

BOSE

PROFESSIONAL



MSA12X

powered beam-steering array loudspeaker

Design Guide
English

When to Design with MSA12X	5
Select the Number of Modules	6
Maximum SPL, Throw Distance & Beam Control of Low-frequency Content.....	6
Array Height.....	6
Dual Beam Mode.....	6
Reverberant Spaces.....	6
Connect and Configure the Array	7
Connect the Modules/Array.....	7
MSA12X Properties and Operation (ControlSpace Designer)	9
MSA12X Device Block.....	9
MSA12X Control Panel.....	10
MSA12X Advanced Window.....	12
Recommended MSA12X Configuration Process.....	13
Configure the Array in Project View.....	13
Associate the Array with a ControlSpace Processor.....	14
Set Dante Subscriptions (Dante Controller).....	15
Adjust Input Settings.....	15
Send Beam Settings to ControlSpace Designer.....	16
Bose Professional Array Tool.....	16
Modeler.....	17

Receive Beam Settings in ControlSpace Designer	18
Adjust Beam Gain and Beam EQ	18
Store a Beam Preset	19
Select Power-on State	20
Assign a Beam Preset to a Parameter Set	21
Select the Beam Pattern	23
Basic Steer/Spread	23
Flat-Floor Optimized	24
Raked-Floor Optimized	24
About Dual Beam Mode	25
Select and Use the Beam Steering Software	26
Steer and Shape the Beam (Bose Professional Array Tool)	26
Steer and Shape the Beam (ControlSpace Designer)	27
Steer and Shape the Beam (Modeler)	28
Array Tab	29
Beam Tab	30
Basic Steer/Spread (Modeler)	31
Flat-Floor Optimized (Modeler)	32
Raked-Floor Optimized (Modeler)	34
Manage Multiple Beam Patterns	35

Frequently Asked Questions	36
Appendix A: IP Address Setup Without a Router	41
ControlSpace ESP Processor with Dante Card.....	41
ControlSpace ESP Processor without Dante Card, Analog Input to MSA12X.....	44
Analog Input to MSA12X without ControlSpace Processor.....	47
Appendix B: MSA12X Capability by Processor Model and Dante Functionality	49
Appendix C: Error Messages	50
Indication Tones (Loudspeaker Output).....	50
MSA12X Health Status Indicator (ControlSpace Designer).....	50
MSA12X Control Panel Message (ControlSpace Designer).....	51
Unmanaged Mode Message (Dante Controller).....	51

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When to Design with MSA12X

The Bose Professional MSA12X powered beam-steering array loudspeaker offers several advantages over the other passive column line array loudspeakers in the market.

The MSA12X is an ideal solution for the following types of spaces:

Space	Solution
<p>Rooms that need a column loudspeaker installed vertically, installed tightly against the wall, or recessed into surfaces for aesthetic reasons.</p> <p>Rooms with structural or design constraints that require the loudspeaker to be installed in non-ideal locations.</p>	<p>The digital beam steering of an MSA12X array allows it to be mounted perfectly vertically and at varying heights — not just at ear-level like conventional passive column arrays.</p> <p>And MSA12X does not need any mechanical aiming or angling brackets, so the array can easily be tight against a wall or in a niche or alcove, visually blending into the room.</p>
<p>Rooms that are acoustically challenging with high reverberation times that need the radiation pattern control offered by digital beam steering.</p>	<p>The digital beam steering of an MSA12X array allows more precise targeting of audience areas, so you can decide where you want to place (and not place) the acoustic energy. This degree of control leads to better direct-to-reverberant sound ratios and speech intelligibility in difficult rooms.</p>
<p>Rooms that require two audience zones to be covered by a single-column array.</p>	<p>Dual Beam Mode uses all 12 drivers of an MSA12X array to generate two simultaneous, independent beams to achieve precise coverage of separate areas, like a main floor and a balcony. Each beam can use its own beam pattern, beam gain, and room EQ to ensure a consistent tonal balance between the two areas.</p>
<p>Rooms without an amplifier rack that can benefit from using a powered loudspeaker.</p>	<p>An MSA12X array connects directly to a standard AC power outlet for its integrated DSP and 600 watts of amplification (12 drivers × 50 watts each) — no external amplifier or processor required.</p>
<p>Rooms that already use, or are planning to use Dante® digital audio and control over Ethernet-based networks.</p>	<p>The Dante interface on MSA12X needs just one network cable connection for audio source and system control. Send a digital audio signal to the MSA12X and use the same connection for ControlSpace network integration.</p>

Select the Number of Modules

When selecting the number of modules of an array, consider the elements in the following four sections.

Maximum SPL, Throw Distance & Beam Control of Low-frequency Content

The number of modules in an array determine its maximum SPL, its throw distance, and the ability to vertically steer the low-frequency content of the beam.

Use the approximate values below as a guideline to select the number of modules an array requires.

Modules	Typical Usable Throw Distance ¹	Maximum SPL ²			LF Beam Control Limit
		10 m (33 ft)	25 m (82 ft)	35 m (115 ft)	
1	10 m (33 ft)	97 dB	91 dB	88 dB	500 Hz
2	25 m (82 ft)	100 dB	96 dB	94 dB	250 Hz
3	35 m (115 ft)	101 dB	97 dB	95 dB	160 Hz

1. Typical Maximum Usable Throw Distance includes considerations for reverberation and speech intelligibility.
2. Maximum SPL is calculated based on free-field (no boundary loading gain) sensitivity, exclusive of power compression and without beam steering, spreading, or smoothing functions applied.

All calculations are based on typical conditions with complex acoustic summation by the Bose Professional Modeler software. Many competitor specifications based on less accurate distance-loss approximations. For designs that exceed the general guidelines listed above, use Modeler software to predict SPL for a specific acoustic environment, or contact your Bose Professional representative.

Note: Conference rooms with lower ceilings and smaller steering angles may not have the same reverberation concerns and could use their maximum SPL requirement as the main guiding factor for the number of modules.

Array Height

If you need to mount the array high on the wall, use a significant steering angle close to -20° , and use a wide spreading angle to cover the front rows of an audience, we highly recommend using two or three modules in an array.

Dual Beam Mode

If you need to use Dual Beam Mode, we recommend using two or three modules in an array. A longer array offers better control of the beam pattern. See **About Dual Beam Mode** for more information.

Note: The array must be using its Dante audio input for Dual Beam Mode to function. Dual Beam Mode is not available for analog audio input sources.

Reverberant Spaces

Column line arrays are often used in reverberant spaces due to their vertical pattern control. Although the MSA12X is designed for both speech and music, column line arrays are typically used in speech-only applications where reverberation can affect speech intelligibility. Generally, the longer the reverberation time is, the more modules we recommend using in an array.

Reverberation time (RT_{60})	Recommended number of modules per array
1.5 seconds	1 module
3.0 seconds	2 module
5.0 seconds	3 module

In cases where your application exceeds the values above, use design tools such as Modeler software to determine system performance.

Connect and Configure the Array

This chapter assumes you have the following:

MSA12X loudspeaker module(s)

a router

Note: When you connect your computer to an MSA12X module for the first time, we **highly** recommend doing so through a router or DHCP server, which will make the setup process simple and easy. The router can be of any brand, can be used without an internet connection, and does not need to be used permanently in the installation. If you do not have a router, see **Appendix A: IP Address Setup Without a Router**.

a Windows computer (for ControlSpace Designer usage)

a Bose Professional ControlSpace ESP processor with Dante functionality (integrated or network card) or ControlSpace EX processor (For a list of supported processors, see **Appendix B: MSA12X Capability by Processor Model and Dante Functionality**)

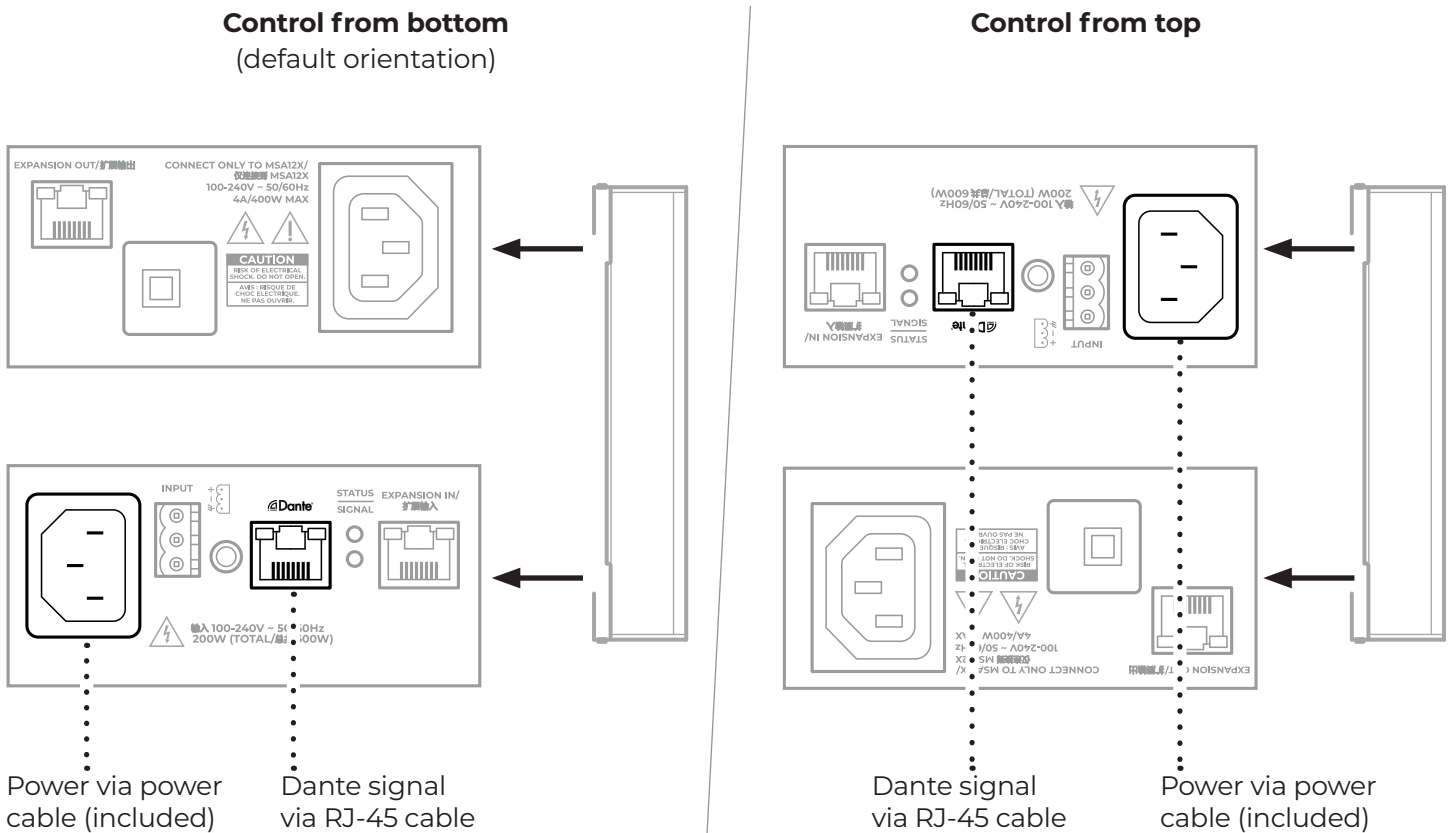
Bose Professional ControlSpace Designer software, Version 5.9.2 or later (free download at BoseProfessional.com)

Audinate **Dante Controller** software, Version 4.4.2.2 or later (free download; account creation required)

Connect the Modules/Array

When you mount an MSA12X, you can choose the orientation: **control from bottom** or **control from top**. The port used for control messages is the **Dante** port (RJ-45). After mounting the array, you must specify this orientation in ControlSpace Designer to ensure the beam is aimed in the correct direction.

Note: If an installation requires the **control from top** orientation, ensure the logo on the grille is inverted.

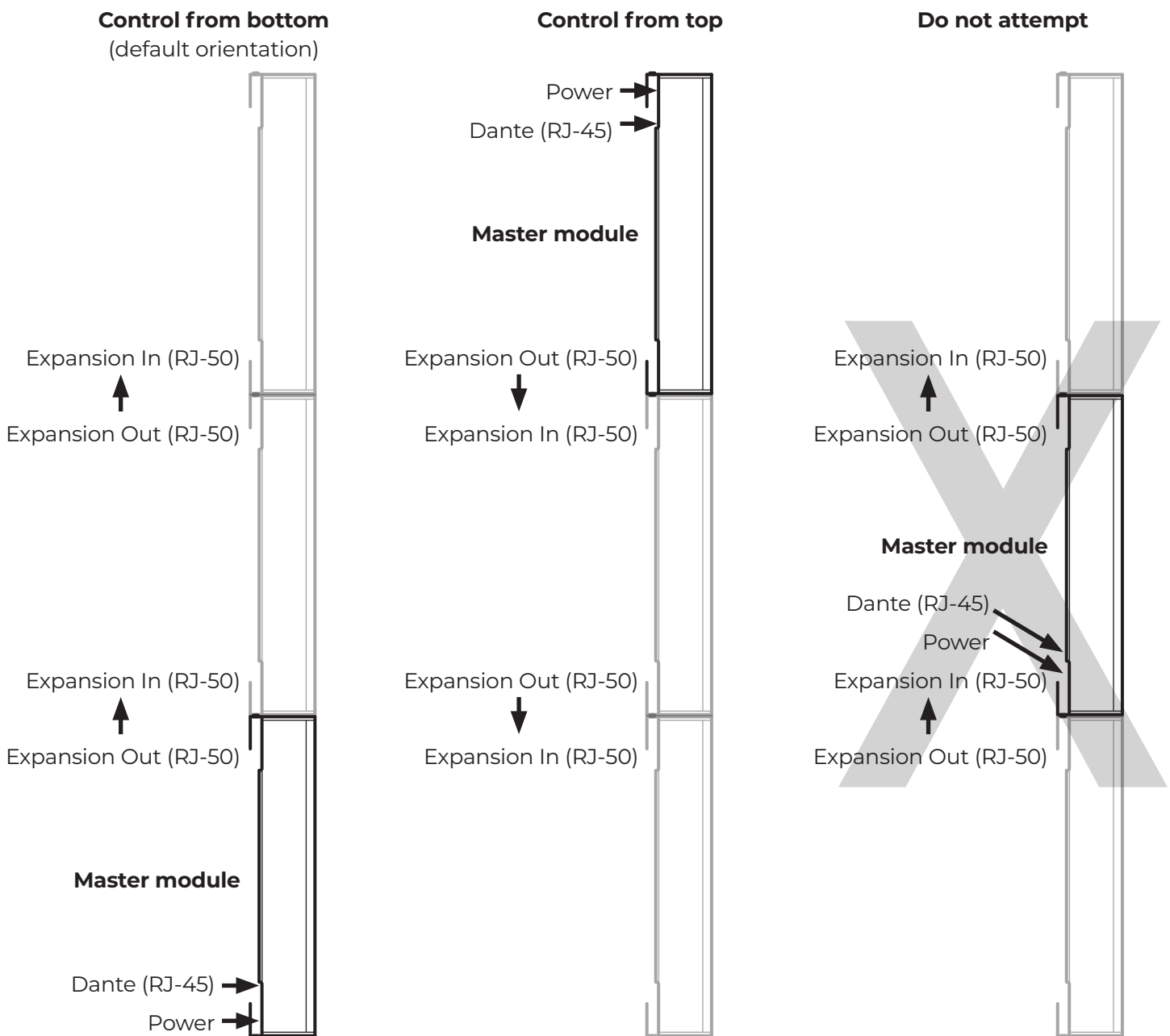


You can configure a longer array by stacking two or three modules and connecting each of them with the included RJ-50 expansion cable. This cable and connector is different from those of the RJ-45 Dante port, though they look similar.

For a multiple-module array, connect the RJ-45 network cable to the **Dante** port of the “master” module of the array — the module that will be used to control the entire array from its bottom or top. The audio signal and control signal will be sent through the RJ-50 expansion cable from the **Expansion Out** port of a module to the **Expansion In** port of another. The master module can be only at the top or bottom of an array, not in the middle.

In software applications, the master module represents the entire array. For example, the IP address of the master module applies to the entire array.

Note: When designing an array with multiple modules, we recommend using masking tape (or a label that will not leave marks or residue) to label each module to indicate its location in the array or overall installation (e.g., **Left** or **Right**; **Top**, **Middle**, or **Bottom**). This can make the installation process more efficient and prevent confusion.

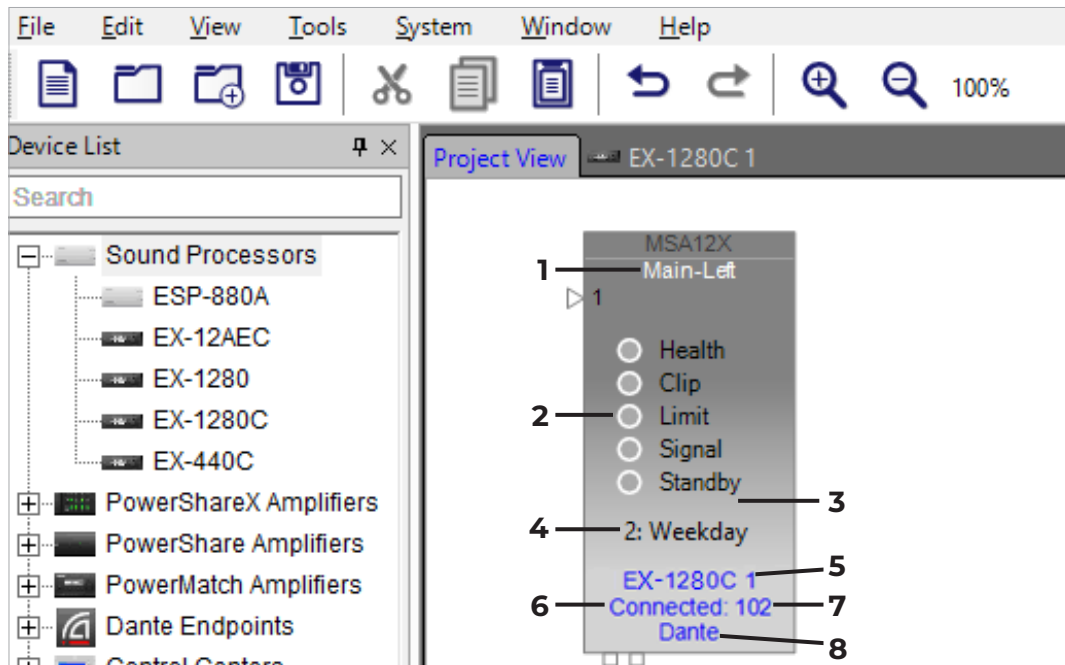


MSA12X Properties and Operation (ControlSpace Designer)

Use ControlSpace Designer to configure the beam pattern (Basic Steer/Spread, Flat Floor Optimized, or Raked Floor Optimized) and beam mode (Single or Dual) and send it directly to an MSA12X array.

MSA12X Device Block

When you add a MSA12X to a ControlSpace Designer project, the device block appears in the Project View panel.

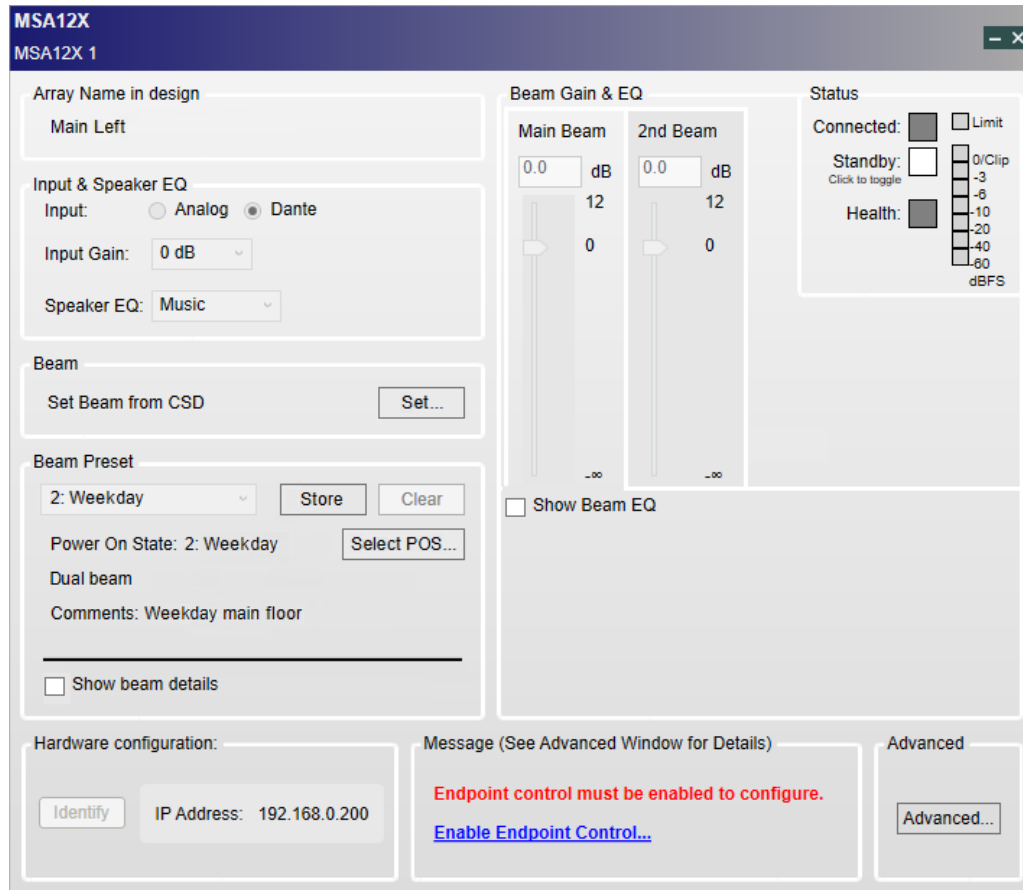


An MSA12X device block displays the following settings:

1. **Device name:** This is the name of the array in this ControlSpace Designer project. To enter a different name, right-click the device block and select **Rename**, or select the device block and press **F2**.
2. **Status indicators:**
 - Health:** Indicates if there is a temperature warning (yellow), temperature fault (red), or driver fault (red). This indicator will be green when there are no warnings or errors. For more information, see **MSA12X Health Status Indicator (ControlSpace Designer)**.
 - Clip:** Indicates an overdriven input signal (over 0 dBFS). If this happens, reduce the input gain of the array.
 - Limit:** Indicates when the output limiter of the array is active (yellow).
 - Signal:** Indicates when an input signal is detected.
 - Standby:** Indicates when the array is in Standby Mode (red). To activate/deactivate Standby Mode, click the Standby icon in the MSA12X control panel.
3. **Array name:** This is the name of the array as specified in Modeler software. This is blank by default. You cannot change this name in ControlSpace Designer.
4. **Beam preset:** This is the currently selected beam preset.
5. **Associated processor device name:** The device name of signal processor that is associated with the array.
6. **Connection status:** This is the current status of the connection between the array and ControlSpace Designer.
7. **Last octet:** This shows the last 3 digits of the IP address of the array (for reference).
8. **Input type:** This indicates the current audio input type: **Dante** or **Analog**.

MSA12X Control Panel

To open the MSA12X control panel, double-click the device block in the **Project View** panel.



Array Name in Design: This is the name of the array as specified in Modeler software. This is blank by default. You cannot change this name in ControlSpace Designer.

Input & Speaker EQ

Input: Select **Dante** or **Analog** as the type of audio source.

Input Gain: Click this menu to select an input gain: **0 dB**, **+14 dB**, or **+24 dB**. The input gain is independent between the Dante and Analog input settings.

Speaker EQ: Click this menu to select **Music** or **Voice**.

Beam > Set Beam from CSD > Set: Click this to set the beam steering and spreading. See **Steer and Shape the Beam (ControlSpace Designer)** for more information.

Note: If you will use the Basic Steer/Spread beam pattern, then you do not need to use any additional software.

Beam Preset: This area contains basic information about the beam preset.

Click the menu to select a stored beam preset.

Store: Click this button to save the current beam settings as a beam preset. For more information, see **Store a Beam Preset**.

Clear: Click this button to delete the currently selected beam preset.

Note: You cannot use this method to delete a beam preset that is designated as the Power On State preset. To delete the Power On State preset, see **MSA12X Advanced Window**.

Power On State: This is the beam preset that is automatically recalled right after the array is power-cycled. By default, the first stored beam preset is selected as the Power On State preset.

Select POS: Click this button to select a preset as the Power On State preset. For more information, see **Select Power-on State**.

Beam mode: This field shows the beam mode. For more information, see **Select the Beam Pattern**.

Comments: This field shows any details about the beam preset as entered in Modeler software.

Show beam details: Select or deselect this checkbox to show or hide the detailed beam settings specified in the Modeler software.

Beam Gain & EQ:

Beam Gain: The gain for each beam. This is useful for balancing the gain settings between two beams when in Dual Beam Mode.

Note: The beam gain cannot be assigned to controllers like the ControlSpace Remote app or the ControlCenter CC-64.

Show Beam EQ: Select or deselect this checkbox to show or hide the EQ curve of the beam. The Beam EQ filter to compensate for the change in tonal balance that can vary with the beam spreading. Modeler software automatically calculates the Beam EQ curve for each beam and includes them with the settings it sends to ControlSpace Designer. You can also adjust the curve manually.

Freq: The center frequency.

Slope: The slope of the curve.

Gain: A high-boost gain.

Restore Defaults: Click this to restore the settings that the Modeler software originally suggested for that beam pattern.

Bypass: Bypass the Beam EQ.

Status

Connected: Indicates when the connection between the array and ControlSpace Designer is active (blue).

Standby: Indicates when the array is in Standby Mode (red). To activate/deactivate Standby Mode, click the **Standby** icon.

Health: Indicates if there is a temperature warning (yellow), temperature fault (red), or driver fault (red). This indicator will be green when there are no warnings or errors. For more information, see **MSA12X Health Status Indicator (ControlSpace Designer)**.

Limit: Indicates when the output limiter of the array is active (yellow).

Level Meter: Indicates the level of the input signal after the input gain. The **Clip** light indicates an overdriven input signal (over 0 dBFS). If this happens, reduce the input gain of the array.

Hardware Configuration

Identify: When Dante functionality is enabled and the device is online, click this button to trigger a flashing LED on the back of the corresponding array. This is useful for identifying which array is being controlled.

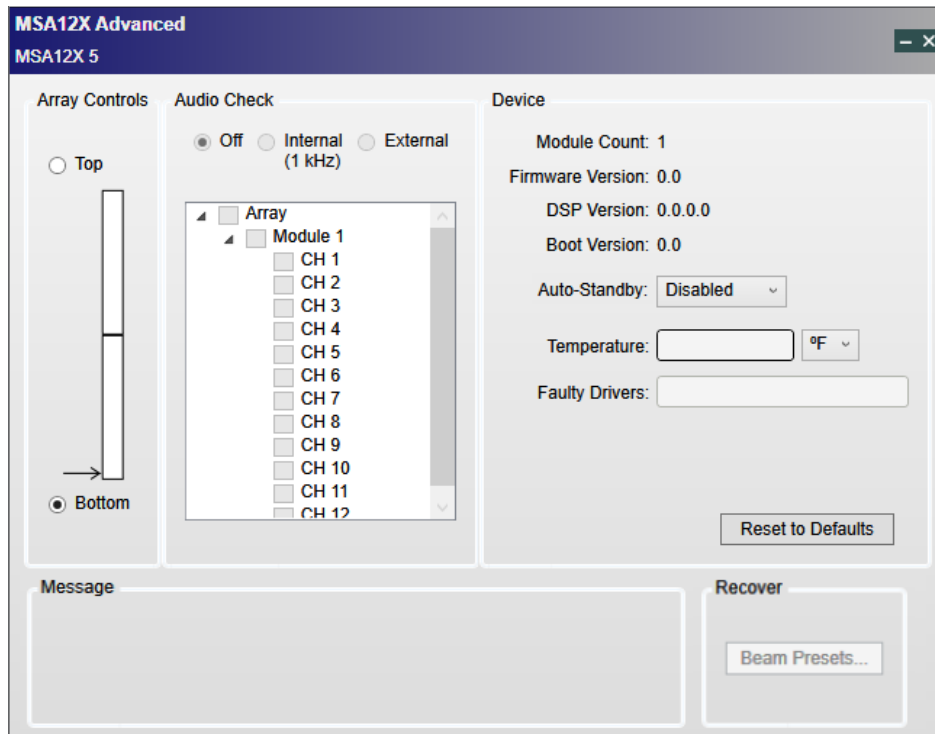
IP Address: The IP address assigned to the array.

If the **Set** button is deactivated, it means the array is online. In this case, you can assign an IP address to the array using Dante Controller.

If you can click the **Set** button, it means the array is offline. In this case, you can assign a specific IP address to the array in ControlSpace Designer. The IP address will be assigned to the array when reconnected to the network.

Advanced...: Click this button to open the **Advanced** window.

MSA12X Advanced Window



Array Controls

This setting enables ControlSpace Designer to orient the beam types and steering correctly. When you mount an MSA12X array, you can choose the orientation of the module(s) by specifying which end of the array is the “master” module — the module that will be used to control the entire array from its bottom or top. **Bottom** is the default setting — in this case, the RJ-45 network cable and power cable enter the master module at the bottom of the array. If an installation requires you to connect these cables to the top of the array instead, select **Top** and ensure the physical array (and logo on the grille) are inverted so the Dante port and power input are at the top of the array.

Audio Check

You can check each array, module, or driver with an internal or external audio signal. Select **Internal (1 kHz)** to prompt the internal signal generator to send a 1 kHz sine wave to the device. This is useful for identifying the array before subscribing Dante routing.

Device

Module Count: The number of modules of the array.

Firmware Version: The version of firmware currently loaded on the MSA12X.

DSP Version: The version of DSP firmware currently loaded on the MSA12X.

Boot Version: The version of boot firmware currently loaded on the MSA12X.

Auto-Standby: Click this menu to select how long the array must detect no signal before it enters Standby Mode. The array will exit Standby Mode and resume normal operation when it detects an input signal of 6–10 seconds.

Temperature: The temperature of internal amplifier. Click the menu next to it to select the measurement units: degrees Celsius (°C) or Fahrenheit (°F).

Faulty Drivers: The number of faulty drivers and/or amplifier channels that are shorted or with excessively high current beyond the capability of the design.

Reset to Defaults: Click this button to clear all stored beam presets and restore the array’s factory default settings.

Recommended MSA12X Configuration Process

There are many different ways to configure an MSA12X system. This guide describes an onsite setup process with the IP addresses of the devices already set.

Configure the Array in Project View

1. Connect your computer to the network and open **ControlSpace Designer**.
2. Once the blank project appears, wait for the MSA12X device blocks to appear in the Project View panel. This process will happen automatically and may take 5–10 seconds, depending on the network status. You do not have to scan for devices or use the Go Online function (MSA12X is a Dante device, and ControlSpace Designer will recognize it regardless).

If an MSA12X device block does not appear:

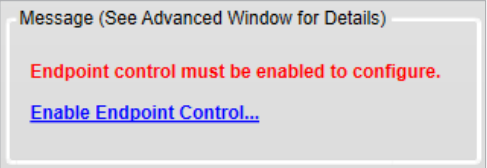
Click the **System** menu and then click **Enable Dante Control**.

Ensure the computer and MSA12X arrays are connected to the network.

Ensure the IP addresses of the computer and the MSA12X arrays are set properly.

3. Before you proceed to Step 4, we highly recommend enabling endpoint control. Click the **System** menu and then click **Enable Dante Control**, or click **Enable Endpoint Control...** in the MSA12X control panel.

By default, endpoint control is disabled. When endpoint control is disabled, you cannot program MSA12X controls in ControlSpace Designer (several controls of the MSA12X control panel will be disabled and the Message field will display an error message).



4. Identify and note which MSA12X device blocks correspond with each physical array. To do this, do one of the following:
 - A. In the MSA12X control panel, click **Identify** to trigger a flashing LED on the back of the corresponding array.
 - B. In the MSA12X control panel, click **Advanced...** to open the **MSA12X Advanced** window. In the **Audio Check** section, select **Internal (1 kHz)** to prompt the internal signal generator to send a 1 kHz sine wave to the array (or a module or driver in the array).
5. In the Project View panel, right-click the MSA12X device block and select **Rename**, or select the device block and press **F2**, and then enter a name for the array. We recommend using a name based on its location in the installation.

Note: Use only characters allowed for Dante device labels: **A–Z**, **a–z**, **0–9**, and “-” (dash or hyphen). Begin the name with **A–Z** or **a–z** only. This name will be used while routing Dante audio later.


Note: This name can be the same as or different from the Array Name already defined in the Modeler software.

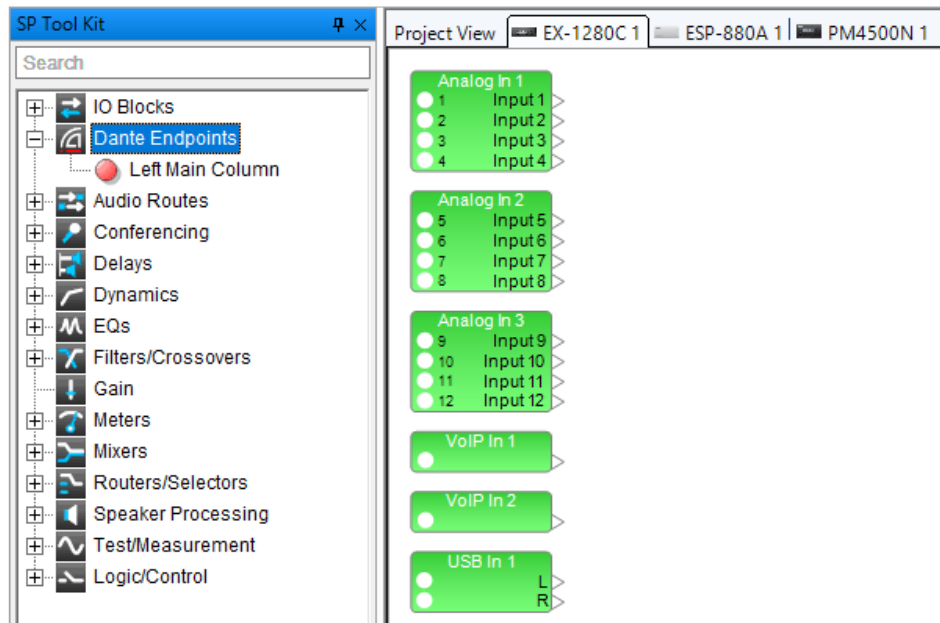
Associate the Array with a ControlSpace Processor

You will need to associate the MSA12X array with a supported ControlSpace processor in ControlSpace Designer. You can also configure Dante routing during this process.

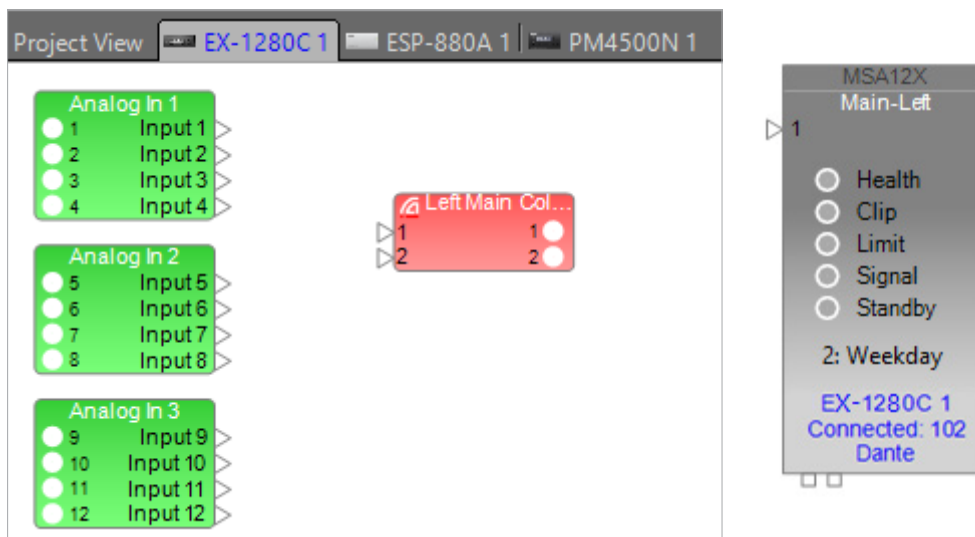
Note: To set multiple beam patterns for an MSA12X array and use supported controllers like the ControlSpace Remote app or ControlCenter CC-64 to invoke changes, your installation must include a ControlSpace processor listed in **Appendix B: MSA12X Capability by Processor Model and Dante Functionality**.

If the MSA12X array will receive an analog audio signal only and will not require multiple beam patterns, you can skip this section.

1. With a supported ControlSpace processor connected to the network, click **Scan** . The processor device block will appear in the Project View panel.
2. Double-click the processor device block to open the processor's Device View panel.
3. In the **SP Tool Kit** panel, expand the **Dante Endpoints** list to see the available MSA12X devices.



4. Click, drag, and drop each MSA12X device into the processor's **Device View** panel. Each device in this Device View panel is now associated with the processor. The name of the processor will appear in the MSA12X device block to indicate this.



5. These red MSA12X device blocks represent the Dante output blocks for each array. Each array has two output channels that correspond to the two beams when the array is in Dual Beam Mode: **Ch1** is the **Main Beam**, and **Ch2** is the **Secondary Beam**. If the array is not in Dual Beam Mode, the Ch2 signal will not be sent from the array.
6. Add other signal processing blocks from the SP Tool Kit panel to the Device View panel and complete the system.

Note: In Dual Beam Mode, you can apply different gain or EQ to each beam (Output 1 or Output 2).

Set Dante Subscriptions (Dante Controller)

Configure all Dante properties and network routing in Audinate's [Dante Controller](#).

Adjust Input Settings

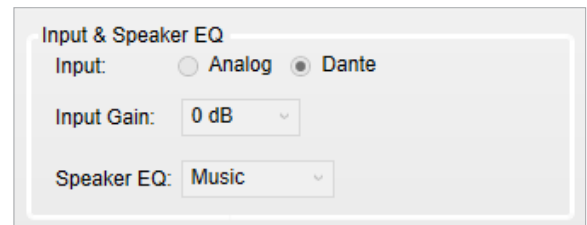
Adjust the input settings to match your system.

In the MSA12X control panel, set the following items in the **Input & Speaker EQ** section:

Input: Select **Dante** or **Analog** as the type of audio source.

Input Gain: Click this menu to select an input gain of **0 dB**, **+14 dB**, or **+24 dB**. The input gain is independent between the Dante and Analog input settings.

Speaker EQ: Click this menu to select **Music** or **Voice**.



Input & Speaker EQ

Input: Analog Dante

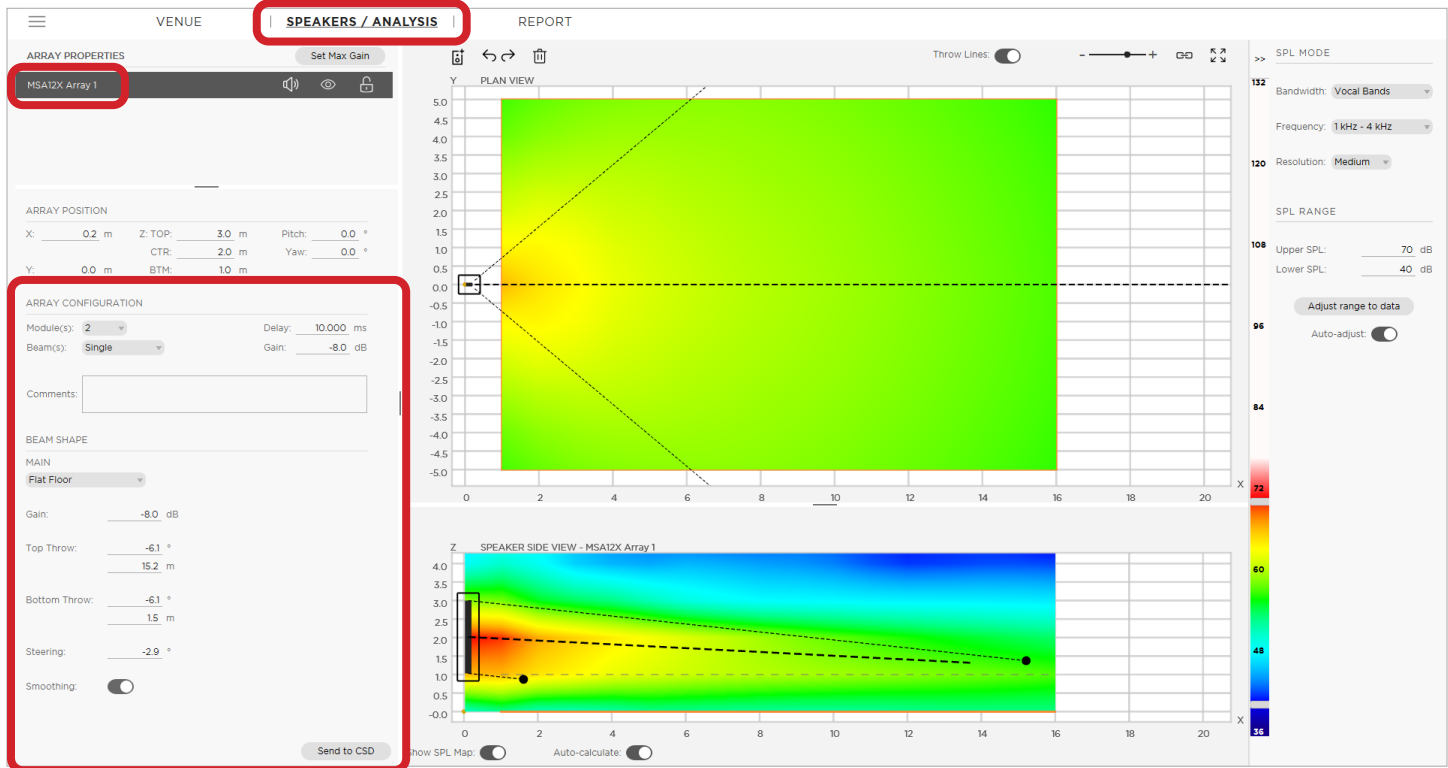
Input Gain: 0 dB

Speaker EQ: Music

Send Beam Settings to ControlSpace Designer

After designing beam settings in Bose Professional Array Tool or Modeler software, you must send the settings from there to ControlSpace Designer.

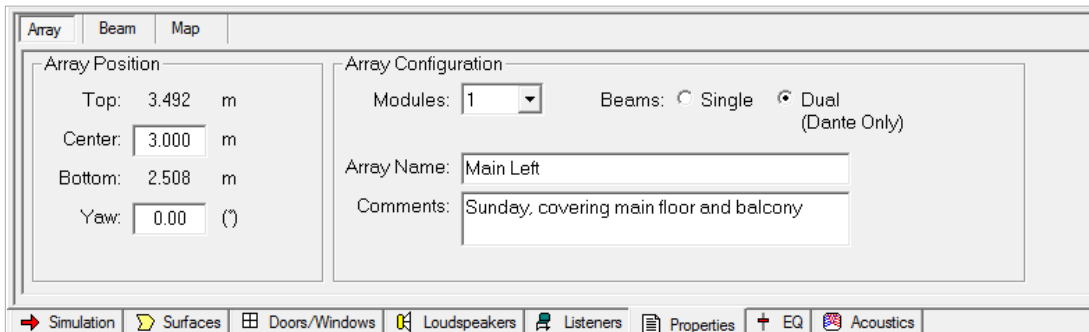
Bose Professional Array Tool



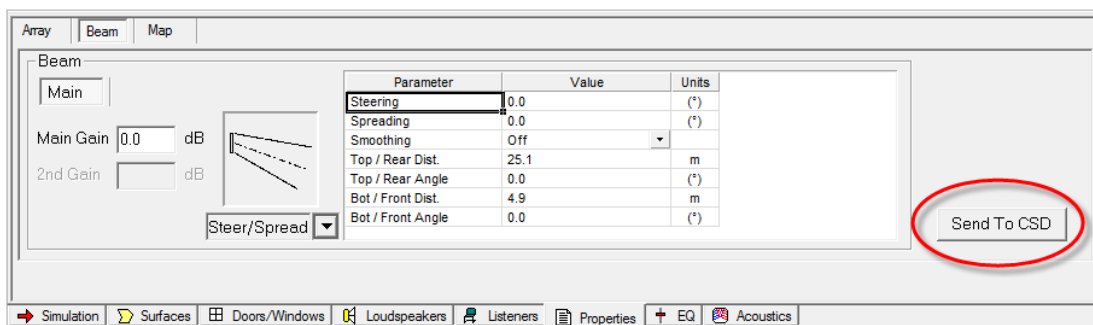
1. Open **Bose Professional Array Tool** and design an array.
2. Click the **Speakers/Analysis** tab and then select the array.
3. In the **Array Configuration** section, ensure the number in the **Module(s)** field matches the number of modules in the physical array. (This number appears as **Module Count** in the **MSAI2X Advanced** window in ControlSpace Designer.)
4. Ensure ControlSpace Designer is open on the same computer.
5. In Bose Professional Array Tool, click **Send to CSD**.
6. See **Receive Beam Settings in ControlSpace Designer** for the next step.

Modeler

1. Open the **Modeler** software and design an array.
2. Select the array and then click the **Properties** tab.
3. In the **Array Configuration** section, ensure the number in the **Modules** field matches the number of modules in the physical array. (This number appears as **Module Count** in the **MSA12X Advanced** window in ControlSpace Designer.)



4. Make sure ControlSpace Designer, Version 5.0 or later, is open on the same computer.
5. Click the **Beam** tab and then click **Send to CSD**.
6. See **Receive Beam Settings in ControlSpace Designer** for the next step.

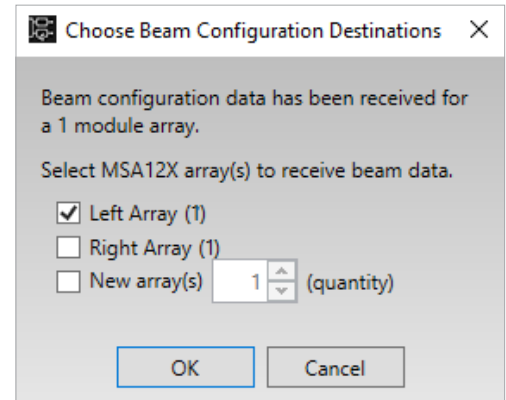


Receive Beam Settings in ControlSpace Designer

After clicking **Send to CSD** in the software in which you created the beam settings, the **Choose Beam Configuration Destination** window will appear in ControlSpace Designer.

Click a checkbox next to each array to select or deselect which MSA12X array(s) will receive the beam settings, and then click **OK**. You can select multiple arrays, if needed. This is helpful if multiple arrays require the same beam settings.

The number in parentheses after each array indicates the number of modules (**Module Count** in the **MSA12X Advanced** window). If this number does not match that of the settings you are sending, you cannot send the beam settings to the array.



If an audio signal is being sent to the array, you will be able to hear the beam pattern change. To change the beam pattern, return to the Bose Professional Array Tool or Modeler software, make adjustments, and repeat this process.

Adjust Beam Gain and Beam EQ

In the MSA12X control panel, set the following items in the **Beam Gain & EQ** section:

Beam Gain: The gain for each beam. This is useful for balancing the gain settings between two beams when in Dual Beam Mode.

Note: The beam gain cannot be assigned to controllers like the ControlSpace Remote app or the ControlCenter CC-64.

Show Beam EQ: Select or deselect this checkbox to show or hide the EQ curve of the beam. The Beam EQ filter to compensate for the change in tonal balance that can vary with the beam spreading. Modeler software automatically calculates the Beam EQ curve for each beam and includes them with the settings it sends to ControlSpace Designer. You can also adjust the curve manually.

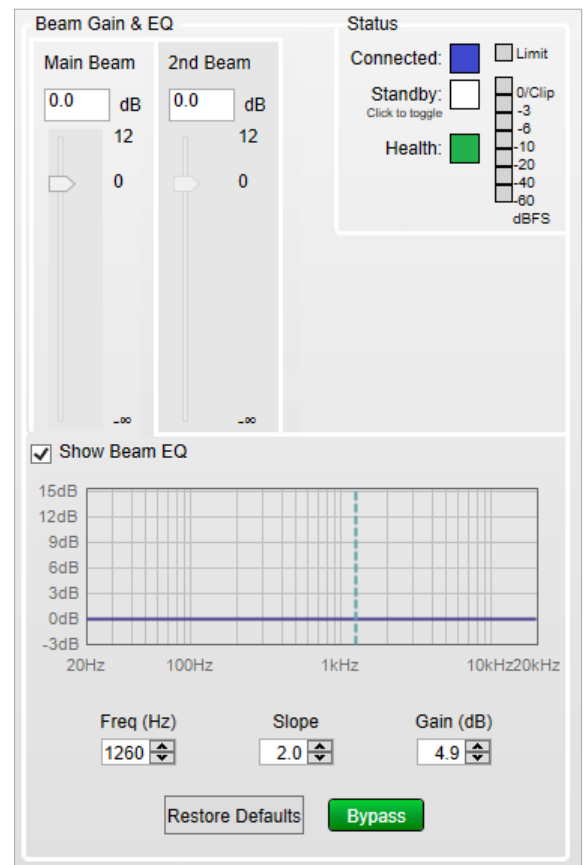
Freq: The center frequency.

Slope: The slope of the curve.

Gain: A high-boost gain.

Restore Defaults: Click this to restore the settings that the Modeler software originally suggested for that beam pattern.

Bypass: Bypass the Beam EQ.



Store a Beam Preset

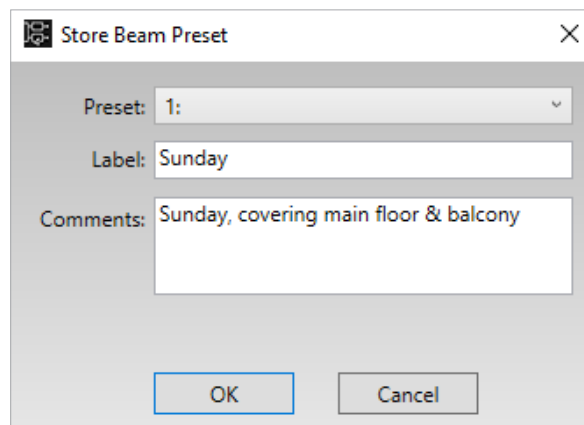
When you are satisfied with the coverage, beam gain, and beam EQ, the next step is to store that beam pattern as a beam preset. Otherwise, the beam pattern will be lost when the array power-cycles. You can store up to 10 different beam presets to each MSA12X array.

A beam preset includes the following settings:

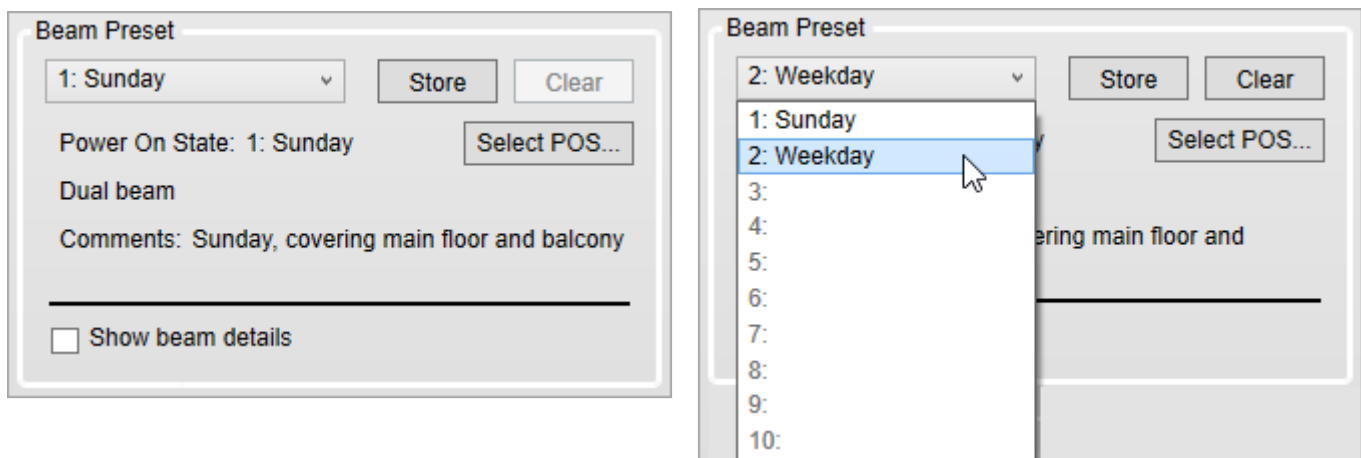
- Input type, input gain
- Speaker EQ
- Beam parameters (steer angle, spread angle, etc.)
- Comments
- Beam gains
- Beam EQs

To store a beam preset:

1. In the **Beam Preset** section of the MSA12X control panel, click **Store**.
2. In the **Store Beam Preset** window that appears, click the **Preset** menu to select the desired preset number. Enter a name in the **Label** field. You can also enter a description in the **Comments** field (up to 50 characters). Click **OK** when you are done.



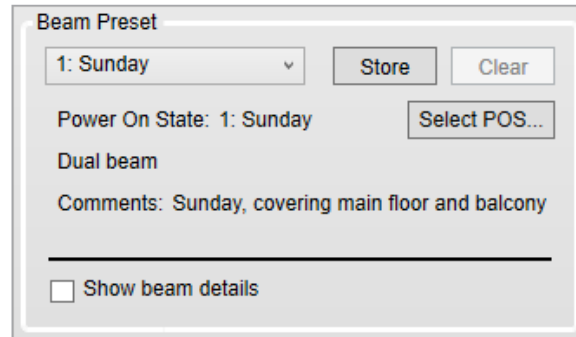
The settings are now stored to that preset, which is selected in the **Beam Preset** section. You can click the menu to select another stored beam preset.



If you change any parameter (that is stored in the beam preset) after this point, the Beam Preset menu will become blank to indicate the settings have changed and not yet been stored to a beam preset.

Select Power-on State

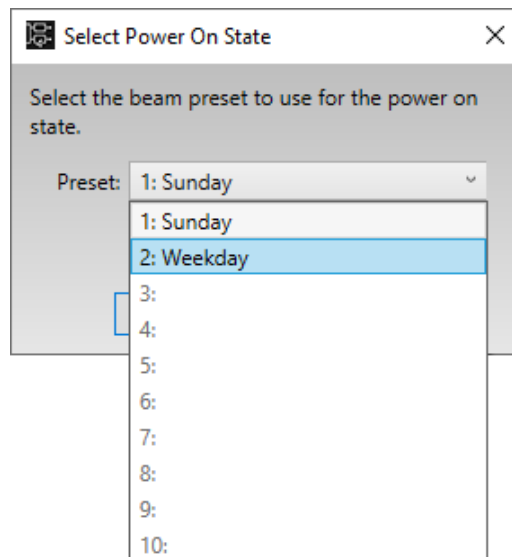
The Power On State is a beam preset that is automatically recalled right after the array is power-cycled. By default, the first stored beam preset is assigned to the Power On State. The Power On State is indicated the **Beam Preset** section.



The screenshot shows a dialog box titled "Beam Preset". At the top, there is a dropdown menu showing "1: Sunday" with a downward arrow. To its right are "Store" and "Clear" buttons. Below this, the text "Power On State: 1: Sunday" is displayed, followed by a "Select POS..." button. Underneath, the text "Dual beam" is shown, followed by "Comments: Sunday, covering main floor and balcony". At the bottom, there is a horizontal line and a checkbox labeled "Show beam details" which is currently unchecked.

To select the Power On State preset:

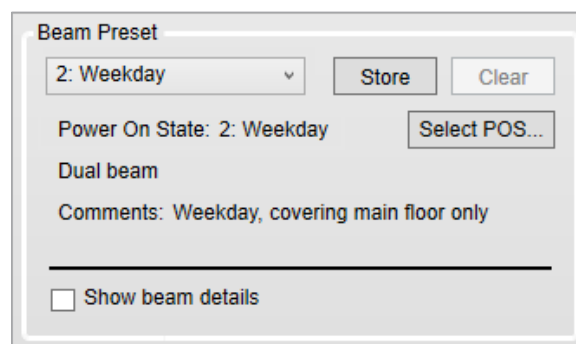
1. Click **Select POS...**
2. In the **Select Power On State** window that appears, click the menu and select the desired preset.



The screenshot shows a dialog box titled "Select Power On State" with a close button (X) in the top right corner. The main text reads "Select the beam preset to use for the power on state." Below this, there is a "Preset:" label followed by a dropdown menu. The dropdown menu is open, showing a list of options: "1: Sunday", "2: Weekday" (which is highlighted in blue), "3:", "4:", "5:", "6:", "7:", "8:", "9:", and "10:".

3. Click **OK**. The Power On State field will show the number and name of the new Power On State preset.

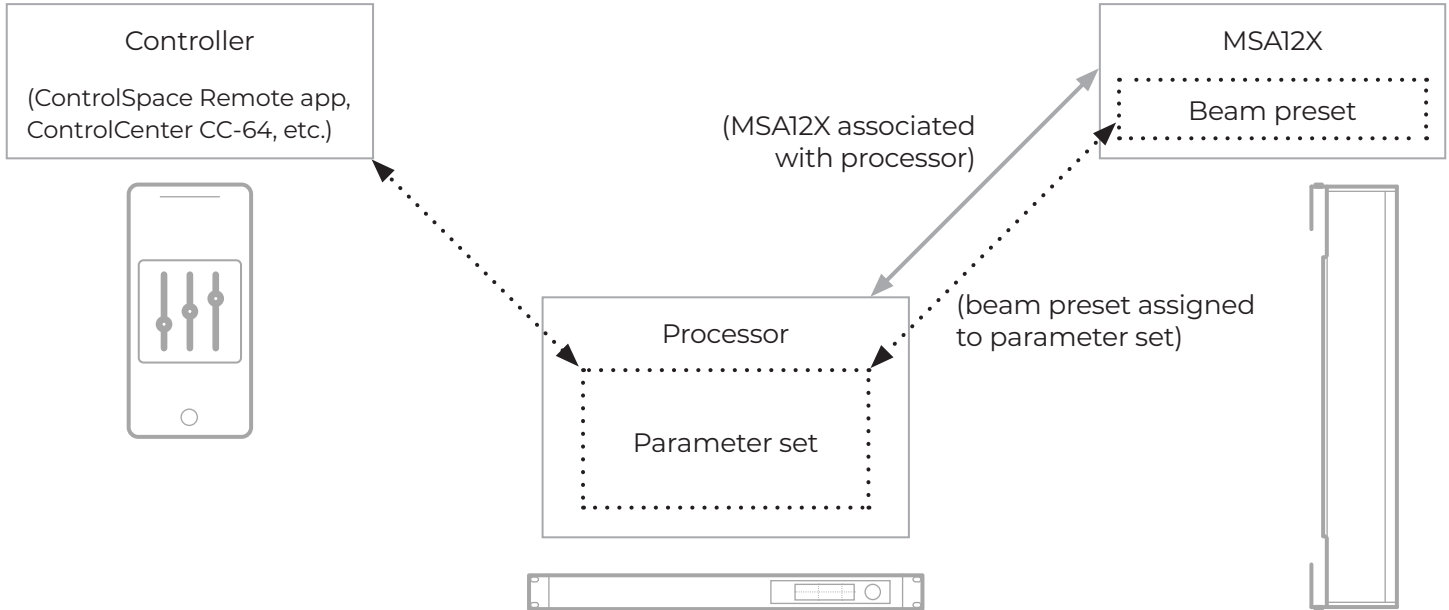
Note: You cannot use the **Clear** button to delete a beam preset that is selected as the Power On State preset. To remove the Power On State preset, see **MSA12X Advanced Window**.



The screenshot shows the "Beam Preset" dialog box after the selection. The dropdown menu now shows "2: Weekday". The "Power On State" field now displays "2: Weekday". The "Comments" field now reads "Weekday, covering main floor only". All other elements, including the "Store", "Clear", and "Select POS..." buttons, remain the same.

Assign a Beam Preset to a Parameter Set

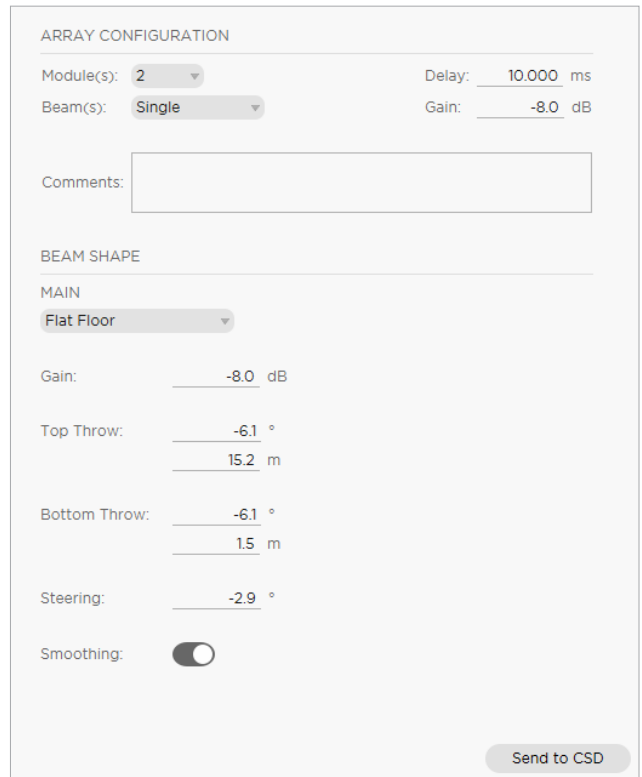
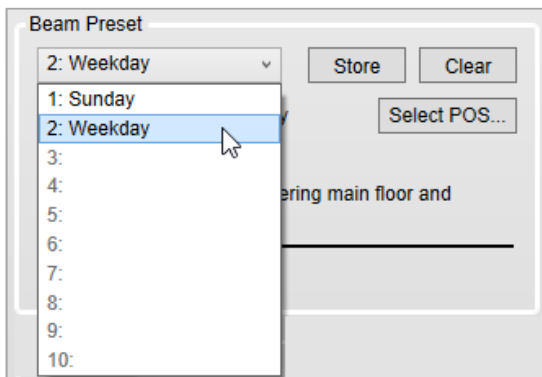
To enable a controller to recall a beam preset, you must first assign the beam preset to a parameter set in a supported ControlSpace processor listed in **Appendix B: MSA12X Capability by Processor Model and Dante Functionality**. You can then use a supported controller (e.g., ControlSpace Remote app or ControlCenter CC-64) to invoke that parameter set, which in turn will recall the beam preset.



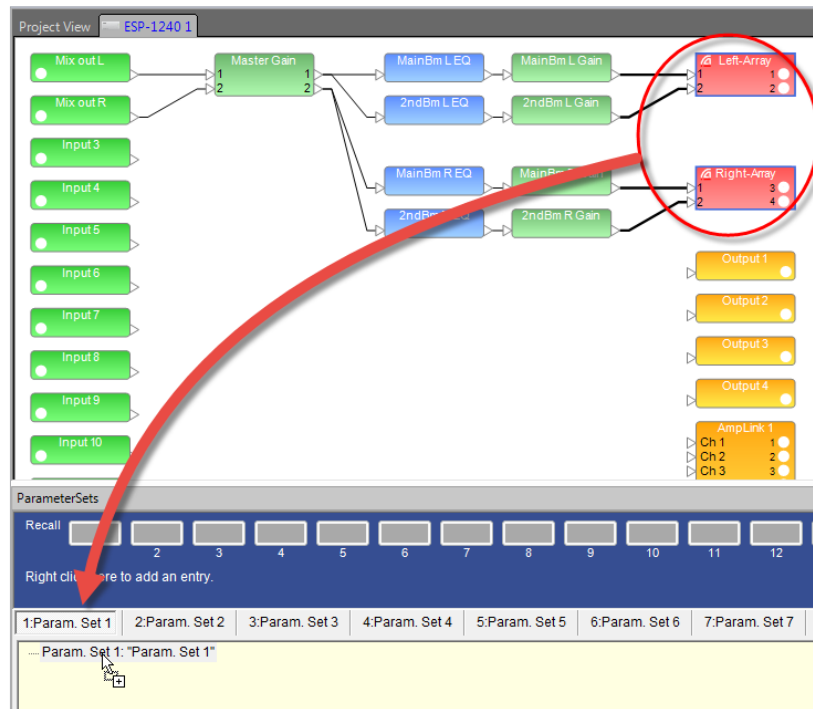
Note: You can assign only a full beam preset to a parameter set. You cannot assign individual parameters of an array (e.g., Beam Gain, Beam EQ).

Note: ControlSpace Designer must be offline in order to assign a beam preset to a parameter set; you cannot do so if the software is online (i.e., if the Project View panel is blue). You can do this while Dante functionality is enabled, though.

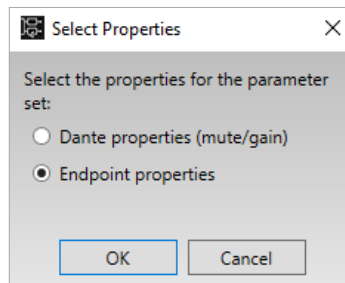
1. Recall the beam preset for the state that you want to assign to a parameter set.



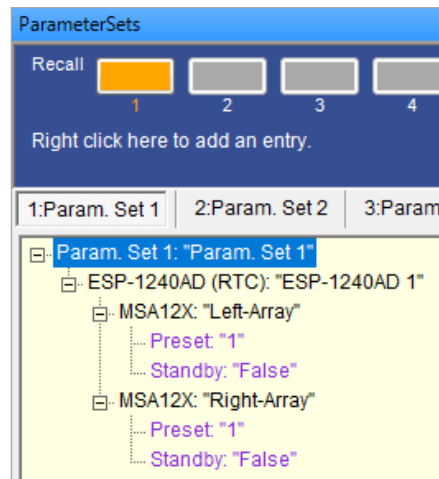
- Open the Device View panel of the processor associated with the MSA12X array, and select the output block that represents the MSA12X device.



- Drag that output block into the parameter set tree in the Parameter Set panel. Rename the parameter set if needed.
- Select **Properties** window appears. Select **Endpoint properties**. Click **OK**.



- Now the beam preset has been assigned to the parameter set.

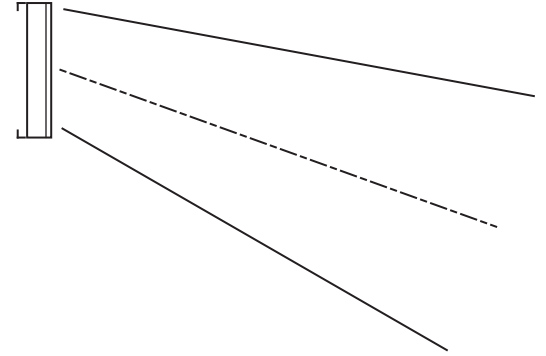


Select the Beam Pattern

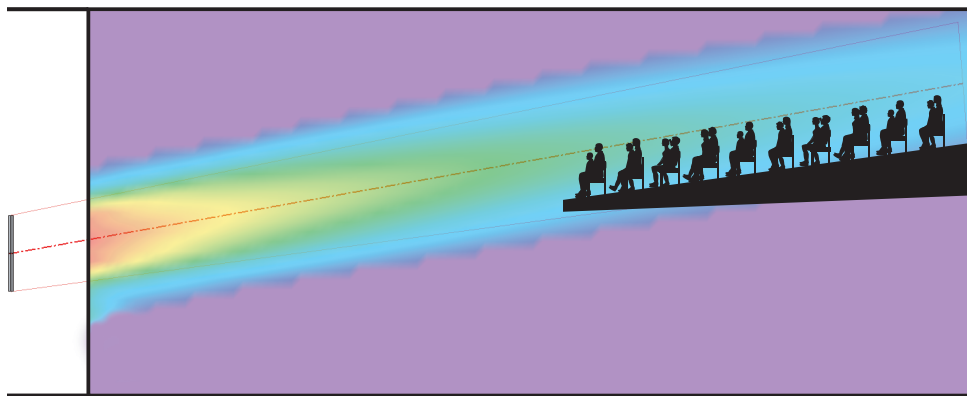
There are three beam pattern options for the MSA12X. You can choose the beam type depending on the location of the array and shape of the coverage area.

Basic Steer/Spread

Basic Steer/Spread is the most basic beam pattern. You can steer this beam vertically and then spread the beam symmetrically from that axis. Steering and spreading are independent functions and are applied vertically, not horizontally. When the steer angle and spread angle are both 0°, the array will radiate the same pattern as that of a passive non-steerable column array like the Bose Professional MA12EX.



This beam pattern has a vocal range smoothing option that makes the tonal balance more consistent throughout the coverage area and suppresses the sidelobes from the beam. The beam shape also becomes smoother, specifically around the vocal range. The downside of using this option is that you lose a few decibels of headroom.

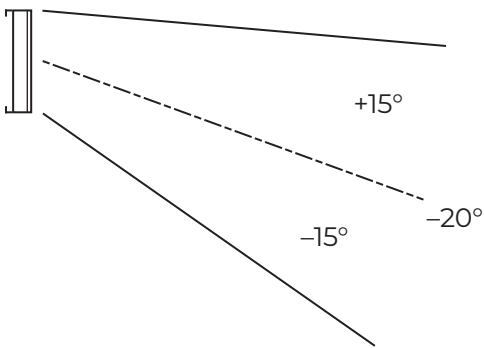


The examples below show arrays with their maximum negative steer angles and a maximum spread angles.

1-module array

Steer: $\pm 20^\circ$

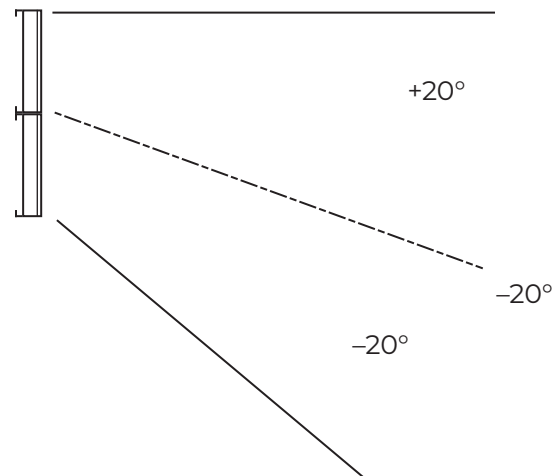
Spread: $\leq 30^\circ$ (-15° to $+15^\circ$)



2- or 3-module array

Steer: $\pm 20^\circ$

Spread: $\leq 40^\circ$ (-20° to $+20^\circ$)

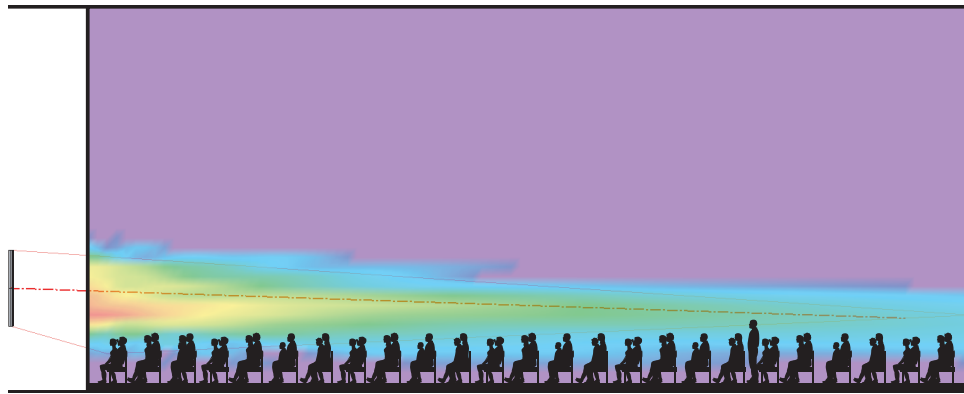
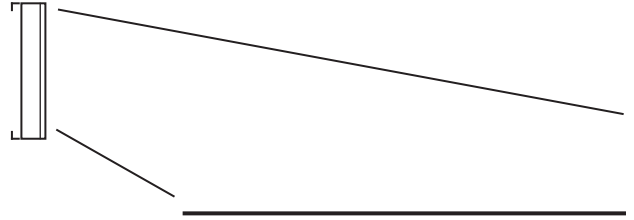


Flat-Floor Optimized

As the name suggests, Flat-Floor Optimized is a beam pattern that works best in areas with flat floors, producing consistent coverage from the front row to the back row of the room, specifically around the vocal range. You can steer this beam vertically only, and you cannot adjust the spreading angle.

This beam pattern works best when the bottom plate of the array is approximately 0.3–0.8 meters (1.0–2.5 feet) above the ear height of the audience. If the array is mounted higher than this, or if the floor is raked, choose a different beam type, like Raked-Floor Optimized.

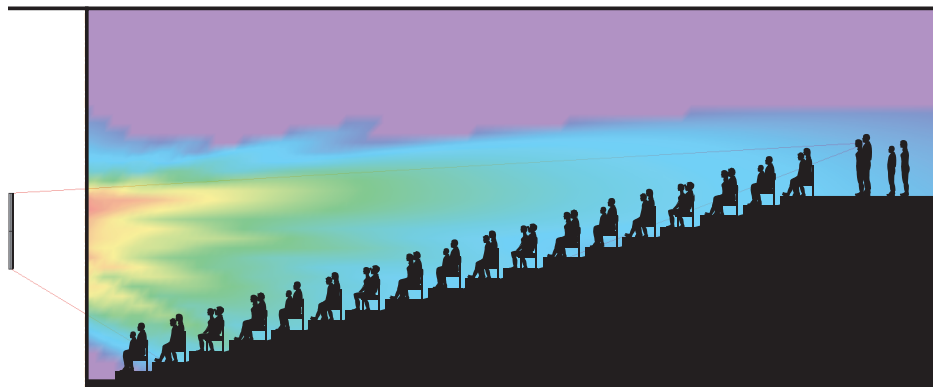
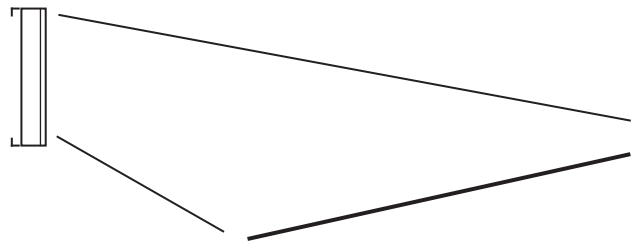
This beam pattern has a vocal range smoothing option that makes the tonal balance more consistent throughout the coverage area and suppresses the sidelobes from the beam. The beam shape also becomes smoother, specifically around the vocal range. The downside of using this option is that you lose a few decibels of headroom. This feature is on by default and recommended for this beam type.



Raked-Floor Optimized

As the name suggests, Raked-Floor Optimized is a beam pattern that works best in areas with raked floors, producing a vertically asymmetrical radiation. The vocal range smoothing option is not available for this beam type.

Note: This beam type is also suitable for a flat floor from a relatively high array position, e.g., when the bottom plate of the array is higher than 1 meter (3.3 feet) above the ear height of the audience.



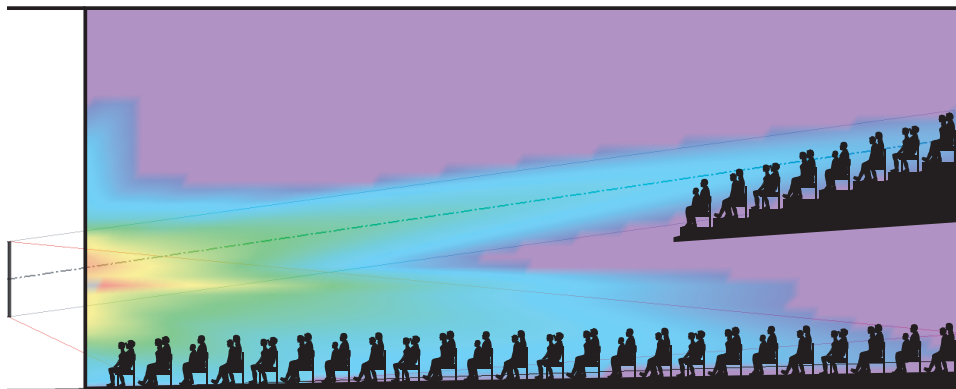
About Dual Beam Mode

Dual Beam Mode uses all the drivers of an array to generate two simultaneous, independent beams. Each of beam can use its own beam pattern, beam gain, and room EQ. This mode also enables better directional control of low frequencies. An array can use Dual Beam Mode with one, two, or three modules.

The array must be using its Dante audio input for Dual Beam Mode to function. Dual Beam Mode is not available for analog audio input sources.

Note: Use ControlSpace Designer to select the Dante input as the input type of the array. You cannot select the input type in Bose Professional Array Tool or Modeler software.

Note: To apply independent room EQ to each beam, the array must be associated with a supported ControlSpace processor with Dante functionality. For a list of supported processors, see **Appendix B: MSA12X Capability by Processor Model and Dante Functionality**. For more more information about room EQ, see the help file in ControlSpace Designer.



Dual Beam Mode using Basic Steer/Spread and Raked-Floor Optimized beam patterns.

Select and Use the Beam Steering Software

Use one of these software applications to steer the vertical coverage of an MSA12X array. All of them are available for free download at [BoseProfessional.com](https://www.boseprofessional.com).

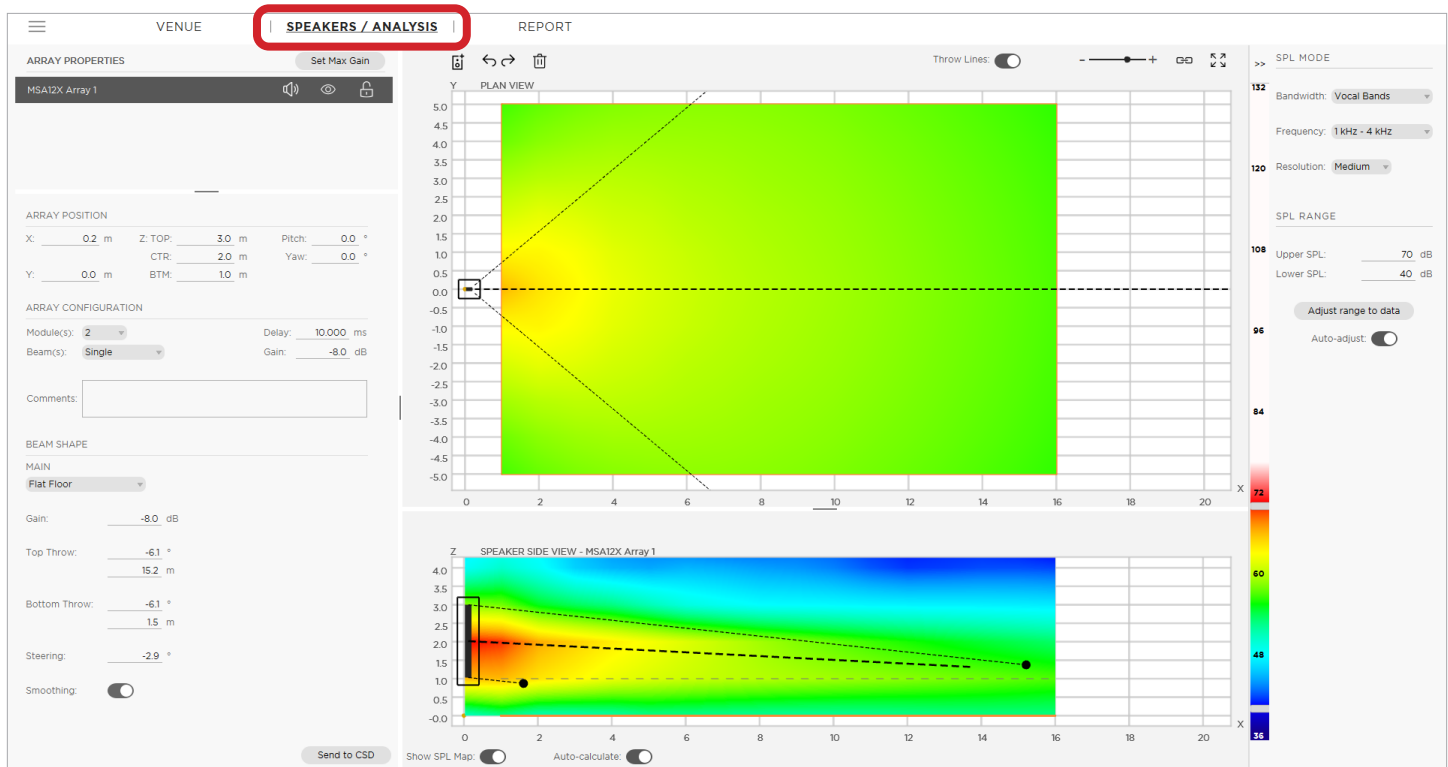
ControlSpace Designer: If you only need the Basic Steer/Spread beam pattern and do not need to see the coverage in the room, you can use just ControlSpace Designer. Vocal range smoothing is not available with this method. For more information, see [Steer and Shape the Beam \(ControlSpace Designer\)](#).

Bose Professional Array Tool: If you want to model an acoustic space quickly, use Bose Professional Array Tool. You do not have to be connected to the array while using it, and you can configure the array using all three beam patterns and beam options. For more information, see [Steer and Shape the Beam \(Bose Professional Array Tool\)](#).

Note: If you want to send the array settings to ControlSpace Designer, a required step to update the physical array, you must use the Windows version of this software.

Modeler: If you need to create a detailed model of an acoustic space, use Modeler software, which is ideal for complex, difficult spaces and computationally intensive predictions, including the full Speech Transmission Index (STI). You do not have to be connected to the array while using it, and you can configure the array using all three beam patterns and beam options. For more information, see [Steer and Shape the Beam \(Modeler\)](#).

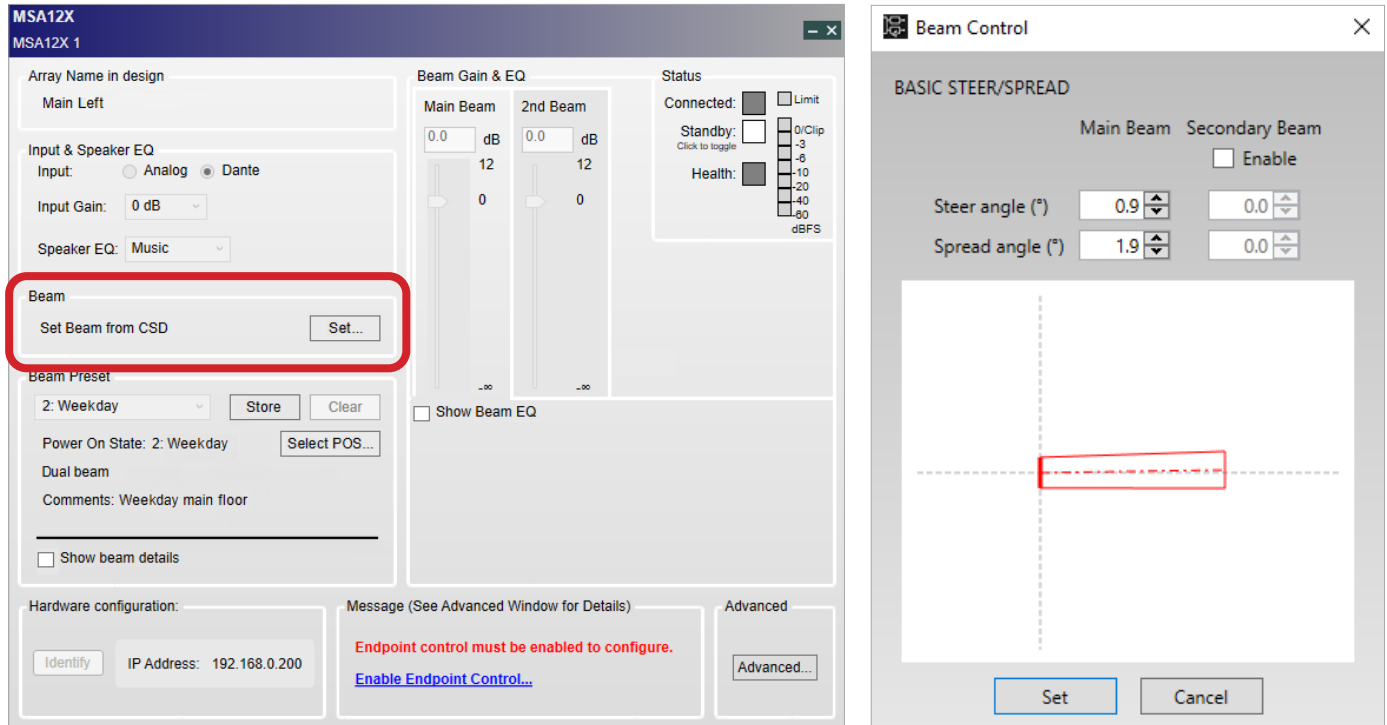
Steer and Shape the Beam (Bose Professional Array Tool)



Note: If you want to send the array settings to ControlSpace Designer, a required step to update the physical array, you must use the Windows version of this software.

1. Open **Bose Professional Array Tool**, and design an array in the **Speakers/Analysis** tab.
For additional help, click the menu in the upper-left corner, select **Help**, and then click **Launch Help (F1)**.
2. When you are ready to update your array with the new beam pattern, see [Send Beam Settings to ControlSpace Designer](#).

Steer and Shape the Beam (ControlSpace Designer)



1. In the MSA12X control panel, click **Set...** in the **Beam** section.
2. In the **Beam Control** window that appears, set the **Steer Angle** and **Spread Angle** for each beam. In the graph in the window, the red lines represent the **Main Beam**, and the red lines represent the **Secondary Beam**.

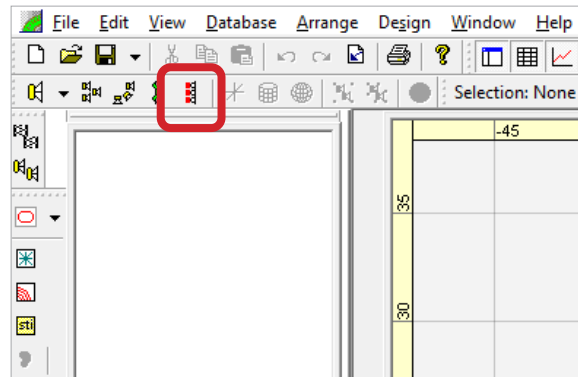
Note: The representational red and blue lines may look different from those in Modeler software, even when the steering and/or spreading angles are the same. This is because Modeler software lets you specify the distance (length of the beam lines), which does not affect this beam type. As long as the steering and/or spreading angles are identical, though, then the radiated beam pattern is identical.

3. When you are finished, click **Set**, which will immediately send the beam pattern to the array. This function is available when the MSA12X device in ControlSpace Designer either **(A)** been associated to a physical array or **(B)** received a beam pattern sent from Modeler software. Otherwise, the **Set...** button will be unavailable.

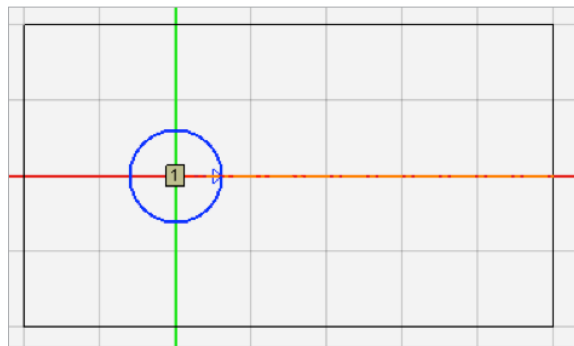
If you like this pattern, store it to a beam preset (see **Store a Beam Preset**).

Steer and Shape the Beam (Modeler)

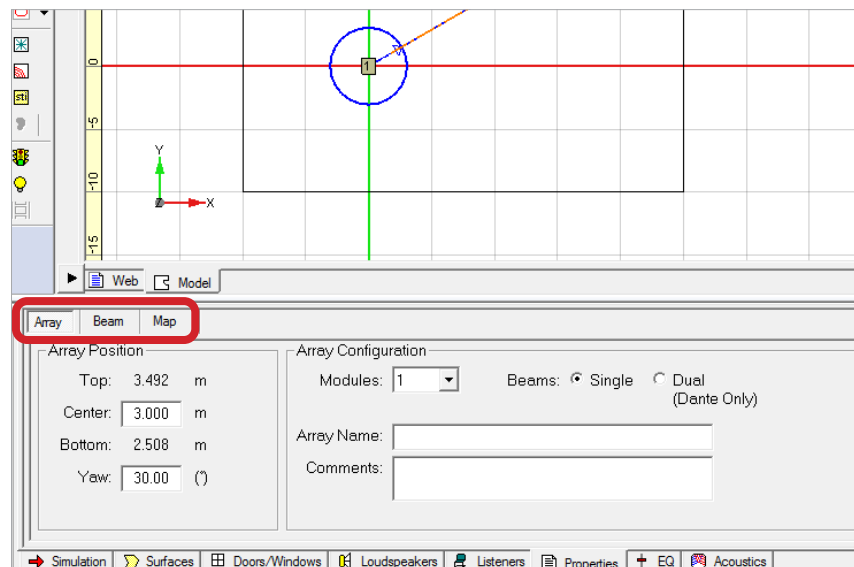
1. Start or open a model. and select the **Place MSA Array** tool.



2. In the **Plan View**, select a surface, and then place an array.



3. Click the array with the **Select** tool to select it.
4. At the bottom edge of the **Detail View** panel, click the **Properties** tab.
5. At the top edge of the **Detail View** panel, click the **Array** tab or **Beam** tab and use the fields in these tabs to configure the settings for the overall array or beam pattern, respectively (see **Array Tab** and **Beam Tab** for more information).



For additional help, click the **Help** menu and then click **Contents (F1)**.

When you are ready to update your array with the new beam pattern, see **Send Beam Settings to ControlSpace Designer**.

Array Tab

The Array tab contains the basic properties of the array as well as the beam mode (Single Beam or Dual Beam).

Array Position

Top/Center/Bottom: Use these fields to set the “Z” coordinate of the array. **Center** indicates the center of the array, **Top** indicates the topmost array plate, and **Bottom** indicates the bottommost plate. The Top and Bottom values are linked to the Center value. Use the Top/Bottom coordinate to specify the mounting height onsite.

Note: These values may not indicate the height of the array from the floor. If the Z coordinate of the floor is **0**, then they indicate the distance from the floor. A different Z coordinate indicates a different distance, e.g., a relative height from another object.

Yaw: Use this field to set the yaw of the array.

Array Configuration

Modules: Click this menu to select the number of the modules in an array: **1**, **2**, or **3**.

Beams: Click a selector to specify the number of the beams radiated from the array: **Single** (1) or **Dual** (2). See **About Dual Beam Mode** for more information.

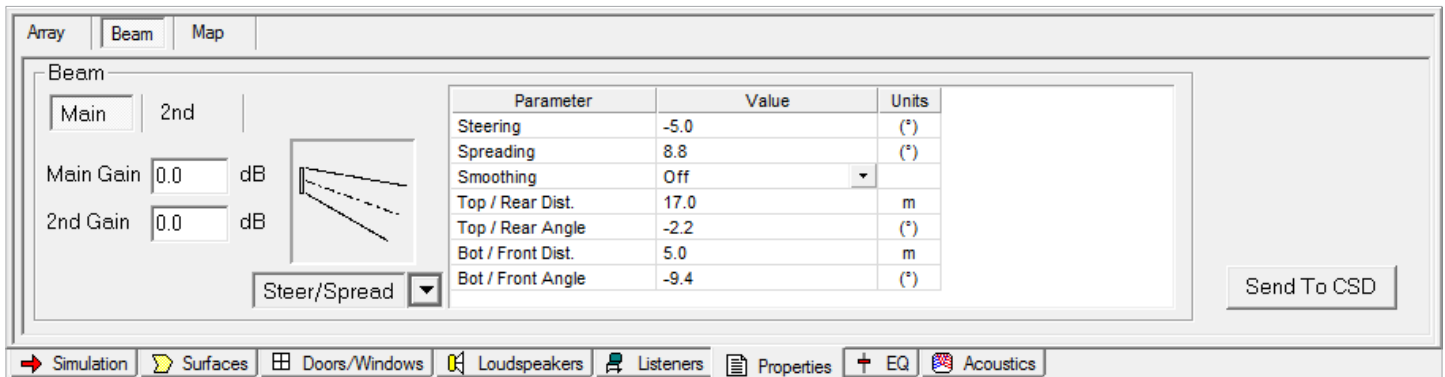
Note: The array must be using its Dante audio input for Dual Beam Mode to function. Dual Beam Mode is not available for analog audio input sources.

Array Name: Use this field to name the array, e.g., “Main Left.” This name is used to manage the link between the Modeler software and ControlSpace Designer (you cannot change the name in ControlSpace Designer).

Comments: Use this field to record any details about the beam preset that will appear in ControlSpace Designer. You could use it to describe the beam pattern (e.g. “Weekday, covering main floor only,” “Sunday, covering main floor + balcony”). This can be useful when comparing multiple beam patterns for an array rather than looking at parameter values (e.g. Steer -10°, Spread +10°).

Beam Tab

In the Beam tab, you can specify the beam type and beam parameters.



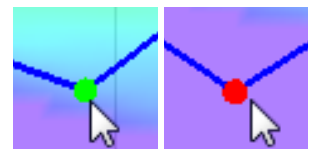
Main/2nd: Click the **Main** tab or **2nd** tab to show the parameters of the main beam or second beam. The **2nd** beam tab is available only when the array is in Dual Beam Mode (to set the beam mode, see **Array Tab**).

Main Gain/2nd Gain: Use these fields to set the independent gain level for each beam. The **2nd Gain** field is available only when the array is in Dual Beam Mode (to set the beam mode, see **Array Tab**).

Beam Type menu: Click this menu to select the beam pattern: **Steer/Spread**, **Flat Floor**, or **Raked Floor**. See the following sections for information on shaping each beam pattern: **Basic Steer/Spread (Modeler)**, **Flat-Floor Optimized (Modeler)**, and **Raked-Floor Optimized (Modeler)**.

Parameter–Value–Units: Use these fields to set the parameters that specify the beam shape. The available parameters vary by beam pattern. A positive value produces an upward angle, while a negative value produces a downward angle. Some of these parameters are interdependent, so changing one may automatically change another. Adjusting the throw lines in the Vertical Coverage Map will also automatically change some of the values and vice versa.

Note: For all beam patterns, you can click and drag the circles at the ends of the throw lines to change the beam shape. The values of the **Top/Rear Dist.**, **Top/Rear Angle**, **Bot/Front Dist.**, and **Bot/Front Angle** parameters will update automatically. The color of the circle will indicate if it is within or outside of its limit. A **green** circle indicates the beam is within the limit. If the circle becomes **red**, then the beam is outside the limit and will automatically “snap” back to its original position.

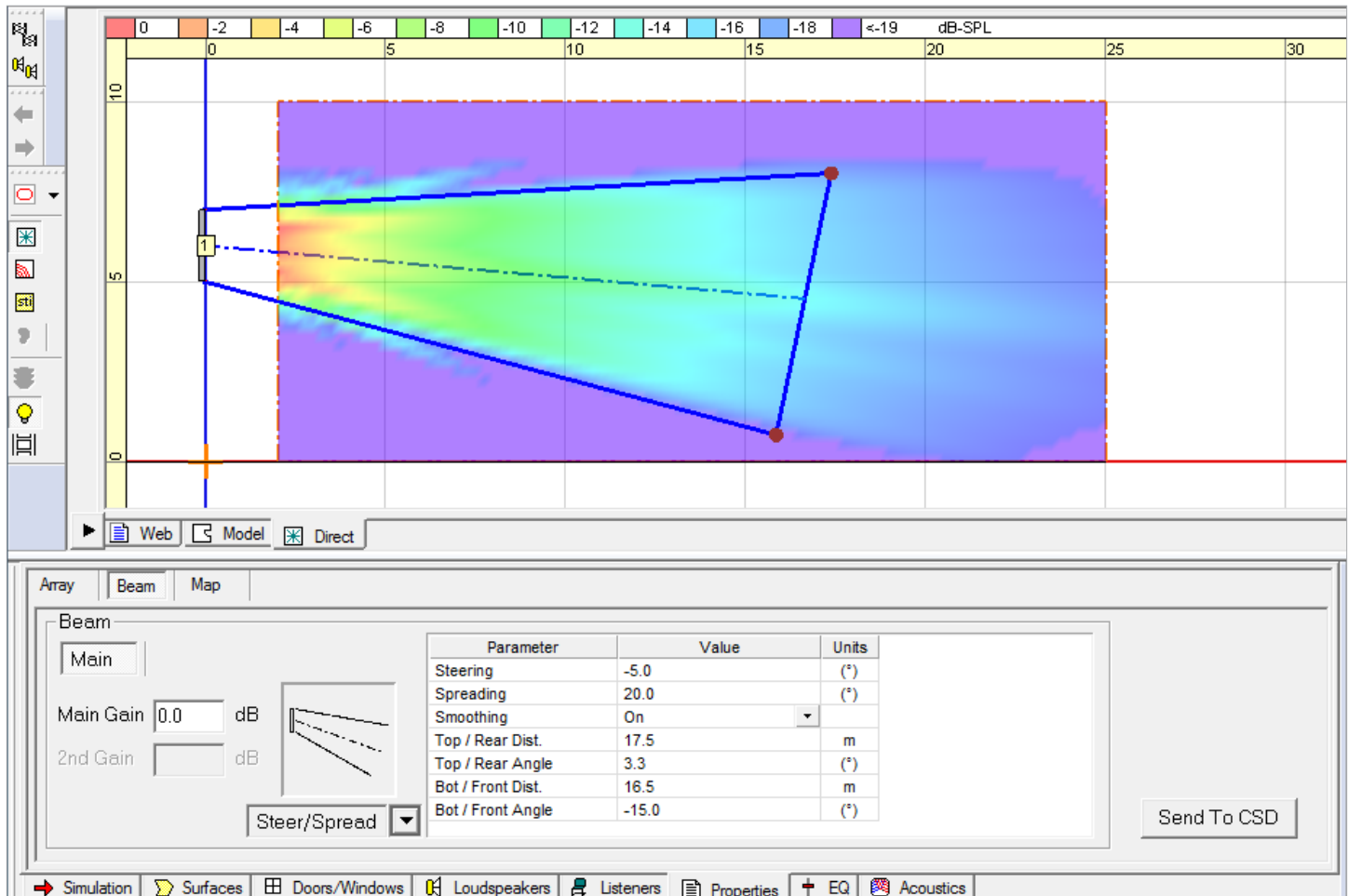


Note: The Basic Steer/Spread and Flat Floor Optimized beam patterns include the **Smoothing** parameter. When the **Value** is **On**, the Vocal Range Smoothing feature makes the tonal balance more consistent throughout the coverage area and suppresses the sidelobes from the beam. The beam shape also becomes smoother, specifically around the vocal range. The downside of using this option is that you lose a few decibels of headroom. The default setting varies by beam pattern:

Beam Pattern	Default Setting (Vocal Range Smoothing)
Basic Steer/Spread	Off
Flat Floor Optimized	On
Raked Floor Optimized	Not available

Send to CSD: Click this button to export the beam settings to ControlSpace Designer. For more information, see **Send Beam Settings to ControlSpace Designer**.

Basic Steer/Spread (Modeler)



Basic Steer/Spread is the most basic beam pattern. You can steer this beam vertically and then spread the beam symmetrically from that axis. Steering and spreading are independent functions and are applied vertically, not horizontally.

You can change any of the following parameters to shape the beam (as well as clicking and dragging throw lines in the Vertical Coverage Map):

Steering: The angle at which the beam is steered vertically.

Spreading: The angle at which the beam is spread vertically from the steering angle.

Smoothing: The Vocal Range Smoothing feature (**Off** by default for this beam pattern).

Top/Rear Dist. or **Bot/Front Dist.:** The throw distance of the top/rear throw line or the bottom/front throw line, respectively.

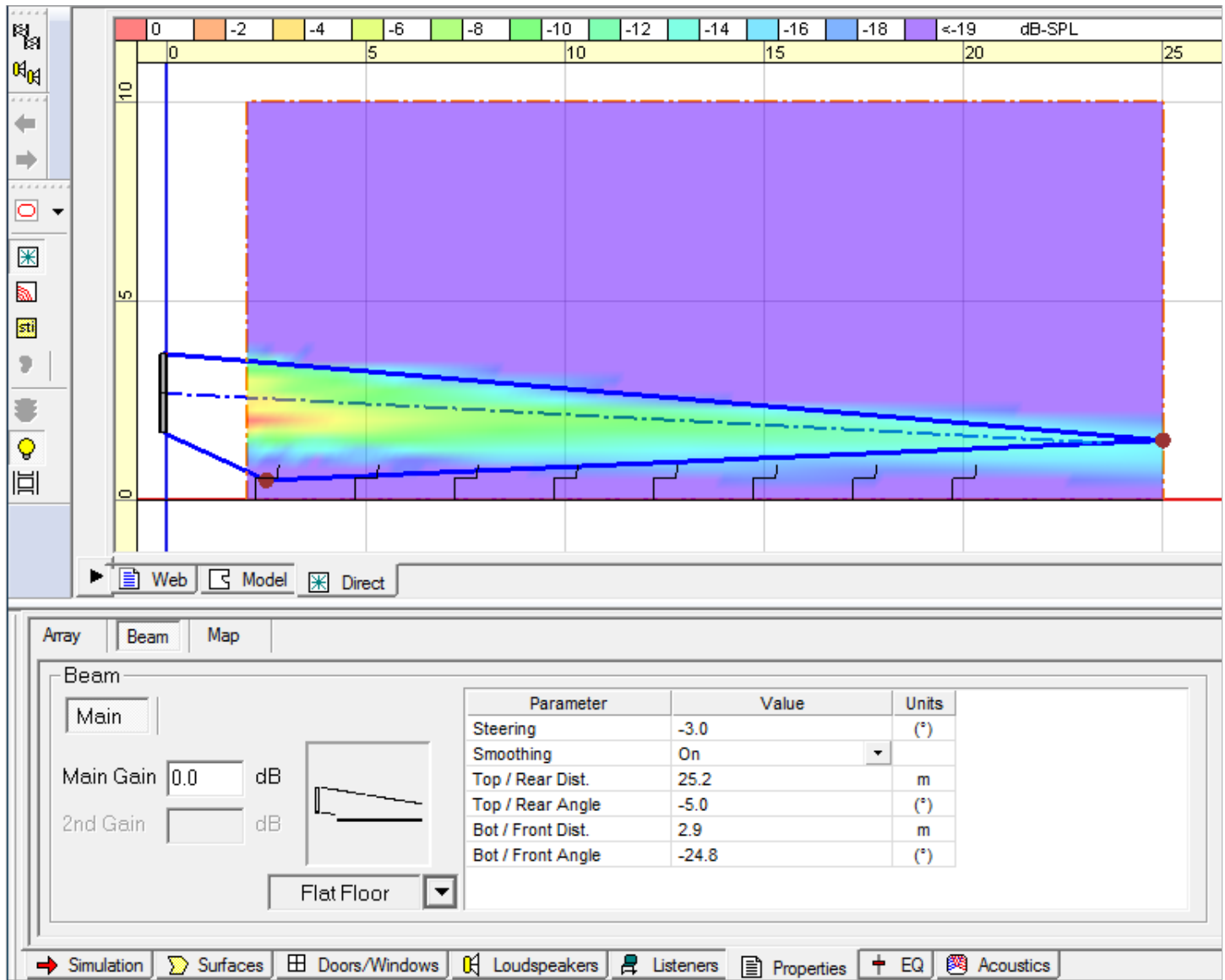
Top/Rear Angle or **Bot/Front Angle:** The angle of the top/rear throw line or the bottom/front throw line, respectively.

Note: Remember to take the ear height of the farthest listener into account.

Note: The sum of the Top/Rear Angle and Bottom/Front Angle values may not necessarily be the same as the Spreading value. This is because the Modeler software automatically adjusts the Steering and Spreading values to effectively cover the far throw point.

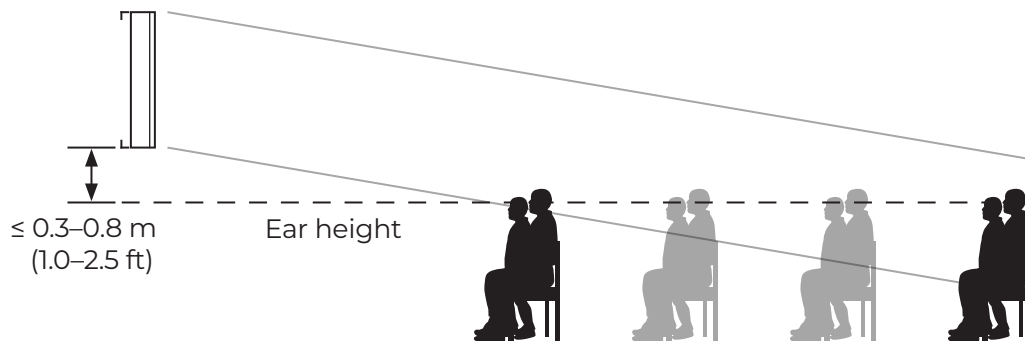
Note: When the **Steering** and **Spreading** values are both set to **0°**, the array will radiate the same pattern as that of a passive non-steerable column array like the Bose Professional MA12EX.

Flat-Floor Optimized (Modeler)



As the name suggests, Flat-Floor Optimized is a beam pattern that works best in areas with flat floors, producing consistent coverage from the front row to the back row of the room, specifically around the vocal range. You can steer this beam vertically only, and you cannot adjust the spreading angle.

This beam pattern works best when the bottom plate of the array is approximately 0.3–0.8 meters (1.0–2.5 feet) above the ear height of the audience. If the array is mounted higher than this, or if the floor is raked, choose a different beam type, like Raked-Floor Optimized.



You can change any of the following parameters to shape the beam (as well as clicking and dragging throw lines in the Vertical Coverage Map):

Steering: The angle at which the beam is steered vertically.

Smoothing: The Vocal Range Smoothing feature (**On** by default for this beam pattern).

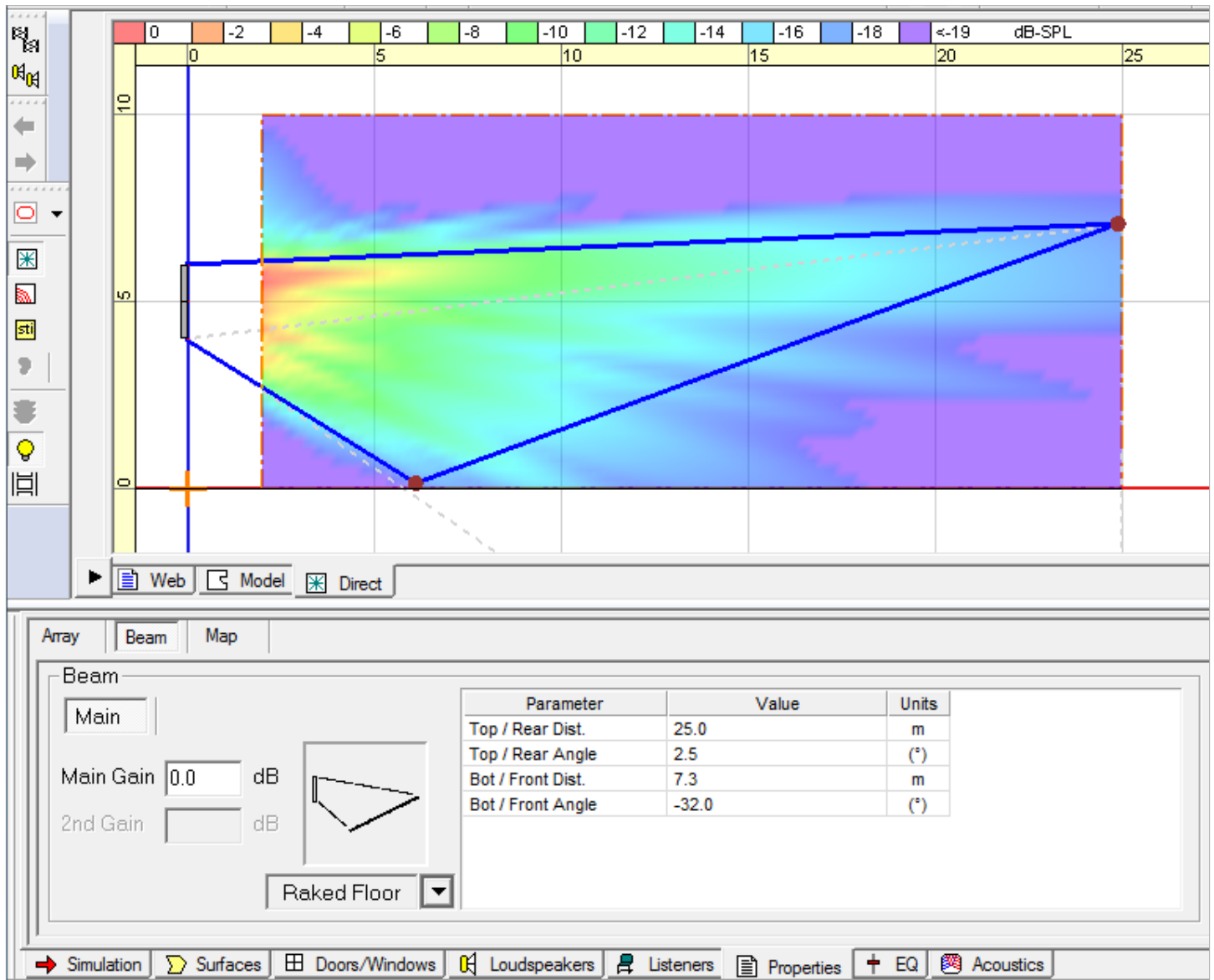
Top/Rear Dist. or **Bot/Front Dist.:** The throw distance of the top/rear throw line or the bottom/front throw line, respectively.

Top/Rear Angle or **Bot/Front Angle:** The angle of the top/rear throw line or the bottom/front throw line, respectively.

Note: Remember to take the ear height of the farthest listener into account.

Note: The Top/Rear Angle and Steering values may not necessarily be the same. This is because the Modeler software automatically adjusts the Steering value to effectively cover the far throw point.

Raked-Floor Optimized (Modeler)



As the name suggests, Raked-Floor Optimized is a beam pattern that works best in areas with raked floors, producing a vertically asymmetrical radiation.

Note: This beam pattern is also suitable for a flat floor from a relatively high array position, e.g., when the bottom plate of the array is higher than 1 meter (3.3 feet) above the ear height of the audience.

You can change any of the following parameters to shape the beam (as well as clicking and dragging throw lines in the Vertical Coverage Map):

Top/Rear Dist. or Bot/Front Dist.: The throw distance of the top/rear throw line or the bottom/front throw line, respectively.

Top/Rear Angle or Bot/Front Angle: The angle of the top/rear throw line or the bottom/front throw line, respectively.

Manage Multiple Beam Patterns

You can set multiple beam patterns in an array and set up end-user recall of these settings.

Note: To set multiple beam patterns for an MSA12X array and use supported controllers like the ControlSpace Remote app or ControlCenter CC-64 to invoke changes, your installation must include a ControlSpace processor listed in **Appendix B: MSA12X Capability by Processor Model and Dante Functionality**.

To store each beam pattern as a Modeler **.mdr** file:

1. In the **Array** tab, enter text in the **Array Name** field to name the array (e.g., “Main Left”).
2. Design a beam pattern and add a short description of the beam in the **Comments** field (e.g., “Weekday, covering main floor only”).
3. Save and name the **.mdr** file (e.g., “Weekday.mdr”).
4. Duplicate that **.mdr** file and enter a different name for the new file (e.g., “Sunday.mdr”).
5. Design another beam pattern for the same array, and then change the short description in the **Comments** field (e.g., “Sunday, covering main floor and balcony”). At this point, the name of the array and number of modules of the array should be the same as in Step 1.
6. Save the **.mdr** file.

If the name of the array and number of modules are the same, then these beam patterns can be sent to ControlSpace Designer as alternative beam patterns for the same array. See **Send Beam Settings to ControlSpace Designer** for more information.

Frequently Asked Questions

Question	Answer
What are the angular limits for basic steering and spreading?	<p>For a 1-module array:</p> <p>Steer: $\pm 20^\circ$</p> <p>Spread: $\leq 30^\circ$ (-15° to $+15^\circ$)</p> <p>For a 2- or 3-module array</p> <p>Steer: $\pm 20^\circ$</p> <p>Spread: $\leq 40^\circ$ (-20° to $+20^\circ$)</p> <p>See Basic Steer/Spread for more information.</p>
How many modules can be used in an array?	You can use up to three modules in an array.
What is the frequency limit for the beam control?	<p>The number of modules in an array determine its ability to vertically steer the low-frequency content of the beam. These are approximate values:</p> <p>1-module array: 500 Hz</p> <p>2-module array: 250 Hz</p> <p>3-module array: 160 Hz</p>
How many modules are required to use Dual Beam Mode?	There is no minimum requirement—you can use one, two, or three modules—but we recommend using an array of two or three modules for better directional control. Note that the array must be using its Dante audio input for Dual Beam Mode to function. Dual Beam Mode is not available for analog audio input sources.
How many beams can radiate from an array?	An array can radiate one beam (Single Beam Mode) or two beams (Dual Beam Mode).
Do I need a power amplifier for driving a MSA12X array?	No. The MSA12X is a powered loudspeaker with built-in amplification; you do not need any additional power amplifiers.
Does MSA12X have an integrated DSP, or do I need an external signal processor?	MSA12X has built-in signal processing/DSP, which manages Speaker EQ, beam shaping, beam gain and beam EQ. If you need to apply more signal processing, e.g., room EQ or signal delay for rear arrays, then you will need an additional supported signal processor (for more information, see Associate the Array with a ControlSpace Processor).
Do I need Speaker EQ on external signal processor?	No. MSA12X has a built-in Speaker EQ, which you can set to Music or Voice .

Question	Answer												
<p>What EQ options does MSA12X offer?</p>	<p>The built-in DSP of MSA12X has 2 layers of EQ.</p> <p>First, it has a built-in Speaker EQ, which you can set to Music or Voice. This provides the basic sound profile for MSA12X. The Music setting closely matches the sound profile of the MA12EX.</p> <p>Second, it has a built-in Beam EQ which compensates for the change in tonal balance that can vary with the beam spreading. Beam EQ is automatically applied by the beam shape and can be viewed and edited in the MSA12X control panel in ControlSpace Designer.</p> <p>An optional third layer is Room EQ, which you can apply to correct for problems in acoustically challenging spaces. Use ControlSpace Designer to add Room EQ as device blocks in a supported Bose Professional ControlSpace processor with Dante functionality.</p>												
<p>How is the Music setting of the Speaker EQ voiced?</p>	<p>The Music Speaker EQ was voiced to closely match the MA12EX (in arrays of one, two, and three modules). Because of this, you can use both MSA12X and MA12EX in the same installation when appropriate.</p>												
<p>What is the difference between the Speaker EQ settings (Voice and Music)?</p>	<p>The Voice Speaker EQ includes some bandwidth adjustments to improve vocal clarity as well as some minor boosts in the 2 kHz–4 kHz range and some cuts at 1 kHz and 8 kHz.</p> <p>The high-pass and low-pass filters applied to each Speaker EQ setting vary as well:</p> <table border="1" data-bbox="836 1333 1485 1554"> <thead> <tr> <th data-bbox="852 1339 966 1365">Modules</th> <th data-bbox="1047 1339 1193 1402">Music (HPF / LPF)</th> <th data-bbox="1307 1339 1453 1402">Voice (HPF / LPF)</th> </tr> </thead> <tbody> <tr> <td data-bbox="901 1417 917 1442">1</td> <td data-bbox="1031 1417 1209 1442">61 Hz / 20 kHz</td> <td data-bbox="1291 1417 1469 1442">80 Hz / 14 kHz</td> </tr> <tr> <td data-bbox="901 1465 917 1491">2</td> <td data-bbox="1031 1465 1209 1491">63 Hz / bypass</td> <td data-bbox="1291 1465 1469 1491">80 Hz / 14 kHz</td> </tr> <tr> <td data-bbox="901 1514 917 1539">3</td> <td data-bbox="1031 1514 1209 1539">63 Hz / bypass</td> <td data-bbox="1291 1514 1469 1539">80 Hz / 14 kHz</td> </tr> </tbody> </table>	Modules	Music (HPF / LPF)	Voice (HPF / LPF)	1	61 Hz / 20 kHz	80 Hz / 14 kHz	2	63 Hz / bypass	80 Hz / 14 kHz	3	63 Hz / bypass	80 Hz / 14 kHz
Modules	Music (HPF / LPF)	Voice (HPF / LPF)											
1	61 Hz / 20 kHz	80 Hz / 14 kHz											
2	63 Hz / bypass	80 Hz / 14 kHz											
3	63 Hz / bypass	80 Hz / 14 kHz											
<p>What MSA12X functions are possible with/without a ControlSpace ESP processor, ControlSpace EX processor, and/or Dante functionality?</p>	<p>See Appendix B: MSA12X Capability by Processor Model and Dante Functionality.</p>												
<p>What types of signal inputs does MSA12X accept?</p>	<p>The MSA12X can accept Dante audio through its RJ-45 Dante port and balanced analog audio through its 3-pin Euroblock connection. You can use ControlSpace Designer to select the input.</p>												

Question	Answer
Can I switch between Dante input and analog input without a computer?	Yes. To do this, your system must include a supported Bose Professional ControlSpace processor with Dante functionality and a supported controller like the ControlSpace Remote app or ControlCenter CC-64. Use ControlSpace Designer to create and store two beam presets — one that uses the Dante input and another that uses the analog input. Then, assign each of these beam presets to a parameter set in the processor. You can then use the controller to invoke that parameter set, which in turn will recall the beam preset. ControlSpace Designer must be offline in order to assign a beam preset to a parameter set; you cannot do so if the software is online (i.e., if the Project View panel is blue). You can do this while Dante functionality is enabled, though.
Can I use Dante redundancy or redundant spillover (from Dante to analog audio) with MSA12X?	<p>No. Dante redundancy is not supported. Each array has only one functioning Dante port (in a multiple-module array, only the Dante port of the master module can be used; the others are deactivated while their Expansion In and Expansion Out ports are used).</p> <p>Switching between input types (Dante and analog audio) must be done manually in ControlSpace Designer (in the MSA12X control panel) or via controller (configured to invoke parameter sets with a supported Bose Professional processor with Dante functionality).</p>
Can I assign beam gains to controllers (e.g., ControlCenter CC-64, ControlSpace Remote app)?	<p>You cannot assign individual parameters of an array (e.g., Beam Gain, Beam EQ) in the MSA12X control panel of ControlSpace Designer; you can assign only a full beam preset to a parameter set.</p> <p>You can achieve the same functionality, though, if your system includes a supported Bose Professional ControlSpace processor with Dante functionality. In ControlSpace Designer, enter the processor's Device View, insert a gain block from the SP Tool Kit, and assign that gain block to the controls.</p>
Can the ControlSpace ESP-00 processor be used with MSA12X?	You can use the ESP-00 and MSA12X in the same system, but the ESP-00 cannot be associated with MSA12X (i.e., you cannot invoke parameter sets with the ESP-00 to recall a beam preset of an MSA12X array).

Question	Answer
Can I use ControlSpace Designer to shape the MSA12X beam?	Yes, if you only need the Basic Steer/Spread beam pattern and do not need to see the coverage in the room, you can use just ControlSpace Designer. Vocal Range Smoothing is not available with this method.
Can I change the IP address of an MSA12X array in ControlSpace Designer (e.g., the Hardware Manager window, the MSA12X control panel, etc.)?	No, use Audinate's Dante Controller .
Can I update the Dante firmware of an MSA12X module in ControlSpace Designer (e.g., the Hardware Manager window)?	No, use Audinate's Dante Updater (in Dante Controller).
Does MSA12X support Dante Domain Manager (DDM)?	Yes, MSA12X supports Dante Domain Manager since ControlSpace Designer 5.9.
Does MSA12X support AES67 audio?	Yes, MSA12X supports AES67 since ControlSpace Designer 5.9. Use Dante Controller or Dante Domain Manager (DDM) to view and configure AES67 settings.
Can I use rear arrays? And when do I need rear arrays?	You can use rear arrays just like when you design your system with column line arrays such as MA12 or MA12EX. This depends on the room shape and beam pattern that you design. We recommend using the SPL map in Modeler software to evaluate the predicted acoustic performance.
Can I "mix and match" MSA12X with other Bose Professional modular column arrays?	Yes. MSA12X is in the same product family as Bose Professional modular line arrays, which includes MA12 and MA12EX. If you do not need to digitally steer the beam for rear arrays, you can use passive modular line arrays with an amplifier instead of an MSA12X (e.g., MA12 with a PowerMatch amplifier).
Does Bose Professional offer EASE GLL files for MSA12X (or the ability to export them) to compare the performance against competitors within EASE or EASE Focus?	No, we do not offer EASE GLL files for MSA12X, though it is possible to import Common Loudspeaker Format (CLF) files into the Modeler software.
Does MSA12X have a Q-SYS plugin?	No.
Is MSA12X EN 54-24 certified for voice-alarm systems?	No, MSA12X is not EN 54-24 certified.
Can I adjust the pitch (vertical angle) of the MSA12X with the included bracket or in any software?	You cannot adjust the pitch with the bracket included with MSA12X, but Modeler software can accommodate physical pitch if it exists due to room dimensions.

Question	Answer
How can MSA12X sell for less than competitors' beam-steering arrays of the same height?	The modular design of MSA12X allows us to stock it like we would for a higher-volume product/SKU; our customers can buy additional MSA12X loudspeakers as needed, whereas competitors' arrays need to be stocked, purchased, and shipped as separate SKUs of single-module arrays, two-module arrays, three-module arrays, etc.
Is the MSA12X paintable?	Yes, you can paint the MSA12X with Krylon® spray paints or other similar products, but the MSA12X must not be installed, powered, or connected to any wiring during the painting process. Follow the instructions in the painting guide for the MSA12X at BoseProfessional.com .

Appendix A: IP Address Setup Without a Router

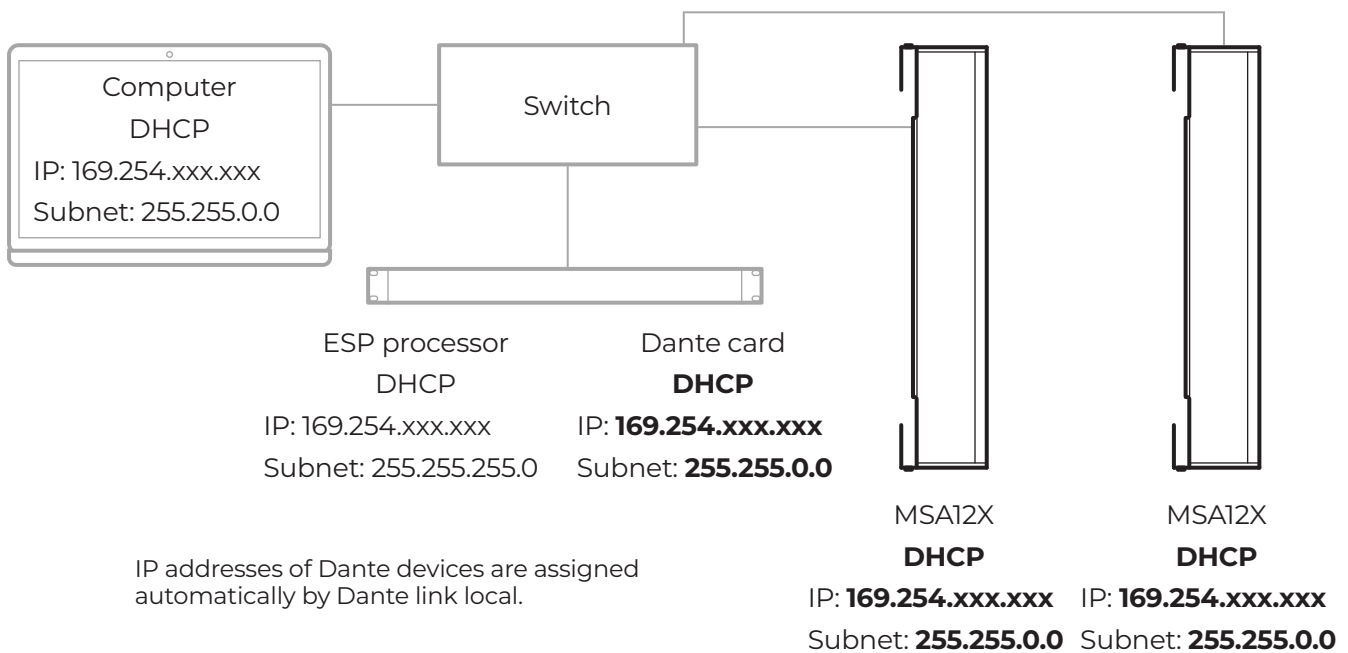
When you connect your computer to an MSA12X module for the first time, we highly recommend doing so through a router or DHCP server, which will make the setup process simple and easy. The router can be of any brand, can be used without an internet connection, and does not need to be used permanently in the installation.

In cases where you do not have a router/DHCP server, refer to this appendix for examples of IP address setup processes for typical scenarios. For more complex network settings, please contact your IT personnel.

Note: Audinate's **Dante Controller**, Version 4.4.2.2 or later, must be installed on your computer (free download; account creation required).

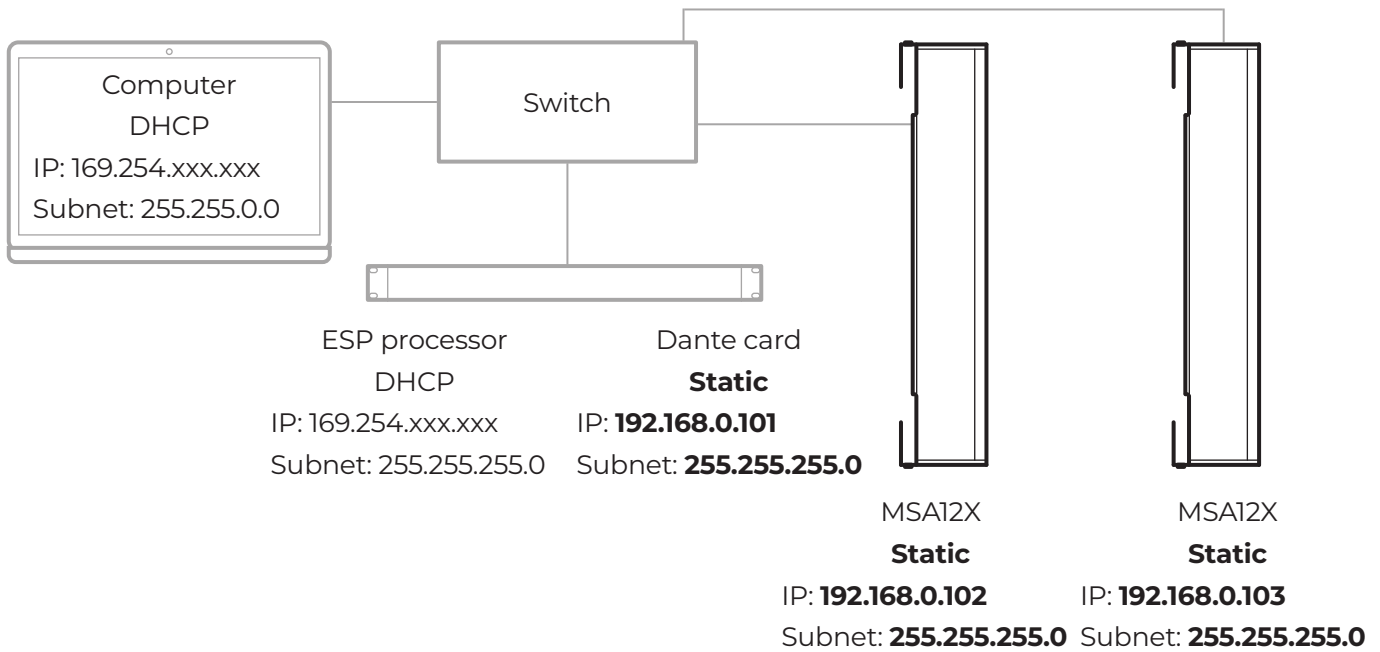
ControlSpace ESP Processor with Dante Card

1. Connect your computer and all the devices to the network.
2. Set the IP address of your computer to **DHCP**.
3. Open **Dante Controller**.
4. Ensure the MSA12X arrays and all other Dante devices (including the Dante card in the ESP processor) appear.
5. Ensure all Dante devices are using the DHCP IP address **169.254.xxx.xxx** and the subnet mask **255.255.0.0**.

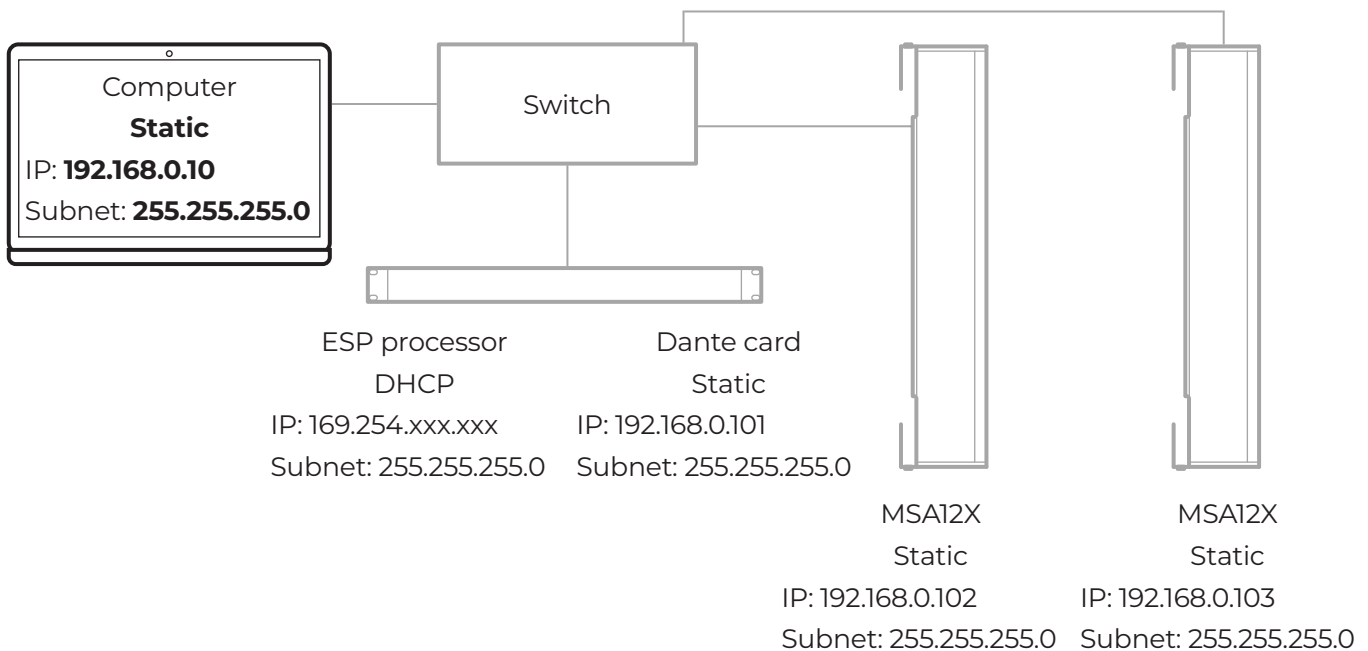


- Change the IP address of all the Dante devices to **static** addresses. Set their IP addresses to **192.168.0.xxx** — using the last 3 digits to differentiate them — and set their subnet masks to **255.255.255.0**.


Note: Each time you change the IP address of a Dante device, the device may disappear in Dante Controller, or you may not be able to assign Dante subscriptions. This is normal.

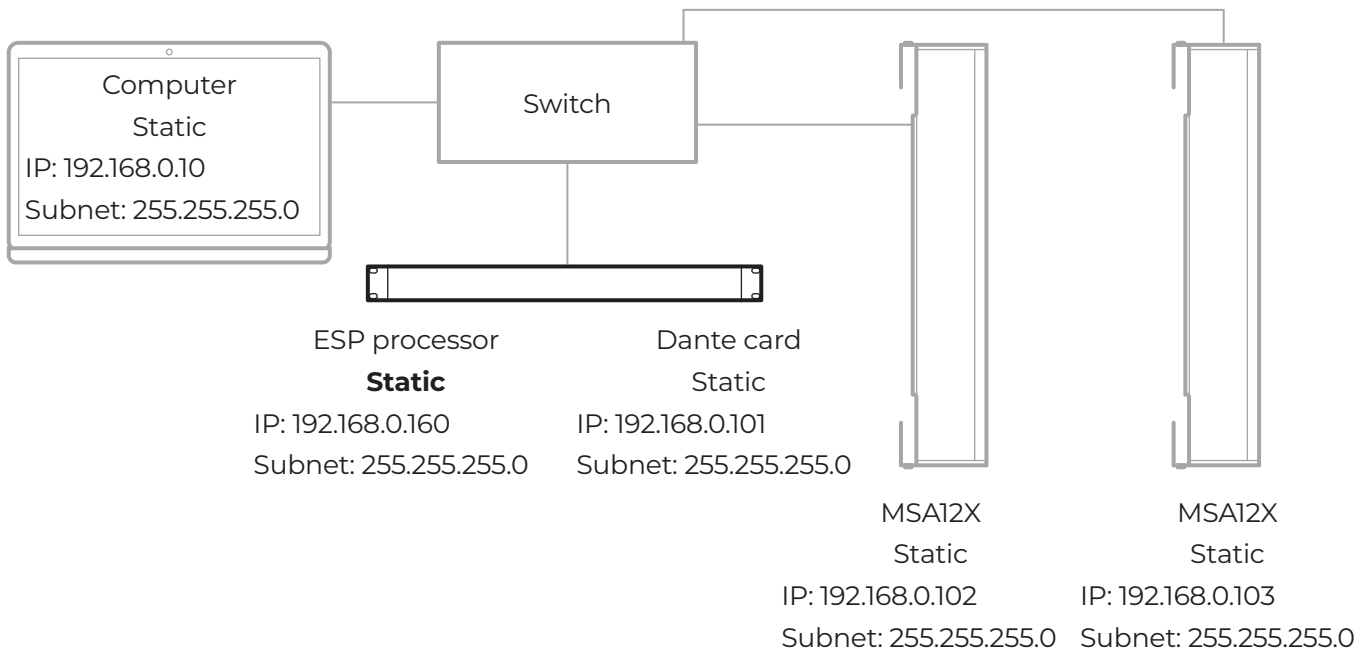


- Change the IP address of your computer to the static address **192.168.0.10** and change its subnet mask to **255.255.255.0**.



- Open **ControlSpace Designer**. The MSA12X arrays will appear in the Project View panel. If they do not appear, open the **System** menu and select **Enable Dante Control**. If they still do not appear, open the **System** menu and select **Host NIC Setup** and ensure the correct network interface card (NIC) is selected.

9. Click **Scan**  to scan the ControlSpace network. The ESP processor with the Dante card will appear. If it does not appear, open the **Tools** menu, select **Set Project Network Properties**, and then ensure the **Project Network Address** is **192.168.0.xxx**. (The default IP address of the ESP processor is **192.168.0.160**.)
10. Set the IP address of the ESP processor to **static**.

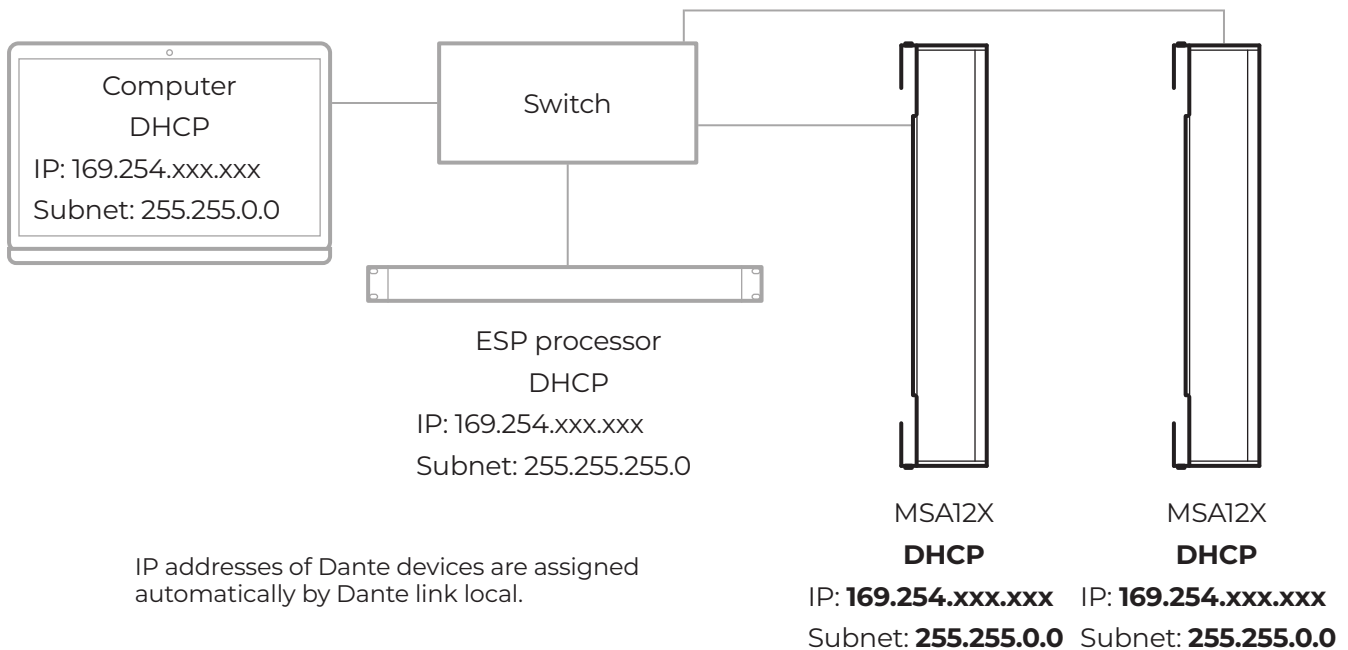


ControlSpace ESP Processor without Dante Card, Analog Input to MSA12X

Note: To set multiple beam patterns for an MSA12X array and use supported controllers like the ControlSpace Remote app or ControlCenter CC-64 to invoke changes, your installation must include a ControlSpace processor listed in **Appendix B: MSA12X Capability by Processor Model and Dante Functionality**.

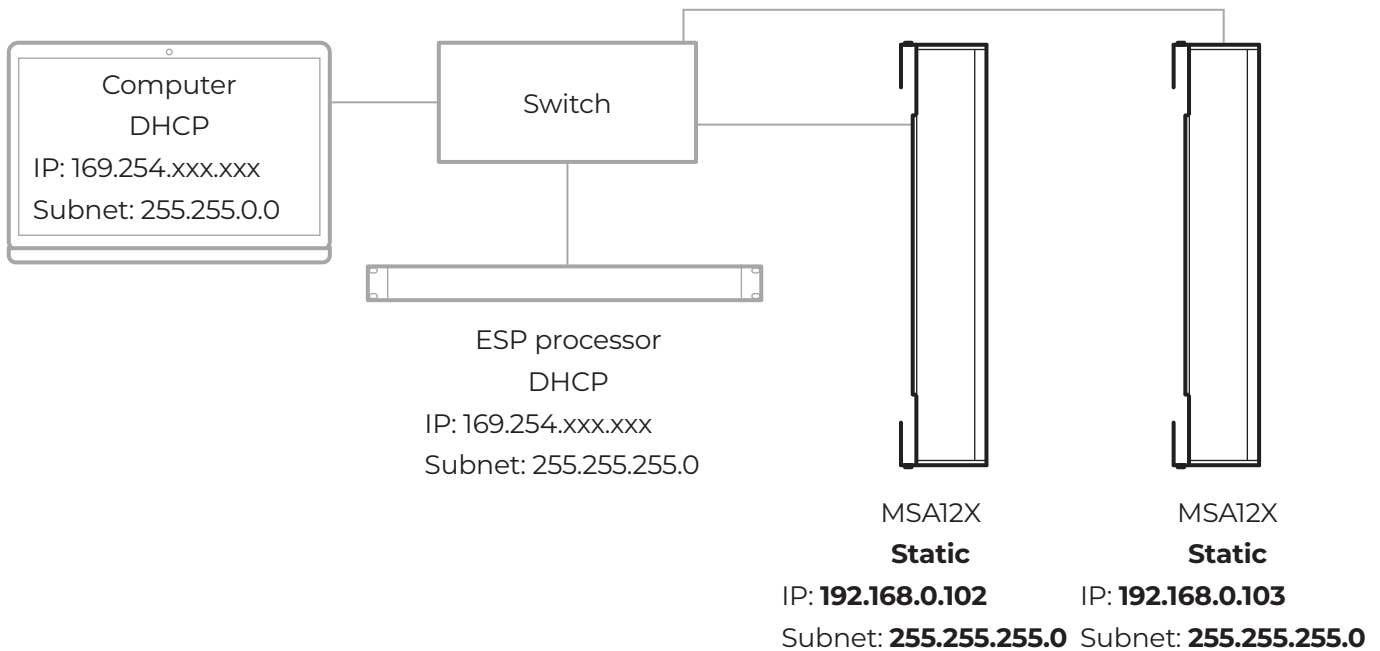
Note: Dual Beam Mode is not available for analog audio input sources. The array must be using its Dante audio input for Dual Beam Mode to function.

1. Connect your computer and all the devices to the network.
2. Set the IP address of your computer to **DHCP**.
3. Open **Dante Controller**.
4. Ensure the MSA12X arrays and all other Dante devices appear.
5. Ensure all Dante devices are using the DHCP IP address **169.254.xxx.xxx** and the subnet mask **255.255.0.0**.

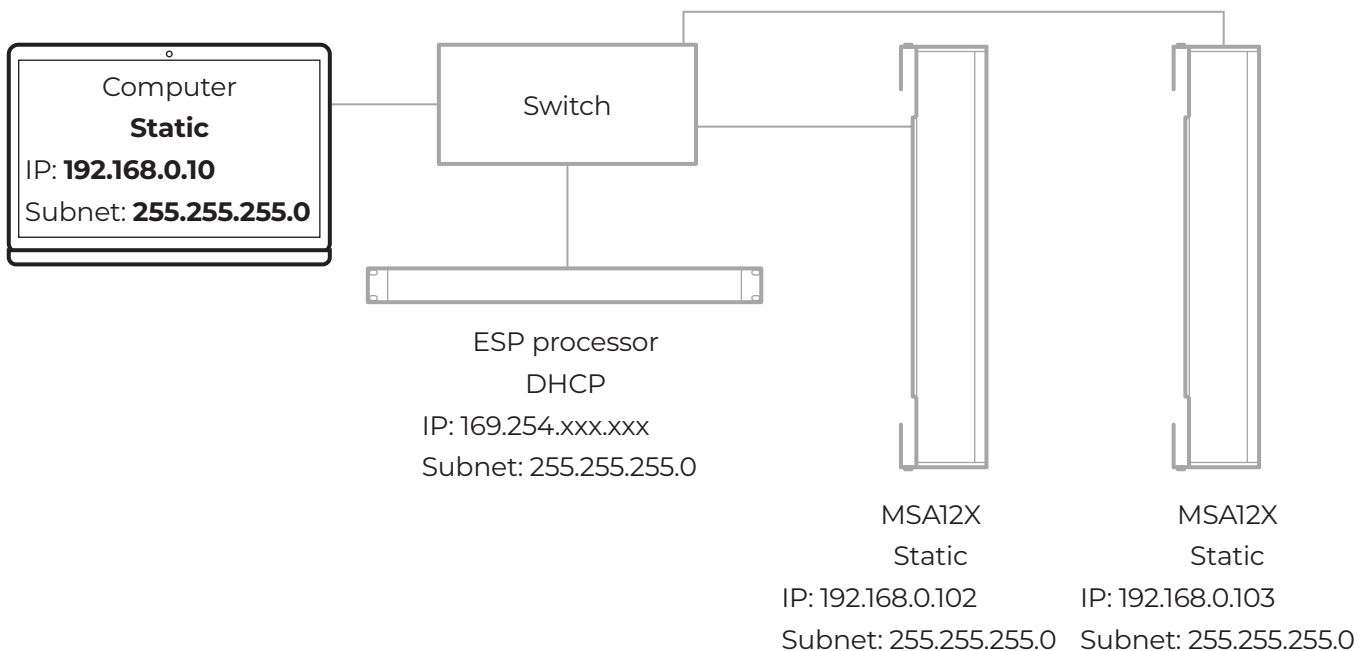


6. Change the IP address of all the Dante devices to **static** addresses. Set their IP addresses to **192.168.0.xxx** — using the last 3 digits to differentiate them — and set their subnet masks to **255.255.255.0**.

Note: Each time you change the IP address of a Dante device, the device may disappear in Dante Controller, or you may not be able to assign Dante subscriptions. This is normal.

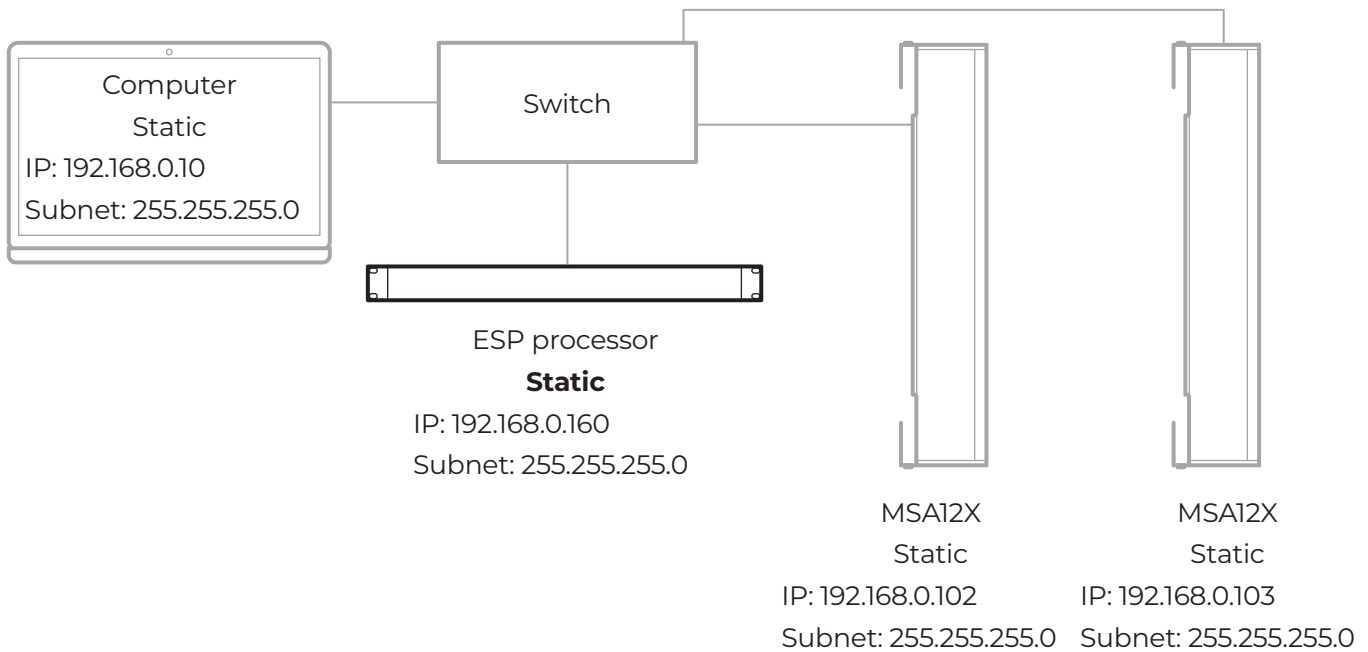


7. Change the IP address of your computer to the static address **192.168.0.10** and change its subnet mask to **255.255.255.0**.



8. Open **ControlSpace Designer**. The MSA12X arrays will appear in the Project View panel. If they do not appear, open the **System** menu and select **Enable Dante Control**. If they still do not appear, open the **System** menu and select **Host NIC Setup** and ensure the correct network interface card (NIC) is selected.

9. Click **Scan**  to scan the ControlSpace network. The ESP processor will appear. If it does not appear, open the **Tools** menu, select **Set Project Network Properties**, and then ensure the **Project Network Address** is **192.168.0.xxx**. (The default IP address of the ESP processor is **192.168.0.160**.)
10. Set the IP address of ESP processor to **static**.



11. In the **control panel** for each MSA12X array, set the **Input** to **Analog**.

Analog Input to MSA12X without ControlSpace Processor

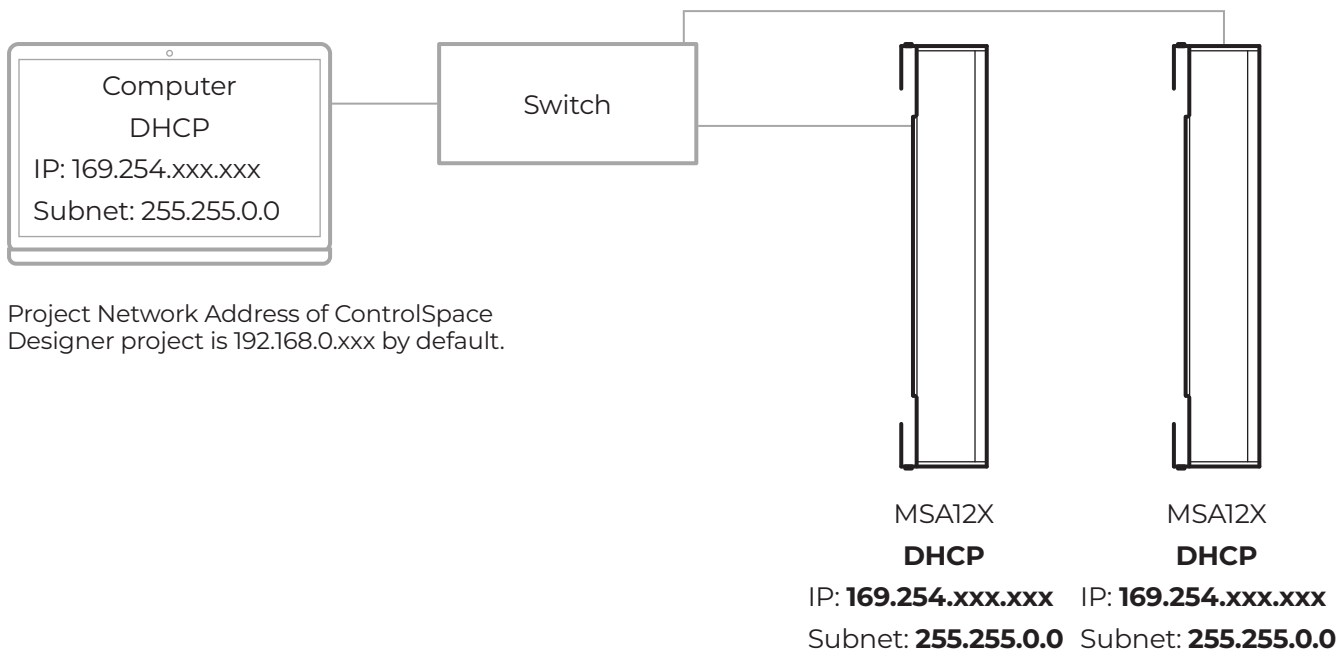
MSA12X is a Dante endpoint device. Even if you do not use the Dante port on the MSA12X to receive an audio input signal, you can use the Dante network to set up its beam configuration. You must also set up the IP addresses of your computer and MSA12X.

Note: If your system does not include a network switch in the system, connect your computer to each MSA12X directly, and follow the process below for each array.

Note: You cannot change the beam pattern via a beam preset without a TRU ESP (ESP-880, ESP-1240, ESP-4120, or ESP-1600) with Dante card or ControlSpace EX-1280C in the system.

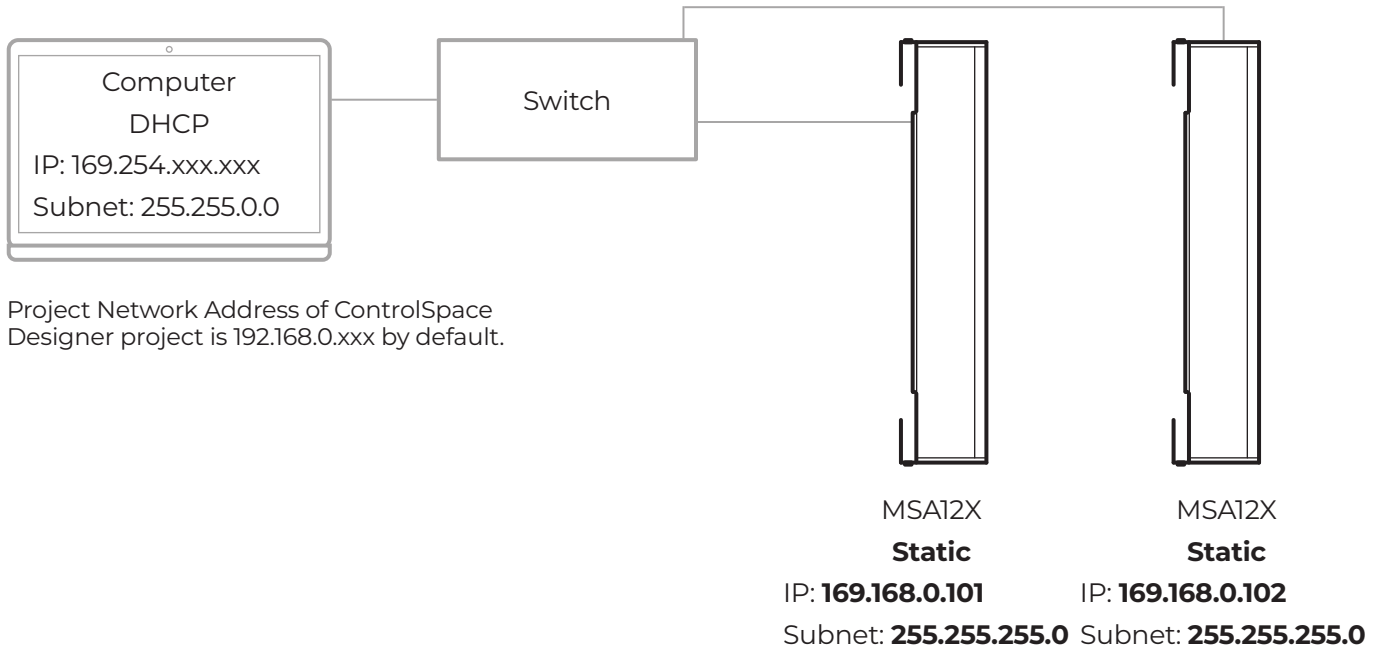
Note: Dual Beam Mode is not available for analog audio input sources. The array must be using its Dante audio input for Dual Beam Mode to function.

1. Connect your computer and all the devices to the network.
2. Set the IP of your computer to **DHCP**. (MSA12X devices may not appear in ControlSpace Designer because the Project Network Address is still 192.168.0.xxx.)
3. Open **Dante Controller**.
4. Ensure the MSA12X arrays and all other Dante devices appear.
5. Ensure all Dante devices are using the DHCP IP address **169.254.xxx.xxx** and the subnet mask **255.255.0.0**.

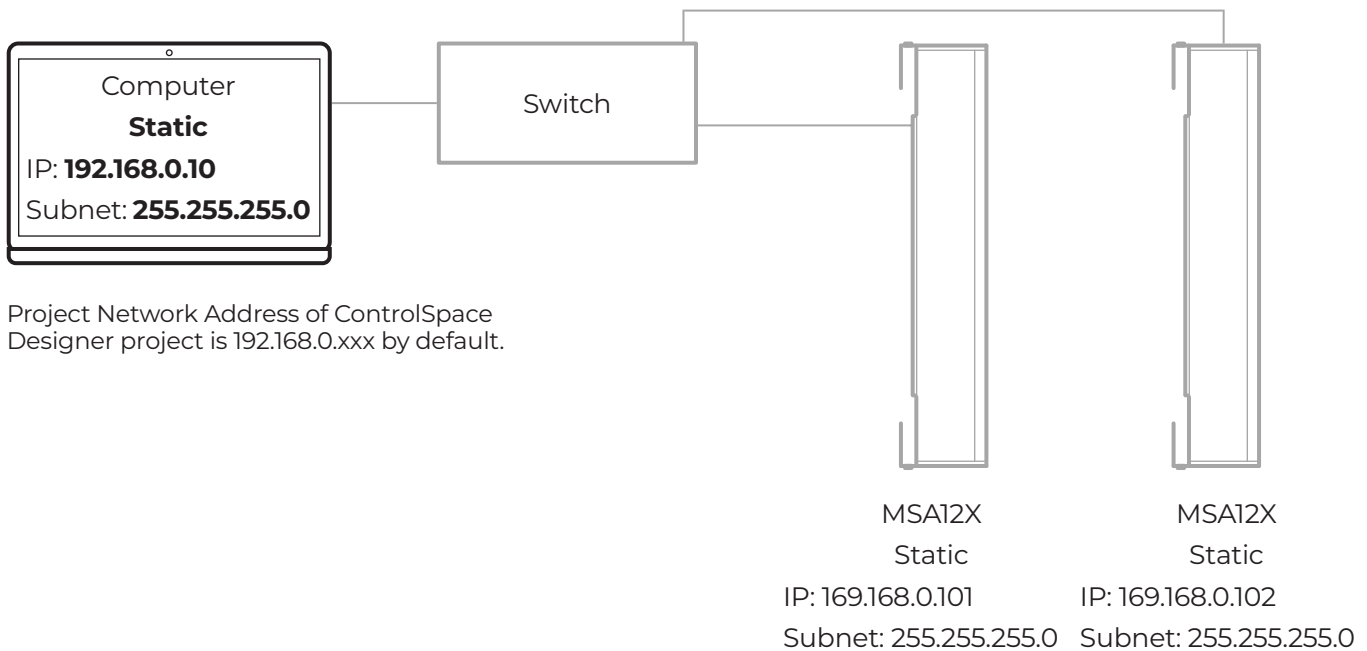


- Change the IP address of all the Dante devices to **static** addresses. Set their IP addresses to **192.168.0.xxx** — using the last 3 digits to differentiate them — and set their subnet masks to **255.255.255.0**.

Note: Each time you change the IP address of a Dante device, the device may disappear in Dante Controller, or you may not be able to assign Dante subscriptions. This is normal.



- Change the IP address of your computer to the static address **192.168.0.10** and change its subnet mask to **255.255.255.0**.



- Open **ControlSpace Designer**. The MSA12X arrays will appear in the Project View panel. If they do not appear, open the **Tools** menu, select **Set Project Network Properties**, and then ensure the **Project Network Address** is **192.168.0.xxx**.
- If Dante control and endpoint control are enabled in ControlSpace Designer, you can set the beam properties of MSA12X without using the Go Online... function.
- In the **control panel** for each MSA12X array, set the **Input** to **Analog**.

Appendix B: MSA12X Capability by Processor Model and Dante Functionality

	ControlSpace ESP processor with Dante functionality (integrated or network card) or ControlSpace EX processor	ControlSpace ESP processor without Dante functionality	No ControlSpace ESP or ControlSpace EX processor in the system
Audio input signal	Dante or analog	Analog	Dante or analog
Beam pattern change* via Bose Professional controller	Yes	No**	No
Beam pattern change* via ControlSpace Remote app	Yes	No**	No
Beam pattern change* via Timer	Yes	No**	No
Beam pattern change* via GPI	Yes	No**	No
Toggle standby via Bose Professional controller, ControlSpace Remote app, Timer, GPI	Yes	No**	No
Dual Beam Mode	Yes	Yes, using Dante Controller	Yes, using Dante Controller
Room EQ, delay	Use ControlSpace EX processor	Use ControlSpace ESP processor	Requires third-party processor

* Beam pattern changes include beam-steering settings, the type of audio input signal (Dante or analog), input gain settings, Beam EQ settings, etc.

** Parameter sets for beam pattern changes are assigned using Dante endpoints, which requires a ControlSpace EX processor (see **Assign a Beam Preset to a Parameter Set** for more information).

To set multiple beam patterns for an MSA12X array and use supported controllers like the ControlSpace Remote app or ControlCenter CC-64 to invoke changes, your installation must include one of the following ControlSpace processors:

ControlSpace ESP-880A	ControlSpace ESP-880 (discontinued)
ControlSpace EX-440C	ControlSpace ESP-880AD (discontinued)
ControlSpace EX-1280	ControlSpace ESP-1240 (discontinued)
ControlSpace EX-1280C	ControlSpace ESP-1240A (discontinued)
	ControlSpace ESP-1240AD (discontinued)
	ControlSpace ESP-1600 (discontinued)
	ControlSpace ESP-4120 (discontinued)

Appendix C: Error Messages

There are several ways in which ControlSpace Designer or Dante Controller may indicate an error when configuring an MSA12X device.

Indication Tones (Loudspeaker Output)

If two 1 kHz sine-wave tones (beeps) play when the MSA12X powers on, there is a condition that could affect its audio quality. This is to prompt end users to tell the AV integrator to consider troubleshooting and/or servicing the module.

MSA12X Health Status Indicator (ControlSpace Designer)

In ControlSpace Designer, an MSA12X device block has a **Health** status indicator — on the signal block in Project View and in its control panel.



If the **Health** status indicator is yellow, this indicates one of the following conditions:

- A temperature warning for one or more modules of the array.

Modules of the array may have been arranged and installed in the unintended order and must be reconfigured. In this case, try deleting and then re-adding the MSA12X devices to the Project View panel.

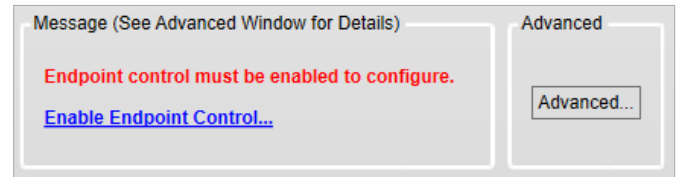
If the **Health** status indicator is red, this indicates one of the following conditions:

- A temperature fault for one or more MSA12X modules of the array that is severe enough to cause the array to shut down.

- Another error condition, e.g., a mismatched beam preset.

MSA12X Control Panel Message (ControlSpace Designer)

In ControlSpace Designer, an MSA12X device block has a **Message** field in its control panel. Descriptions of the various error messages are below. You can also click **Advanced** to view additional information.



Common Messages

- 1401:** Endpoint control is disabled. This can be enabled from the System menu.
- 1301:** Communication timeout: Timeout detected while communicating with the array.

Uncommon Messages

- 1101:** Driver failure: Amp board detected driver failure.
- 1102:** Lost module(s): Module count has decreased at least once after booting.
- 1103:** Module count mismatch: Beam preset in use has a module count different than current active module count.
- 1104:** Over temperature: Array is overheated.
- 1105:** Lost amplifier board: Bad amplifier board connection (internal flat cable).
- 1201:** Beam preset error: The loudspeaker has less modules connected than it had when the presets were stored.
- 1202:** Beam preset error: The loudspeaker has more modules connected than it had when the presets were stored.
- 1203:** Beam preset error: The loudspeaker modules appear to have been rearranged since the presets were stored.
- 1204:** Beam preset error: The loudspeaker modules have mismatched presets and appear to have come from different arrays.
- 1302:** Communication error: Messages were rejected.
- 1303:** Communication error: Messages have timed out.
- 1402:** Current beam preset was changed by an external device not in ControlSpace Designer project.

Unmanaged Mode Message (Dante Controller)

If a **Configure Dante Interfaces in Unmanaged Mode** window appears in Dante Controller, select the **Use shared Dante interface** checkbox, and then set the **Primary Interface** to the network interface on your computer that is connected to your Dante devices (this is indicated by green **1G** and status indicators in the image).

