



## Installation and Configuration Instructions

### N-way Divisible Conference Rooms, Version 1.0

#### Cisco Best Practices

March 9, 2023

Use this document in addition to the Version 2.2 Two-way System Drawing which describes a 2-way divisible room, but the same concepts apply to N-way divisible; there is only one “primary” codec for the room in the center of the combined room and all others are “secondary”. Do note that where you see a 2-way DA to split HDMI outputs 1 and 2 (monitor connectors) from the Primary codec out to the actual monitor and the Secondary codec, you will need DAs with more output ports if you have more than one Secondary room and corresponding Codec so that each one can get a copy of the Monitor outputs of the Primary.

This document concentrates on tasks for the onsite installer and system administrator. This document assumes dual monitor functionality in each room. [What does that mean?](#)

- The use of two screens in the front of the room is preferred for most installations. On Webex calls, both screens will show remote participants until someone starts sharing content, at which point the 2<sup>nd</sup> screen will show content. The setting for this is [Monitors: Dual](#).
- If the screens are different sizes – perhaps a projector for content and an LCD screen for people – then you can use the setting [Monitors: DualPresentationOnly](#). This guarantees that the larger screen will only show content during calls.
- You can use a confidence monitor collocated with the Presenter Camera. You would use a DA to run it off either HDMI 1 or HDMI 2 output from the codec – which means you need to decide in advance what you want it to show. Normally, you want the confidence monitor to show the active speaker from the far end participants for the best eye contact. If you use an HDMI DA off the HDMI 1 output, you will accomplish this, regardless of using [Monitors: Dual](#) or [Monitors: DualPresentationOnly](#).
- The Codec Pro platform is capable of running in true “Triple Monitor” role. In this mode, screens 1 and 2 always show remote participants, and screen 3 shows content. However, [Monitors: Triple](#) is not possible with this simplified design. [Why?](#) We use HDMI 3 for a video tie line from the Secondary Codec to the Primary Codec; therefore it is not available for other uses. In the event that the customer definitely needs to use a triple monitor configuration, then it is necessary to add a video matrix switcher to the design, and use completely different programming.
- Some of our customers use a single projector in each conference room. This design and macro will support using only one screen in each room. You merely delete the second HDMI tie line from the Primary to the Secondary – output 2 from the Primary into the Screen 2 DA, which



can be removed, and the tie line eventually goes into Input 4 on the Secondary. That complete HDMI chain can be removed if you have only one screen in each room.

If you wish to be able to show a presenter side-by-side with an audience member, use the “Presenter QA Mode” feature of the macro (set `PRESENTER_QA_MODE` to `true`). Classroom Mode and/or Briefing Room Mode are not supported when using any Divided - Combined design. The programming for those room types uses a hidden macro that conflicts with any type of custom program, whether it uses the CE Macro Framework or a program on a control system. This is why the macro provided implements its own Presenter QA Mode with a custom touch device panel button labelled “Auto QA”

## Definitions

Here is the terminology we will use in this document:

*Primary Room* refers to the room that is used for the presenter when the rooms are combined.

*Secondary Room* refers to the auxiliary spaces that mirror the Primary Room.

*Primary Codec* refers to the Codec Pro that drives the Primary Room. It is the only codec that makes calls when the rooms are combined.

*Secondary Codec* refers to the Codec Pros that drive the Secondary Rooms.

*Combined Mode* indicates that the wall between the rooms is open.

*Standalone Mode* indicates that the wall is closed, and each room operates independently.

## Physical Installation – Layer One – Video

### System schematics / one-lines

Refer to the System Drawings for this section.

### Total number of cameras

The Codec Pro has six video inputs. You can avoid using external video switchers by following these guidelines.

As shown on page 1 of the system drawings, typically there will be one Quad Camera in the front of the room and one Presenter Camera in the back of the room (or on a side wall). If the conference room is set up like a boardroom, with a long, narrow table, you can use a second PTZ camera in the front of the room to capture the head of the table. This would, then, be a maximum of three cameras.

For the presenter camera, please use Input Connector #2 (HDMI), as shown in the system drawings.

This guarantees proper operation of the presenter camera. It also supports PresenterTrack, so feel free to use that feature.



We always recommend using 3G-SDI input 6 for any additional PTZ camera. If you are using the original Precision 60 Camera, it has a native 3G-SDI output on BNC, which can connect directly to 3G-SDI input 6 using Belden 1694A cable (or similar) along with an adapter from BNC to micro-BNC. If you are using the newer PTZ 4K Camera, which is HDMI only, you will need a Decimator MD-LX to convert from HDMI to BNC, either at the camera or at the codec. This device is inexpensive and is known to work well.

The macro allows you to select which input on the Primary that you want to use for the video tie line from HDMI output 3 on the Secondary Codecs to the HDMI inputs on the Primary. This is configured in the **connectors** array of each element in the **compositions** array within the **config** constant object in the macro. For composition elements of the **compositions** array, the **connectors** array will typically only contain one connector value for where the HDMI cable coming in from a Secondary codec is connected into an HDMI input on the Primary codec.

You could, for example, use SDI input 6 for this tie line, which has the advantage of leaving you with more HDMI inputs for other presentation sources.

You have a total of 6 video inputs on a Codec Pro so, considering you will have at least one content source, a main camera, and a presenter camera on the primary room, you could have up to 3 inputs available for Secondary rooms therefore implementing a 4-way divisible room solution.

### Total number of presentation inputs

The design uses HDMI video tie lines, which use one or more HDMI port on the Primary Codec (one for each Secondary codec) and two HDMI ports on the Secondary Codec (assuming you are using dual monitors in both rooms. More on monitors later).

The number of available presentation inputs depends on how many PTZ cameras you are using. If you are using two PTZ cameras, you have just two HDMI inputs (#4 and 5) on the Primary Codec, and one input (HDMI #5) on the Secondary. For conference rooms that need several content sources, an external switcher can be used to increase the number of content sources. One of the most simple is to use an Extron SW2 or SW4 HDMI 4K, which has an automatic mode. If someone plugs a laptop into a higher-numbered input, it automatically overrides the lower-numbered inputs. Or you could use a Lightware switcher – 4 input or 8 input – which can talk directly to the codec using the CE Macro Framework and the Lightware L3 Library. This library is not built into the macros provided with Version 2.2; so it would take a programmer to add that functionality. Regardless of the brand of video switcher used, the Share Tray on the Cisco touch interface will show all of the content inputs, and even show which ones have sync and are ready to use. This is documented in the various Customization Guides which can be found here: <https://www.cisco.com/c/en/us/support/collaboration-endpoints/spark-room-kit-series/series.html#~tab-documents>



## Audio Connections (page 3 of System Drawings)

Here we show a typical setup with Cisco Ceiling Microphones, and amplified wireless for the presenters. The Quad Camera loudspeakers are used for conference audio, and an external speaker system is also used if you are amplifying the presenter microphone.

NOTE: The diagram only shows one Secondary codec with its audio line output 5 feeding back to the Primary codec via input connector 8. For multiple Secondary codecs, you must connect line output 5 of the Secondary into some other microphone input on the primary and specify which one it is in the `mics` array of the corresponding element in the `compositions` array within the `config` constant object in the macro.

Important: On the Primary Codec, add 12ms of delay to all loudspeaker outputs, including the Quad Camera. This assures that the Primary and Secondary rooms will hear simultaneous audio, with no apparent latency, without affecting lip sync in the Primary Room.

In addition, in **Audio Console on the Primary Codec**, right click on the HDMI 3 tie line to the Secondary Codec, and raise the gain to maximum. [You can see screen shots of Audio Console for both Primary and Secondary Codecs in another document.](#)

We use a business rule that when the rooms are Combined, only the wireless microphones in the Primary Room can be used. This keeps the design simple. In addition, the Presenter Camera and the laptops in the Primary Room should be used. The Secondary Room Navigator UI is locked out with a message to use the touch panel in the Primary Room.

If there is a requirement to enable the Navigator in the Secondary Room to also control the system, this can be done with a bit of customization, involving the GPIO Pin 1 on the Secondary Codec, a relay, and an A/B switch from BlackBox: the CAT6 A/B Switch – Latching RJ45 Remote Controller Ethernet RS232, Dry Contact. The macro on the Secondary codec would need to be edited to change the state of GPIO pin #1, which would be connected to a relay, which would trigger the contact on the Black Box switch. We do not have a premade solution, but several customers have done this.

## Wall Sensor and GPIO Connections (page 4 of System Drawings)

Here we show an optional wall sensor – a type we use internally at Cisco. It connects to the GPIO system on the Primary Codec – to Pin 1, 12VDC, and GND. If you use a wall sensor, it automatically configures the codecs to be in Combined Mode or Standalone Mode, depending on whether the wall is



open or closed. In the event that the wall sensor becomes inoperable – perhaps someone with a ladder knocked it out of alignment – there is a PIN-protected Override panel on the Navigator.

However, the wall sensor is optional. The users can combine or divide the rooms from a simple panel on the Navigator user interface – no PIN required.

In any case – wall sensor or no wall sensor – the other GPIO connections between the Primary and Secondary Codecs are required. These three connections are communication channels so that the Primary can instruct the Secondary in a reliable, robust manner.

If you are going to use more than one Secondary room/Codec, be sure to connect Pins 2,3 and 4 from the Primary into the corresponding pins 2,3 and 4 on all Secondary codec pros with a custom cable that splits the connections from those pins on the Primary out to the corresponding ones on the Secondary Codecs. Lowering and raising the voltage on a pin on the Primary Codec that split and directly connected with pins on 3 different Secondary Codecs has been shown to work in our testing, but you might want to build a custom splitter with some circuitry to guarantee voltage levels and power consumption.

## Codec Registration and Local Accounts

A key requirement is that you need IP access to both codecs, for both SSH and HTTPS. (The network admin must also allow HTTP messages between the codecs). If you are lucky, the customer will allow you to use your own laptop on their network, or allow you to use one of their computers. If you are unlucky, you will need an alternate method of accessing the codecs. Fortunately, there is a way.

Starting with the Primary Codec, hook an Ethernet cable from your laptop into any of the auxiliary Ethernet ports on the Codec Pro. Don't use the LAN port – use any camera control or Touch 10 / Navigator port. Your laptop will get an IP address of 169.254.1.30 and a subnet mask of 255.255.255.0. (Your laptop will complain about no Internet access because this is a link-local network).

You can reach the codec with your browser at 169.254.1.1. You can also use PuTTY or your favorite SSH client to reach the codec at the same address. When you want to configure the Secondary Codec, you do actually have to remove your Ethernet cable from the Primary Codec and attach it to the Secondary. Because link-local networks are non-routable (by definition), you cannot connect any two codecs to each other using those auxiliary ports, **and you should never attach an auxiliary Ethernet port to a customer LAN.** [Why?](#) Each codec has a DHCP server for the camera control and touch 10 / Navigator Ethernet ports. This applies to every Cisco video codec going all the way back to the C Series. If you plug an aux Ethernet port into a customer LAN, the codec will try to provide IP addresses to devices that join the network. I think most modern networks will find this and disable the switch port, but I did once bring down the network in the office where I worked by plugging a DHCP server into the LAN. Oops.



Whether the Codec Pro are registered on-prem (CUCM or 3<sup>rd</sup>-party call control), to the Webex Cloud, or even used standalone with H.323 IP address dialing, you **must** have local admin accounts on both codecs. This also means that you must find out from the customer how the codec is to be registered, if you don't already know.

If the customer has already registered the codecs and done basic configuration, ask them to create an admin account on each codec specifically for your use. This must be a full administrator account, not a “user” or “integrator” account.

If the codecs are registered to the Webex Cloud, the admin can use Control Hub to create a local account on each codec for your use. If you already have access to the codec web interface – perhaps the codec is fresh out of the box – here is how you create additional user accounts. Let's start with a brand-new codec, fresh out of the box.

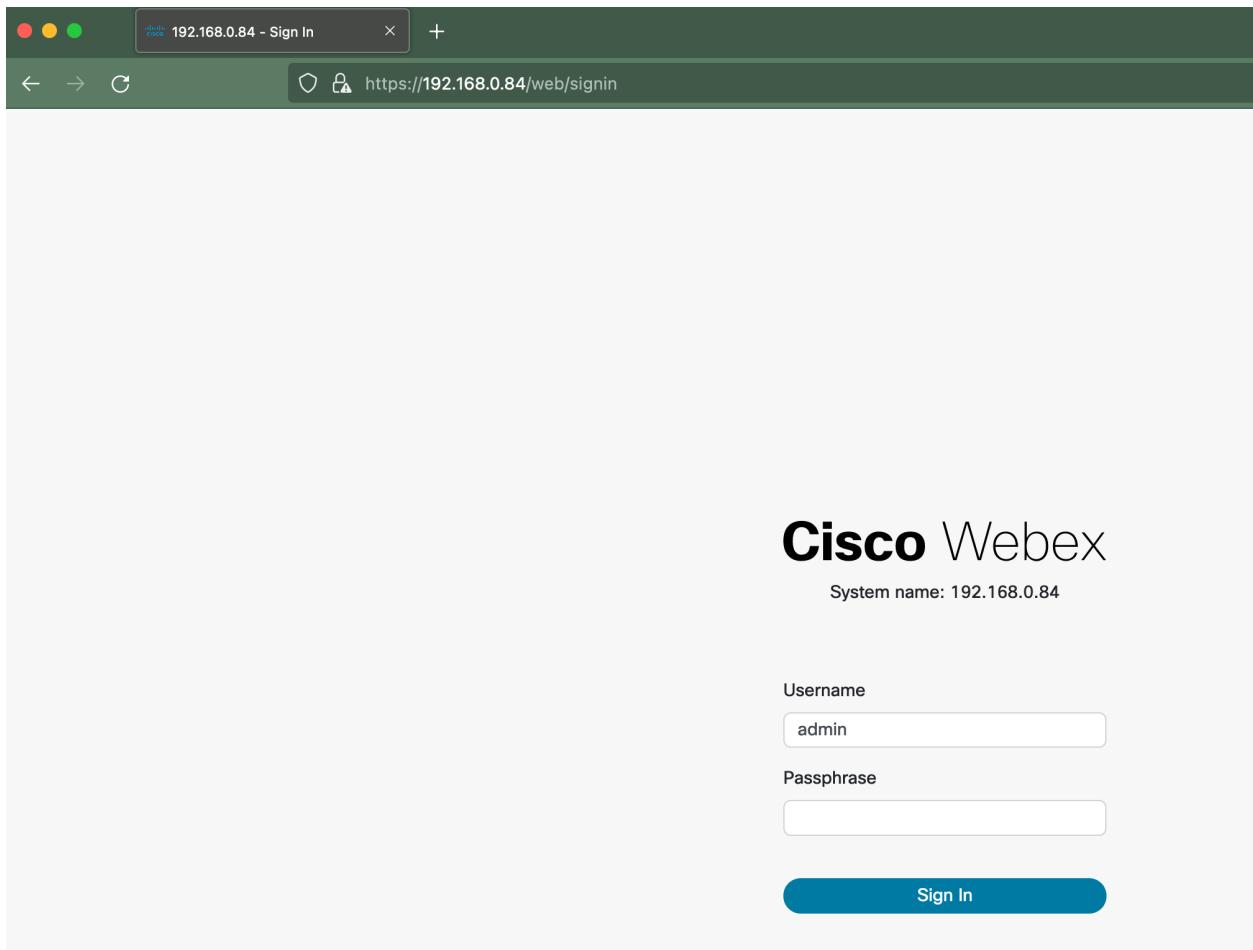


Figure 1: The login screen



With a brand new codec, or one that has just been factory reset, the user name is *admin* and the password is <blank>, which is to say no password at all.

The screenshot shows the Cisco Webex Local Device Controls interface. On the left is a sidebar with navigation links: Home, Call, Settings, Users, Security, Personalization, Audio Console, UI Extensions Editor, Macro Editor, Developer API, Software, Issues and Diagnostics, and Backup and Recovery. The main content area is titled "System Information". It contains several sections: "General" (IPv4: 192.168.0.84, MAC Address: 00:A5:BF:C4:5D:A5; IPv6: -; Serial Number: FDO22322SSW, Ethernet Active Interface), "Software" (RoomOS 10.11.2.2 4d365f74e2c, Software Version), "Utilization and Environment" (Occupied, Occupants, Sound Level (dBA), Ambient Noise (dBA), Temperature (°C/°F), Relative Humidity (%)), and "Issues" (Passphrase Vulnerability, Missing System Name, Call Protocol Misconfiguration). A "Register Device" section with a "Register to Webex" button is also present. The top right corner of the main content area shows three small icons: a person, a gear, and a plus sign.

Figure 2: The Home screen

You will note several messages in the upper right hand corner. You can proceed with some important tasks before contacting the sysadmin to have the codec registered, **unless they use CUCM**. If they use CUCM, you may as well have the sysadmin get the codecs registered now, and go get lunch. Ask them to create a local admin account for you while they are getting the codecs registered.

If the plan is to register to the Webex Cloud, you should complete some important tasks now, before entering the 16 digit registration code.

Create two local admin accounts on both codecs for use by you – the installer – and by the CE Macro Framework.

To begin, click on “Users” on the left side of the web interface.



The screenshot shows the 'Users' page of the Cisco Webex Local Device Controls interface. At the top, there is a navigation bar with a search bar and a user icon. Below the navigation bar, the title 'Users' is displayed. A table lists a single user entry: 'admin' (Status: Active). To the right of the table is a 'Remote Support' section containing text about Remote Support users and a note that none are active. At the bottom of this section are two buttons: 'Create User' (highlighted with a green box) and 'Delete User'.

Figure 3: The Create User screen

Do not use the Remote Support section. Instead click on the “Create User” button which you see highlighted here.

The screenshot shows the 'Add New User' form. On the left is a sidebar with navigation links like Home, Call, Settings, Users, Security, Personalization, Audio Console, UI Extensions Editor, Macro Editor, and Developer API. The main form has fields for 'Username' (set to 'CameraMacro'), 'Roles' (checkboxes for Admin, Audit, RoomControl, Integrator, User, with Admin checked), 'Status' (radio buttons for Active and Inactive, Active selected), 'Client Certificate DN' (empty field), 'New passphrase' (text input with a red asterisk and a 'Generate new passphrase...' link), 'Confirm passphrase' (text input), and 'Your passphrase' (text input). A note at the bottom states: 'When creating or modifying admin users, you must enter your own passphrase for verification.' At the bottom right is a 'Create User' button.

Figure 4: Creating User screen



Here I have created a new Admin user with these credentials:

Username: CameraMacro

Password: CameraMacro

IMPORTANT: Uncheck all Roles except Admin, and uncheck the “Require passphrase change...” box.

To complete the task, click on “Create User”. If you logged in with an existing account that has a password, you would need to include that in the “Your passphrase” field.

You can obviously use any username and password, but I always use this one for inter-codec communication. It is just a standard that I use.

Then, create one more Admin user for exclusive use by you and your team.

Registering to the Webex Cloud? You can do this now if you want, or later

From the Home screen, click on “Register to Webex”. You will need a 16-digit code for each codec, and you need to make certain the sysadmin has told you which one is for the Primary and which is for the Secondary Codec.

The screenshot shows the Cisco Webex Local Device Controls interface at the URL <https://192.168.0.84/web>. The left sidebar contains navigation links for Home, Call, SETUP (Settings, Users, Security), CUSTOMIZATION (Personalization, Audio Console, UI Extensions Editor, Macro Editor, Developer API), and SYSTEM MAINTENANCE (Software, Issues and Diagnostics, Backup and Recovery). The main content area displays 'System Information' with sections for General (IPV4: 192.168.0.84, MAC Address: 00:A5:BF:C4:5D:A5; IPV6: -), Software (RoomOS 10.11.2.2 4), and Utilization and Env (Occupied). A 'Issues' panel on the right lists three items: 'Passphrase Vulnerability' (critical, red), 'Missing System Name' (warning, orange), and 'Call Protocol Misconfiguration' (warning, orange). A 'View' button is located next to the 'Missing System Name' issue. A modal window titled 'Register to Webex' is overlaid on the page. It contains a text input field with placeholder 'XXXX-XXXX-XXXX-XXXX', a 'Register' button, and a checked checkbox for 'Disable local users and integrations'. Below the checkbox is a warning message: 'This device will be registered to Webex without being locked down. Existing user accounts and macros will not be disabled.'

Figure 5: Register to the Webex Cloud



Make sure to uncheck “Disable local users and integrations”. Otherwise you will lose the users you just created.

### Fill in a System Name

If the codecs use CUCM, they will already be given a system name. Otherwise you should give it one. Just click on Settings on the very left hand side of the Home page, and you will see a “Configuration / SystemUnit” screen. Ignore the CustomDeviceID unless you have explicit instructions for that field, and in the Name field, put something simple that is short and makes sense.  
For example, “1794A Primary” indicates conference room 1794A and that it is the Primary Codec. Likewise, “1794B Secondary” would make sense for the other codec. You don’t need quote marks and spaces are OK.

### Web Interface Configuration – Video

Label and configure every video input on both codecs

From the Home page, choose Settings on the left, and then scroll down the center section until you find Video. Among the various settings for each input connector, there is a Name field, which is extremely useful.



Configuration / Video

**Connector 1**

CEC Mode	(i) On
HDCP Mode	(i) Off
InputSourceType	(i) camera
Name	(i) Quad Camera (0 to 50 chars)
PreferredResolution	(i) 1920_1080_60
PresentationSelection	(i) Manual
Quality	(i) Motion
RGBQuantizationRange	(i) Auto
Visibility	(i) Never

**CameraControl**

Camerald	(i) 1
Mode	(i) On

**OptimalDefinition**

Profile	(i) High
Threshold60fps	(i) 1920_1080

**Connector 2**

CEC Mode	(i) On
HDCP Mode	(i) Off
InputSourceType	(i) camera
Name	(i) Presenter Camera (0 to 50 chars)
PreferredResolution	(i) 1920_1080_60
PresentationSelection	(i) Manual
Quality	(i) Motion
RGBQuantizationRange	(i) Auto
Visibility	(i) Never

**CameraControl**

Camerald	(i) 2
Mode	(i) On

Figure 6: The Video configuration section with correct settings – both codecs



The first task is to label each video input, even if it is not being used. In addition, set Visibility to Never for everything except local content inputs. This field determines whether the input will be shown in the Share tray.

### Primary Codec

For HDMI input Connectors 1 and 2, name them Quad Camera and Presenter Camera respectively. If your only content input is on input 5, type “Laptop” or “Computer” or “Content” or whatever makes sense to your users and set Visibility to “If Signal”. For the PresentationSelection field, use “Manual” – do NOT use Autoshare, Desktop, or OnConnect.

For any inputs that are actually not used, please name them as well. Type in “Not Used”. You will be grateful later ☺

### Secondary Codecs

For HDMI input Connectors 3 and 4, make sure “Visibility” is set to Never. You don’t want the Primary room accidentally sharing video from the Secondary Room when they are in Standalone Mode. Inputs 3 and 4 are tie lines from the Primary, and allow the Secondary Codec to mirror the screens in the Primary Room.

If your only content input is on input 5, type “Laptop” or “Computer” or “Content” or whatever makes sense to your users, and set Visibility for “If Signal.” For the PresentationSelection field, use “Manual” – do NOT use Autoshare, Desktop, or OnConnect.

For any inputs that are actually not used, please name them as well. Type in “Not Used”.

### Primary Codec

Then, go back and check all of the other settings for each video input that is not managed by the macro: Connectors 3, 4, 5 and 6.

HDCP Mode should be Off unless you are actually using it on Input 5. HDCP is problematic with combined rooms, so it is best to avoid it if possible.

Remember that any input sources that are used for cameras must have “Camera” as the InputSourceType. This is what allows them to be selected from the camera drop-down box on the Navigator or Touch 10. Also – for any cameras, make sure you use consecutive CameraIDs, and list the serial numbers for each camera in the Camera section of the Settings screen.

### Secondary Codec

Again, go back and check all of the other settings for each video input – Connectors 2, 5 and 6.



HDCP Mode should be Off unless you are actually using it on Input 5. HDCP is problematic with combined rooms, so it is best to avoid it if possible.

The same rules apply for cameras as for the Primary Codec.

Both Codecs – starting again with some repetition

**PreferredResolution:** for all cameras, set this to 1920\_1080\_60, including Connector 2. For content sources, set it to 3840\_2160\_30 which is 4K. Even if you don't think the customer's laptops can do 4K, you should set it anyway.

**Quality** should be Motion for all camera sources and Sharpness for all content sources.

**Visibility** is very important! This setting allows the Connector source to be seen in the Share Tray, or not. For any sources that you absolutely do not want shared set them to **Never**. Do the same for any Connectors that are Not Used. Connectors 3 and 4 on the Secondary Codec which are automatically set to **Never** by the macro.

For legitimate content sources, set them to "**IfSignal**".

**PresentationSelection** is equally important!

*Do not use Desktop or OnConnect for any divisible / combined rooms. Strange Navigator behaviors will occur if you use either one. Instead, use "**Manual**". This setting has no effect if Visibility is set for Never.*

Lastly, the **Optimal Definition** section is very useful. For cameras with good lighting, set the Profile to **High**. If lighting is poor in the room, use **Normal**. For content sources, set the Profile to **High**. Why? This setting will increase transmitted resolutions if set for **High**, and use lower resolutions if set to **Normal**.

**Threshold60fps:** set at 1920\_1080 for cameras and "**Never**" for content sources, unless you specifically want 60fps on a laptop in order to show videos.

## Web Interface Configuration – Audio Settings

For the most part, the macros take care of the audio settings. However, you should make sure to configure all of the microphone inputs. On the Primary Codec, you can use microphone inputs 1 - 7 (#8 is reserved for an audio tie line). On the Secondary Codec, you can use all eight microphone inputs.

- For any mic inputs that are not used, set Mode: Off.
- When using DSPs or dynamic microphones, turn PhantomPower Off.
- When using Cisco Table Microphones, you can leave the Level settings at the default of 58. For 3<sup>rd</sup> party microphone systems, or Cisco Ceiling Microphones, use the VU Meters to set the correct levels.

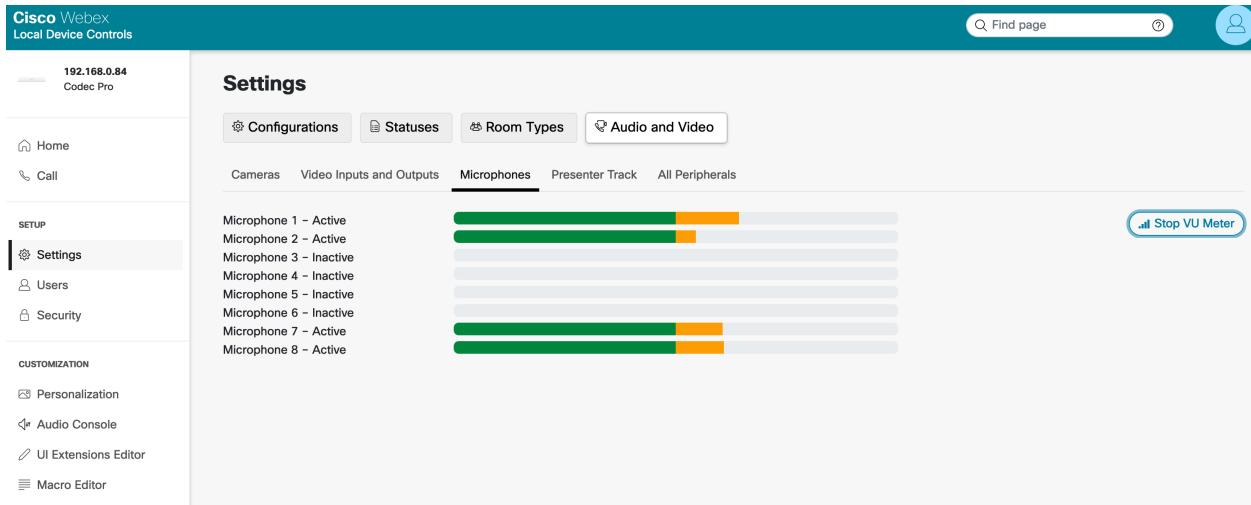


Figure 7: The VU meters

## Loudspeaker Systems

For very small conference rooms, the Quad Camera is sufficient, with a max output level SPL 90dB. It is also possible to augment the Quad Camera with ceiling speakers, which give very good results and also allow for sound reinforcement of presenter microphones. Any type of external sound system can be used – wall-mounted front-firing speakers, ceiling speakers, hanging pendant speakers, etc. We strongly recommend wiring external sound systems in stereo, since this improves the aural experience for the users.

Line outputs 1 and 2 are defaulted to balanced line level at nominal +4dBu. The output levels are adjustable, and they can be set for monaural if necessary. There are a total of 6 line outputs, and on the Secondary Codec, line output #5 is reserved for use as an audio tie line. Audio Console can be used to apply custom routing to any line output, as well as to define up to eight parametric equalizers and apply them almost anywhere in the audio path.

When using external sound systems, be sure to apply unity gain. Set the level of the Codec Pro's volume control at 70% as a starting point, since that ensures unity gain within the codec itself and optimizes the echo canceler. During normal operation, the users can raise and lower the volume without worrying about artifacts or echo, so long as unity gain is properly setup during installation.

## Ultrasound

All Cisco video devices use ultrasound in the range of 20-22 kHz for pairing with computers, tablets, and phones. There are several useful applications use with pairing. When setting up divisible rooms, it is important to check for leakage of ultrasonic frequencies between the rooms when the wall is closed. A simple RTA application – like SpectrumView from OxfordWaveResearch – can be used to check for



the existence of frequencies in the 20-22 kHz range. (You must first go to settings and set the Recording sample rate for 48000.)

With the wall closed, and the Primary Codec ultrasound volume set to zero, check in the Secondary Room for a signal. Your screen should look like this:

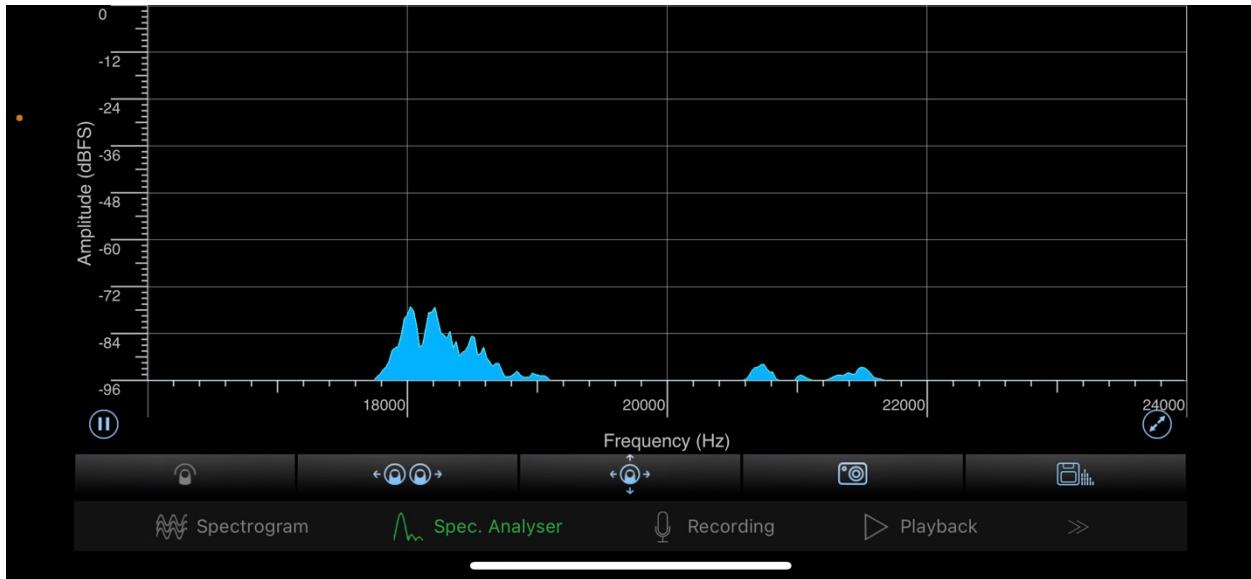


Figure 8: Ultrasonic frequencies

Assuming you see the waveforms between 20000 and 22000, walk over to the Primary Room and check again. You should see no waveforms, because the wall is closed and you don't want leakage. The Quad Camera will transmit ultrasound. Care needs to be taken with external sound systems. For example, if the specs on the loudspeakers are up to only 17 kHz, ultrasound might cause a buzzing sound and you would want use a low pass filter (using Audio Console) to avoid sending ultrasound to the ceiling speakers.

If you do experience some leakage of ultrasound between rooms, you can adjust the ultrasound volume down from the default of 70 to something lower.

WakeupOnMotionDetection: This is off by default. If you want to use it, turn it On.

## Web Interface Configuration – Other Settings



Wireless microphones: By default, only the Primary Room w/l mics can be used when the rooms are combined. If there is a requirement for Secondary Room w/l mics to also be used when the rooms are combined, just add in one RDL STM-DA3 (Radio Design Labs) for each w/l microphone in the Secondary room. It will allow you to split the mic signal for use in the Primary Codec when the rooms are combined. The macros need to be modified slightly to turn microphone inputs on and off, but this is not difficult.

In the web interface - Config / Video, this value is ILLEGAL: Monitors: Auto. You must change it. Most installations will use Monitors: Dual, or Monitors: DualPresentationOnly. But if there is only one screen in the room, then it would be set for Monitors: Single.

The current design does not support Monitors: Triple or Monitors: TriplePresentationOnly.

Make sure to set the MonitorRole settings on the HDMI outputs correctly.

#### AUDIO CONSOLE

See the accompanying document with screen shots and explanations of the Audio Console settings for each codec. We are using the same microphones as in the Audio page of the line drawings, and we are including sound reinforcement for the wireless microphones.

#### LONG HDMI RUNS

You will note that we are specifying FSR Digital Ribbon Cables for long HDMI runs. They come in different lengths and can be found here: [https://fsrinc.com/fsr-products/product/p8k-digital-ribbon-cable/category\\_pathway-156](https://fsrinc.com/fsr-products/product/p8k-digital-ribbon-cable/category_pathway-156)

There are several reasons we specify them:

- a) They are the best hybrid fiber / copper HDMI cable, because they are powered at both ends and support wall plates.
- b) They do not have removable connectors – best to stay away from those types of cables.
- c) They are less expensive and more reliable than active extender pairs.

On the other hand, the fiber component is fragile and care must be taken when pulling them. In addition, the attached HDMI connectors mean that narrow conduit runs are not feasible.

Sound Control Technologies makes excellent extenders for both Cisco cameras and Cisco microphones, using UTP cable, so there are alternatives.

### The Remote Experience



The programming that is running on the Primary Codec makes decisions to automate camera behaviors during calls.

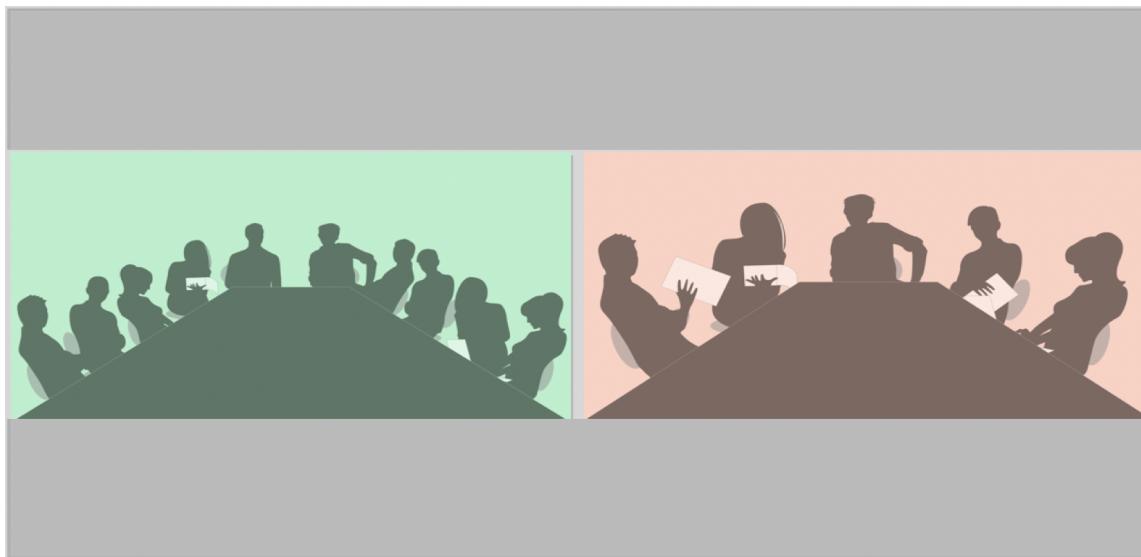


Figure 9: Side by side video

At the beginning of the call, and at other times, an Overview shot is chosen to send to remote participants. In a divisible conference room multiple Quad Cameras (one connected to each Primary or Secondary Codec) a camera preset is used on each Codec Pro (preset ID #30) and all camera images are sent in a composed image, we call it “side by side” because typically if just using one Secondary room you actually see them in a 2-video feed composition side by side like depicted above. This establishes to remote participants that there are multiple rooms combined with people in the conference and allows them to see everyone.

This “side by side” Overview shot is also used at two different times: when nobody in either room has spoken for a long time, and if someone mutes the microphones – as if desiring a sidebar conversation. At all other times, the cameras switch automatically.



Figure 10: Primary Room camera

This image shows what happens when someone in the Primary Room has started speaking. The main program running on the Primary Codec Pro determines that there is a person speaking in the Primary Room, and three things happen:

1. The Primary Codec enables its own Quad Camera instead of the side by side Overview.
2. The Quad Camera looks for the active speaker and zooms in to that person.
3. In the meantime, the Primary Codec tells the Secondary Codecs to enable their own Quad Cameras, to be ready for the next shot.

If the person speaking is in a Secondary Room, the Primary Codec then selects the corresponding video connector ID as configured in the **config** constant, which is the feed from the Quad Camera in the Secondary Room. To be specific, these things occur when someone is speaking in a Secondary Room:

1. The Primary Codec selects the corresponding HDMI as the main video source.
2. The Quad Camera in the Secondary Room has already found and zoomed in to the active speaker.

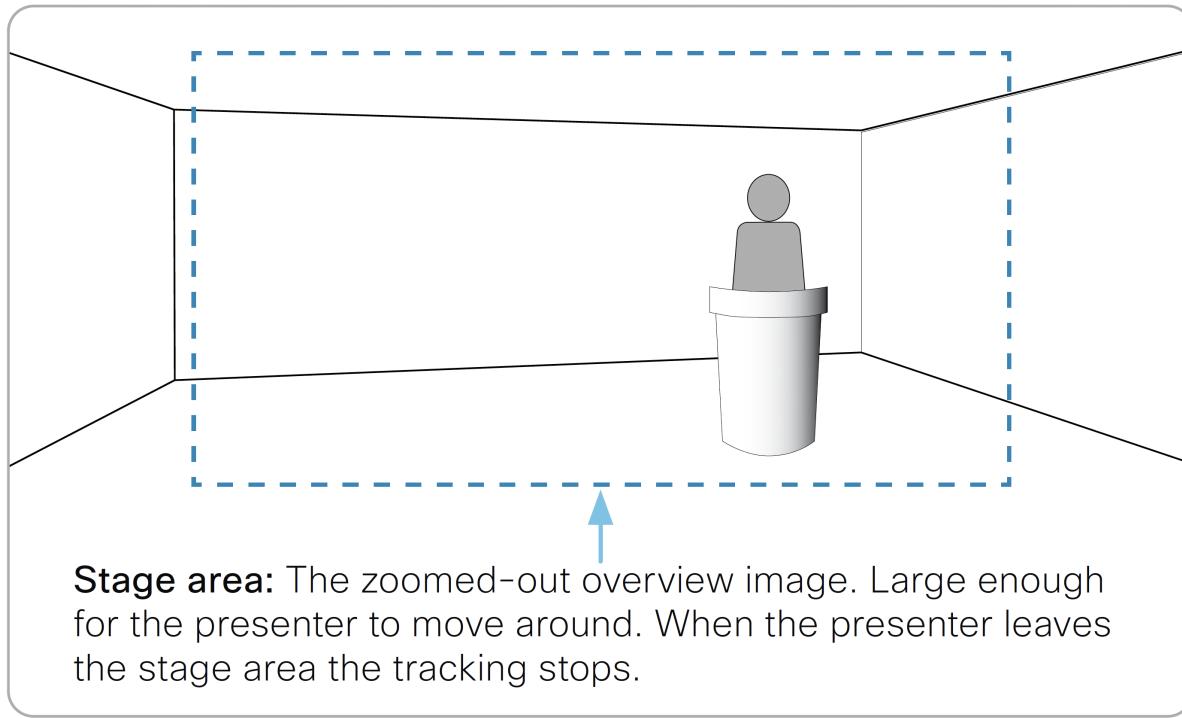


Figure 11: Presenter camera

The fourth and last camera behavior is when the presenter is leading the meeting. The Cisco PTZ 4K Camera is activated – either manually on the Navigator panel or automatically thru a podium or wireless microphone – and that camera image becomes the main video source. PresenterTrack technology allows the camera to track a roving presenter, and this feature can be installed using a simple Wizard in the codec's web interface. It requires no license or extra cost.

#### Cisco-provided JavaScript

Cisco is providing JavaScript based macro code at no charge, as part of a larger effort to standardize two-way divisible room programming. However, this is considered sample code, under a license that can be found here: <https://developer.cisco.com/docs/licenses>

Part of the wording of the license says the code is provided on an as-is basis, without warranties of any kind. This is true of all sample code that can be downloaded from GitHub or RoomOS.cisco.com. What this means is that Cisco does not own maintenance of the program and will not take TAC calls on the programming. As is normal in any custom AV integration, the AV integrator takes responsibility for correct operation of the entire solution, including the programming. The intent of Cisco-provided code is to standardize Boardroom solutions, reducing cost for both the AV integrator and the customer, while simultaneously using Cisco Best Practices in the design of the solution. The intent is that Cisco will provide operational code, but in all cases the integrator / programmer should be prepared to take



ownership of the coding if there are issues. Fortunately, we have several customers who will be testing the solution and providing feedback to our programmers directly.

## Programming

The CE Macro Framework is a JavaScript-based development environment that allows custom programs to run directly on the codec. Both the Primary and Secondary Codecs run two macros that enable the automatic operation of the system. In general terms, the programming provides the following logic flow:

- A default configuration is run on each codec every time it boots up. These configurations and commands set the codec up for proper operation, overriding certain settings that must not be changed by the user.
- In Standalone Mode, each codec runs a small set of additional configurations and commands to ensure correct audio and video routing for each room to operate independently.
- In Combined Mode, a different set of configurations and commands are run to enable both rooms to act as one. Some of the things that happen:
  - The Secondary Codecs are put into DoNotDisturb so that they can't receive a video call.
  - The Navigator touch interface on the Secondary Codecs is locked out with a message to use the touch panel in the Primary Room.
  - Audio and video routing are changed so that the Secondary mirrors the Primary's video and audio.
- In addition, there is a non-volatile memory macro on each codec that is used to store the current state – Combined or Standalone – in addition to other values.



### **Project Management**

We highly recommend that the customer team or integrator engage an experienced project manager, in order to keep the project moving along and facilitate information exchange. This can only occur with proper and frequent communication.

### **Design Changes**

Please keep Cisco informed if there are any major design changes during project development, or even after installation and commissioning is complete.

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