on the EagleEye Director
2. Add a group that contains both the Amplifier and EagleEye Director outputs
3. Ensure the in-room volume control is done properly so that in-room level adjustments are heard in the room are also heard by the EagleEye Director.

As an example of the customizations required, an example configuration file that supports 2 HDX Ceiling microphones, an HDX codec, and a stereo audio amplifier output will be created.

To start the project, launch the SoundStructure Studio program and select **New Project** from the SoundStructure Studio File menu.

#### **Step 1: Select the Inputs**

1. At Step 1, click **Microphone** and then click **HDX Ceiling microphone**,
2. Adjust the quantity to **2** and click **Add**,
3. Next, add the HDX codec by clicking **Video Codec, Polycom HDX**, and click **Add**.

The resulting channels that are defined are shown in Figure 4.

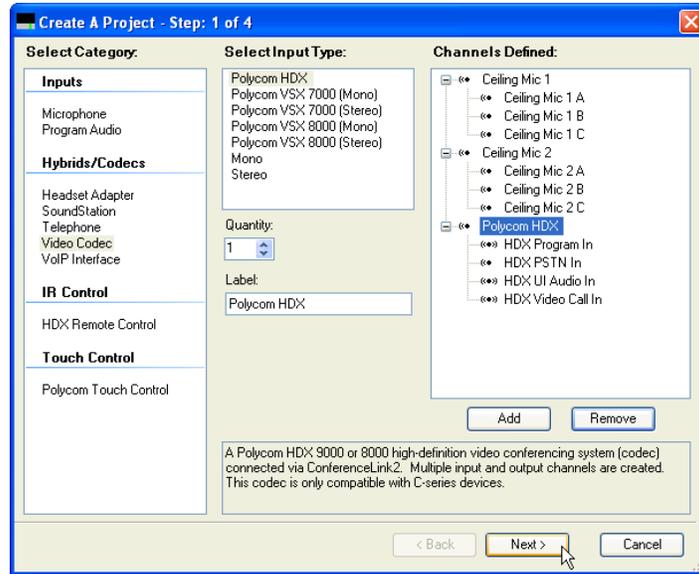


Figure 4 - Step 1 of creating a SoundStructure project.

## Step 2: Select the Outputs

To create the outputs, follow these steps:

1. Click **Next** to select the outputs and select a stereo amplifier called “Amplifier” and click **Add** as summarized in Figure 5.

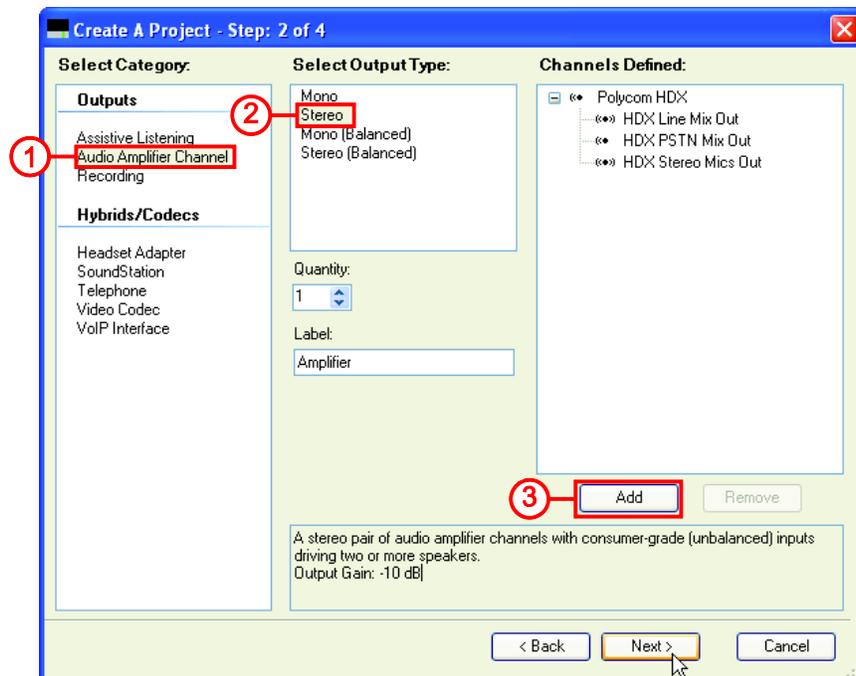


Figure 5 - Add a stereo amplifier channel for the local room audio to the project by following the numbered steps.

- Next, select another stereo amplifier output, rename the channel to “EagleEye” for the EagleEye Director and select **Add** as summarized in Figure 6.

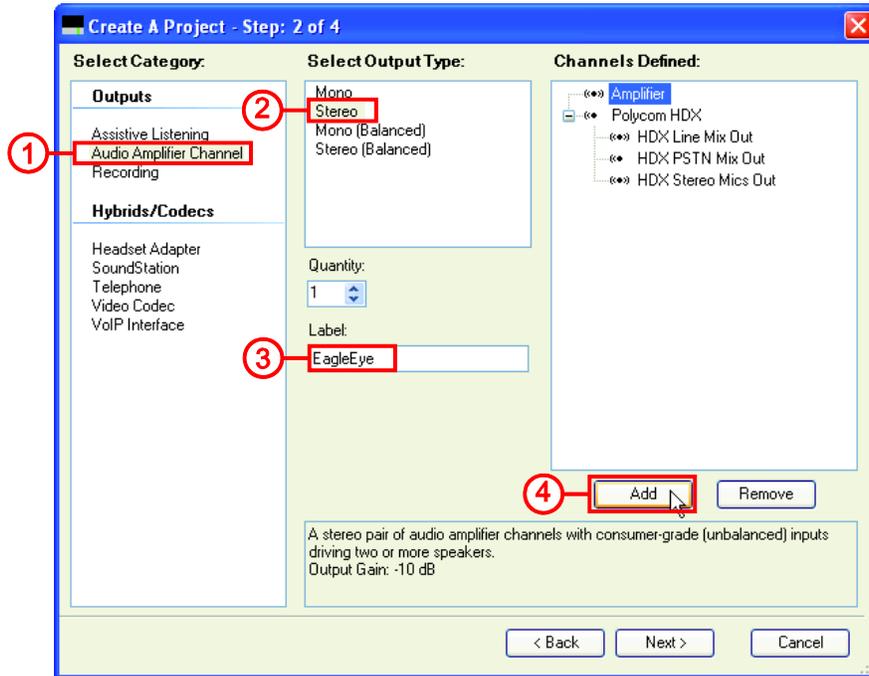


Figure 6 - Add an amplifier channel and rename EagleEye in step 2 of creating a SoundStructure Project by following the numbered steps.

The resulting channels shown in the Channels Defined section are shown in Figure 7.

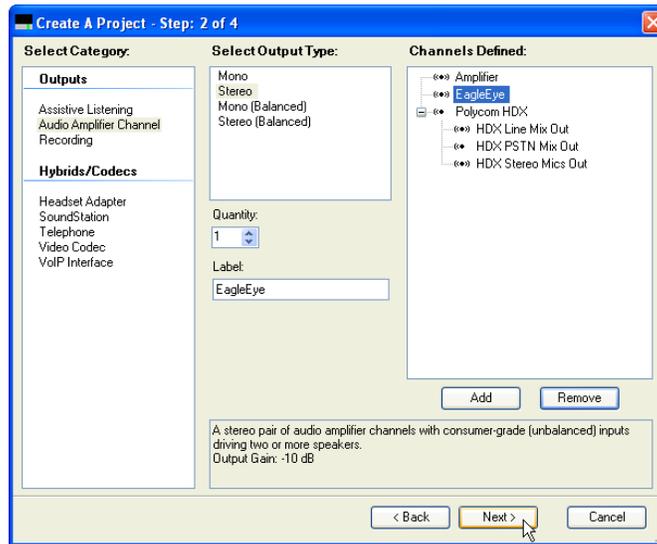


Figure 7 - The result after clicking Add to create the EagleEye audio channel.

### Step 3: Select the Equipment

Click **Next** to continue and select the default SoundStructure devices. In this case a SoundStructure C8 device is required to implement the system as shown in Figure 8. You can manually select a different device or simply click **Next** to get to the last step.

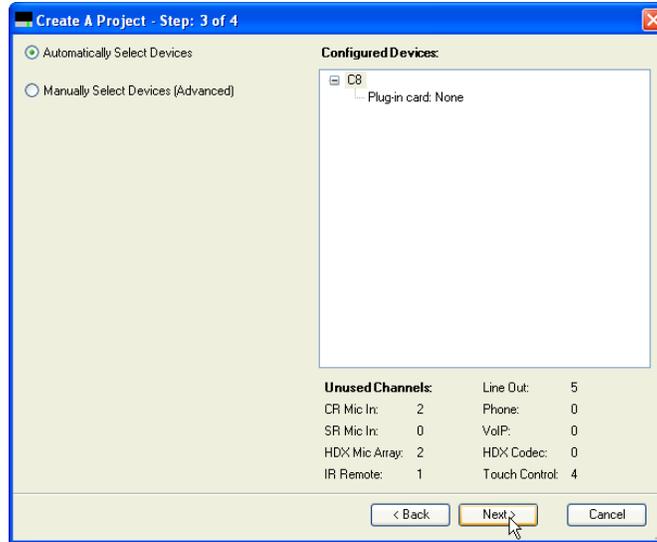


Figure 8 - Step 3 automatically selects the equipment required to implement the design.

### Step 4: Finish the Project

Click **Finish** to create the offline project as shown in Figure 9.

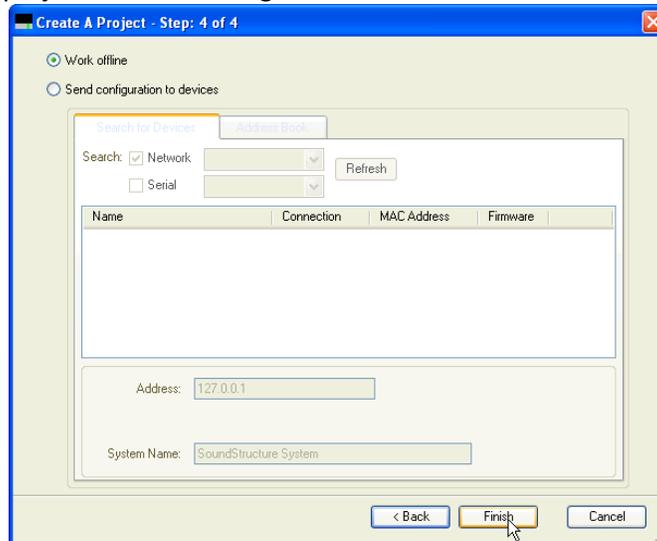


Figure 9 - Select 'Work offline' in the final step of the project to make it easier to make the remaining project changes.

### Matrix Settings

Navigate to the **Matrix** page of the designed project to review the settings as shown in Figure 10. As shown in this figure the remote audio from the Polycom HDX In channel is routed to both the Amplifier and the EagleEye outputs. The bold crosspoint values indicate the matrix crosspoints are unmuted and the value indicates the gain with 0dB indicating that

the signal level is not changed at the matrix crosspoint. Crosspoints can be muted and unmuted by right clicking on the crosspoint.

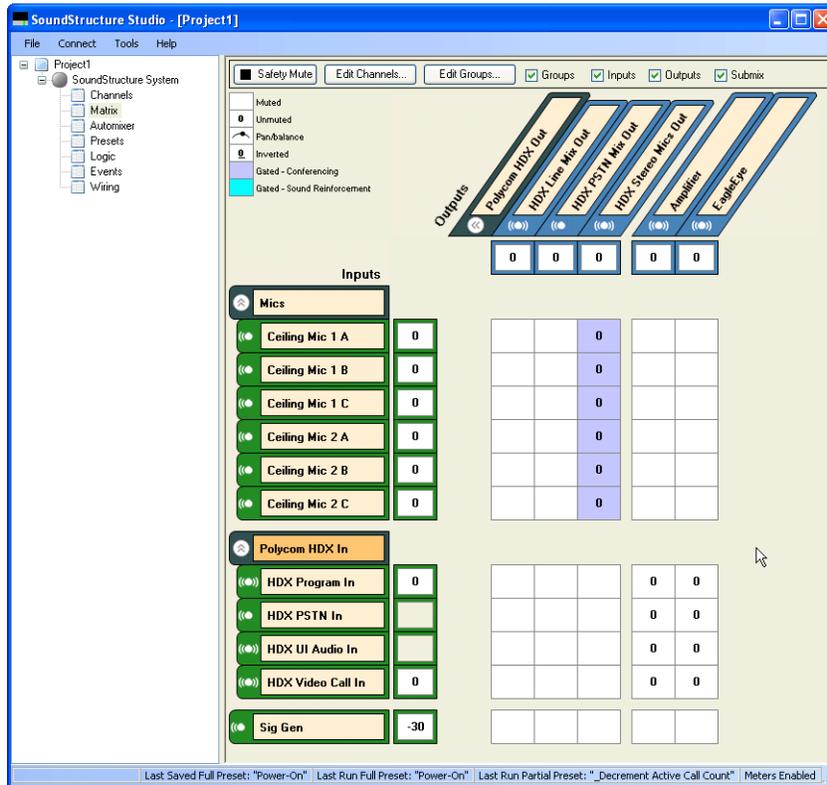


Figure 10 - The default matrix that is created for this project routes the echo cancelled microphones to the HDX codec and the HDX codec audio is routed to the amplifier and to the EagleEye Director.

In preparation for adjusting how volume is controlled, click the **Edit Group** control on the Matrix page and enter a group label of “ToLocalRoom” and press **Add Group** as shown in Figure 11.

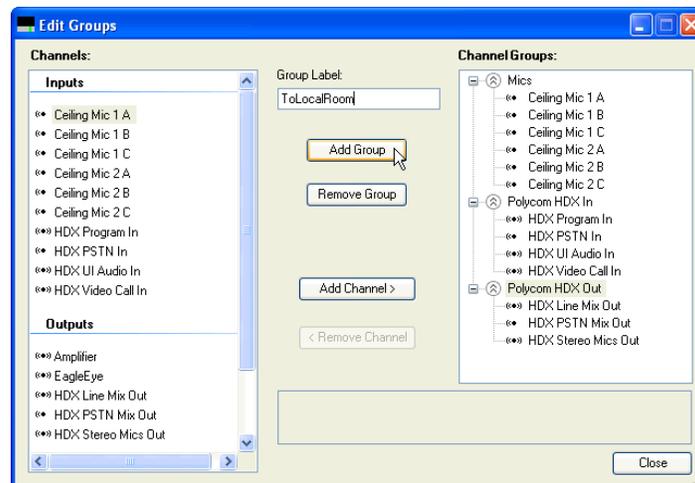


Figure 11 - Using Edit Group to add a group called ToLocalRoom.

After clicking **Add Group** select the Amplifier channel and, while pressing the **Ctrl** button on the keyboard, click the output channel EagleEye to select both outputs and then click **Add Channel>**. This will add both audio channels to the ToLocalRoom group as shown in Figure 12.

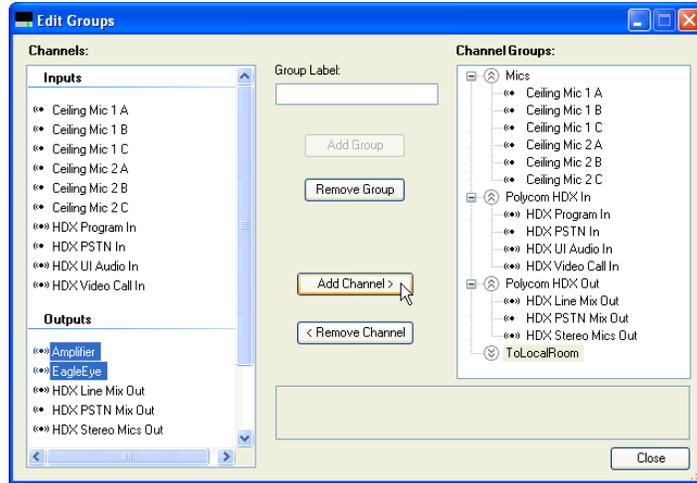


Figure 12 - Use Ctrl left click to select multiple audio channels and then, press Add Channel>.

After pressing **Add Channel>** the resulting Edit Groups page appears as shown in Figure 13.

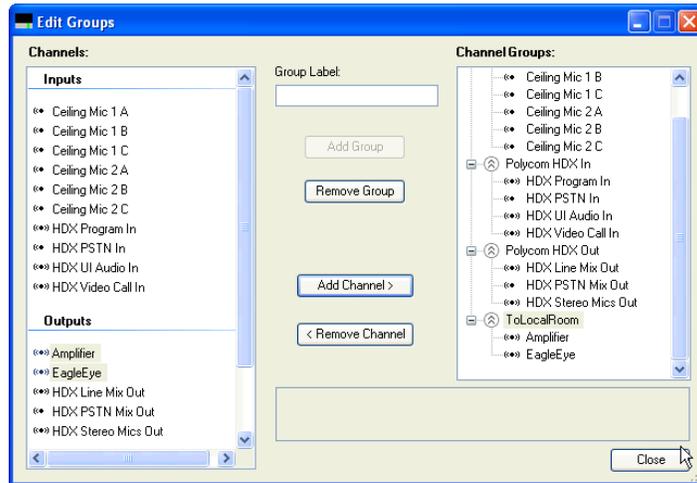


Figure 13 - The ToLocalRoom group includes the Amplifier and EagleEye channels.

The resulting matrix with the new group is shown in Figure 14. Notice that the group is defined as the two stereo output channels Amplifier and EagleEye.

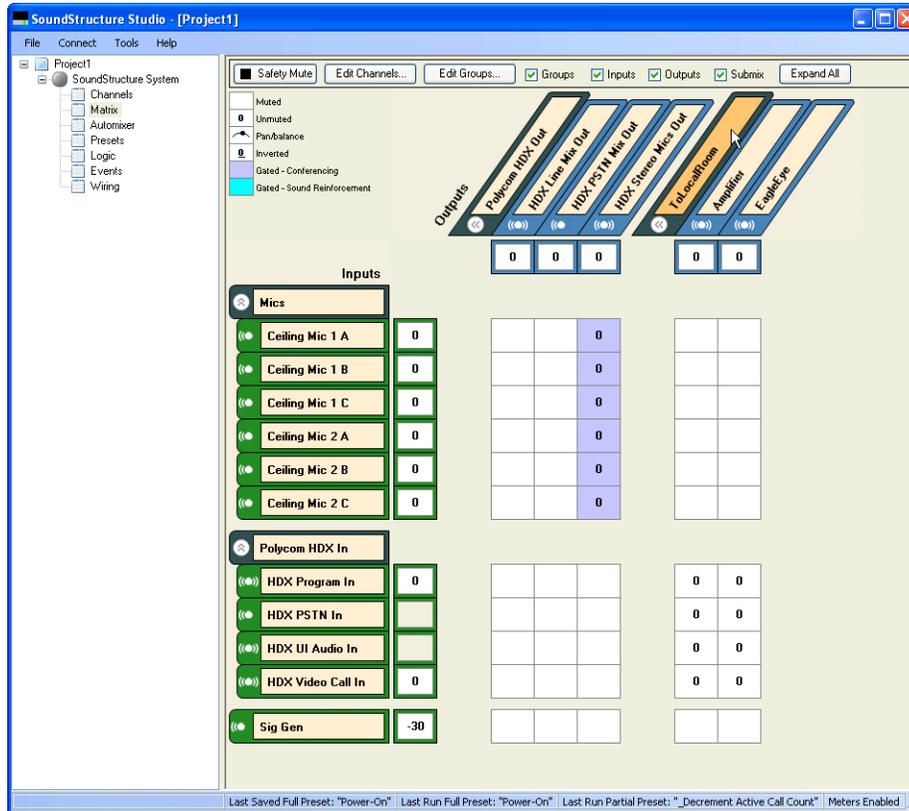


Figure 14 - The audio matrix after the new ToLocalRoom group has been added to the project.

As part of ensuring the volume control adjusts both the Amplifier and EagleEye outputs, the user min and max fader settings on the ToLocalRoom group will be set to match the min and max fader settings on the Amplifier channel. The reason for setting the user min and max fader values is that any time a SoundStructure system is designed with an HDX codec, by default the Amplifier fader min and max values are automatically set to -31 and 20dB respectively as shown in the left side of Figure 15. The user min and max values are set to allow the audio to be adjusted by the HDX codec over a range of 0 and 51 and have that volume range map directly into the Amplifier fader values of -31 to +20dB. This means that when the HDX volume is set to 0, the fader on the Amplifier will be set to -31dB and when the HDX volume is set to 51, the fader on the Amplifier channel will be set to +20dB.

Because we've defined the group ToLocalRoom, we'll set the group user min fader value to -31dB as shown in the right side of Figure 15. The user max value defaults to +20dB, so no change is required. Changing the user min fader value of the ToLocalRoom channel group will automatically adjust the user min fader value of all channels in the group. In this case the user min fader value of the EagleEye output is set to -31dB.

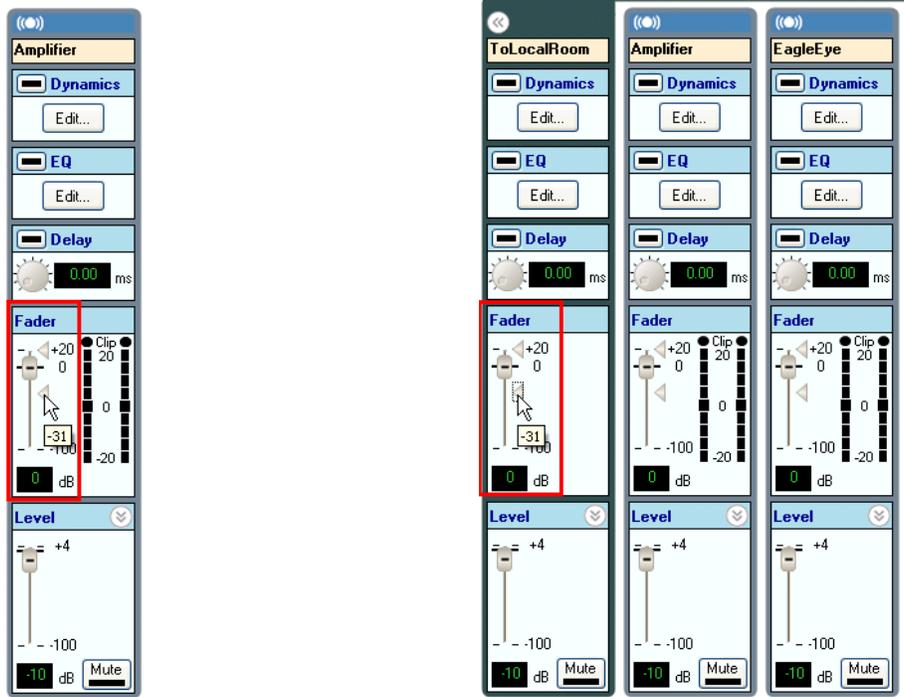


Figure 15 - The fader min value of the Amplifier channel (left) and setting the value of the fader min on the ToLocalRoom group (right).

### SoundStructure Volume Control Events

Next, let's review the Events that are associated with this project and ensure that the audio level to the EagleEye Director stays synchronized with the audio level sent to Amplifier.

On the events page shown in Figure 16, there is a default event called **\_Polycom HDX to SST Volume** that maps the volume from the HDX codec, using the `clink_volume` parameter, to the fader value of the Amplifier channel. To keep the level of the Amplifier and EagleEye outputs the same, edit this event by double clicking in the event and change the Amplifier output to the ToLocalRoom output as shown in Figure 17.

Events						
<input type="button" value="Add Event..."/> <input type="button" value="Remove Event"/> <input type="button" value="Copy To New..."/> <input checked="" type="checkbox"/> Group by audio channel <input type="button" value="Enable All"/> <input type="button" value="Disable All"/>						
Event Name	Status	Source	Parameter	Trigger	Status	Action
<b>Default</b>						
<input checked="" type="checkbox"/> <b>_Polycom HDX to SST Volume</b>		31 Device 1	<code>clink_volume</code>	always	0.0	map fader : Amplifier
<input checked="" type="checkbox"/> <b>_Polycom HDX Call Active</b>	<input type="radio"/>	Device 1	<code>clink_call_active</code>	equals true		run "_Increment Active Call Count"
<input checked="" type="checkbox"/> <b>_Polycom HDX Call Inactive</b>	<input type="radio"/>	Device 1	<code>clink_call_active</code>	equals false		run "_Decrement Active Call Count"
<input checked="" type="checkbox"/> <b>_CLink to Mics Mute</b>	<input type="radio"/>	Device 1	<code>clink_mute</code>	always	<input type="radio"/>	map mute : Mics

Figure 16 - The default events for this project with the volume event highlighted.

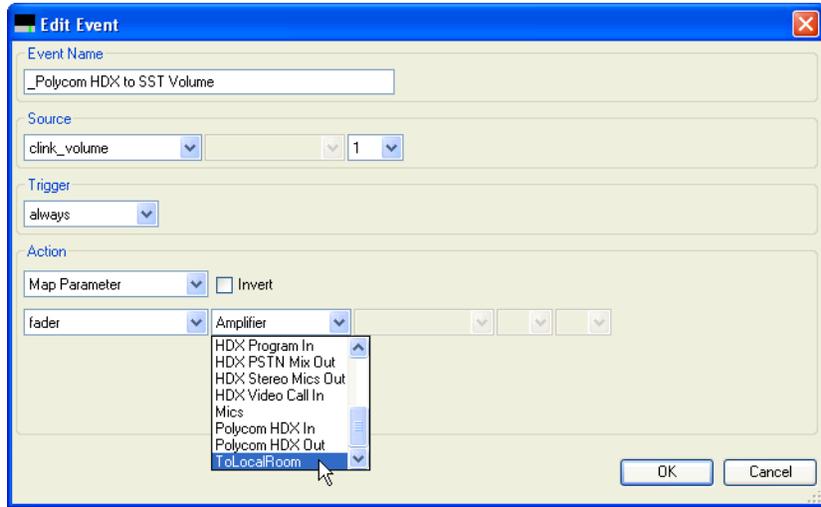


Figure 17 - Editing the volume control event to use the ToLocalRoom group in place of the Amplifier channel.

Click **OK** to save the event and the result is shown in Figure 18.

Event Name	Status	Source	Parameter	Trigger	Status	Action
<b>Default</b>						
<input checked="" type="checkbox"/> _Polycom HDX to SST Volume	31	Device 1	clink_volume	always	0.0	map fader : ToLocalRoom
<input checked="" type="checkbox"/> _Polycom HDX Call Active	●	Device 1	clink_call_active	equals true		run "_Increment Active Call Count"
<input checked="" type="checkbox"/> _Polycom HDX Call Inactive	●	Device 1	clink_call_active	equals false		run "_Decrement Active Call Count"
<input checked="" type="checkbox"/> _CLink to Mics Mute	●	Device 1	clink_mute	always	●	map mute : Mics

Figure 18 - The resulting volume control event after editing and saving the event.

Now if the volume changes on the HDX codec, either via an HDX IR remote or an explicit HDX API command for adjusting the volume, the ToLocalRoom group within SoundStructure will track that change and, because ToLocalRoom is a group, changes will adjust the group members: Amplifier and EagleEye. This will automatically make it louder or quieter to both the audio amplifier channel and to the EagleEye Director.

### Confirming the Physical Wiring Matches the Project Wiring

Now that the project is configured properly, the next step is to confirm the physical wiring of the audio to the Amplifier and to the EagleEye Director. Navigate to the Wiring page and expand the output area as shown in Figure 19. In this figure the Amplifier is connected to outputs 1 and 2 and the EagleEye Director is connected to outputs 3 and 4.

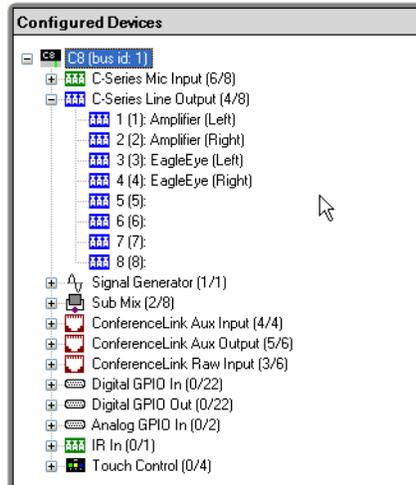


Figure 19 - The wiring page for the designed system with the outputs expanded.

If this wiring does not match how you would like to connect the system, you can click and drag audio channels on the wiring page to move to different outputs to match your desired wiring. In this example, the wiring matches our desired system and therefore no further changes are required on the wiring page.

### Saving the SoundStructure System Project

Once the configuration changes have been made, it is important to save the project to disk to ensure the changes are saved to the file that will ultimately be uploaded to the SoundStructure system. To save the file, navigate to the File menu and select **Save Project1** as shown in Figure 20.

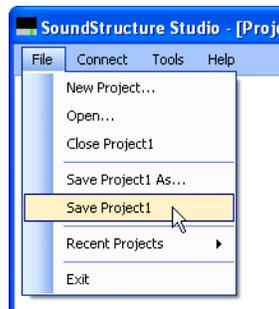


Figure 20 - Navigating to the File Save menu.

Next enter the filename of the project and click **Save** as shown in Figure 21.

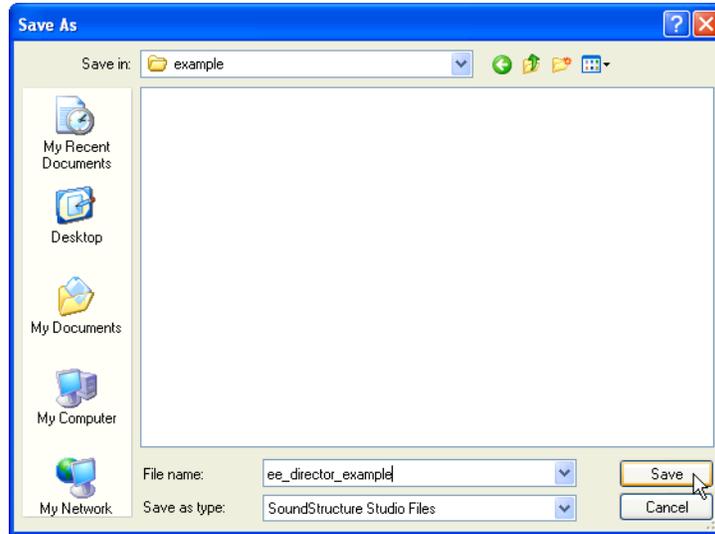


Figure 21 - Selecting the directory and filename to use for saving the project.

Since the settings of the project have changed since the project was first created, we'll be presented with options for how to handle the changes relative to the existing project and presets. In this example because we want to overwrite the power on preset so our changes are always loaded when the device powers up, select **Overwrite preset** as shown in Figure 22 and click **OK** to continue.

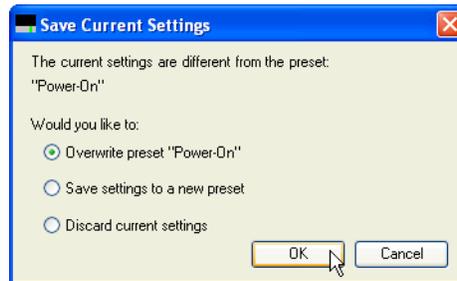


Figure 22 - Select Overwrite preset "Power On" because of all the changes we've made to the project.

Once the system has been physically wired, the project is now ready to be uploaded into a SoundStructure System for final testing. See the SoundStructure Design Guide for information on how to upload a SoundStructure project to a SoundStructure system.

## Conclusion

The Polycom EagleEye Director for HDX delivers an affordable, personalized telepresence experience in group meetings. The addition of one or more SoundStructure devices to the system improves the overall audio experience with more microphones, loudspeakers, or other audio inputs or outputs while retaining the personalized telepresence experience. Integrating the SoundStructure system is easy and only requires moving the outputs to the SoundStructure device and some minor changes to a SoundStructure project.