

PCoIP Graphics Agent for macOS Administrators' Guide

24.03

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About the Graphics Agent for macOS

This guide is intended for administrators who are deploying the Graphics Agent for macOS as part of HP Anyware. It assumes thorough knowledge of macOS conventions and general networking concepts, including firewall configuration.

The Graphics Agent for macOS is part of HP Anyware. It enables users to deliver GPU-powered physical workstations to end users via remote clients.

Users include high-end knowledge workers, graphic designers, artists, and CAD/CAM designers.

A deployed Graphics Agent for macOS requires these components:

- **A host machine** which provides the desktop to remote clients. The host must be supported macOS machine. See [System Requirements](#) for more information.
- **The agent software** installed on the host machine.

About GPUs

The Graphics Agent for macOS uses the GPU in your Mac. You do not need to install a secondary GPU.

Where to Find Information about Other Components

This guide describes the Graphics Agent for macOS.

For complete information about all of the components used in PCoIP ecosystems, including architectural diagrams and deployment suggestions, see one of the following documents:

HP Anyware architectures and descriptions:

- [PCoIP All Access Architecture Guide](#)

For more information about PCoIP clients, see one of the following:

- [Anyware client 24.03 for Windows Administrators' Guide](#)
- [Anyware client 24.03 for macOS Administrators' Guide](#)
- [Anyware client for 24.03 Linux Administrators' Guide](#)
- [Tera2 Anyware Zero Client 24.03 Administrators' Guide](#)

For information about HP Anyware licensing, see our [Licensing FAQ](#). Most Anyware systems use Cloud Licensing. For systems using a local License server instead, refer to the following guides:

- [License Server Administrators' Guide for *Online Environments*](#)
- [License Server Administrators' Guide for *Offline Environments*](#)

Release 24.03 of the Graphics Agent for macOS includes:

Support for macOS 14 (Sonoma)

Version 24.03 of the macOS Agent introduces support for macOS 14 (Sonoma), and removes support for macOS 12 (Monterey).

System Requirements

The Graphics Agent for macOS depends on the following system capacities and capabilities:

Host Requirements

Host machine requirements	
Operating Systems	<p>Intel Macs: macOS 13 (Ventura), 14 (Sonoma)</p> <hr/> <p>Apple Silicon Macs: macOS 13.2+ (Ventura), 14 (Sonoma)</p>
Hardware Configurations	<p>Supported on Apple Silicon Macs and newer (2017+) models of Intel-based Mac hardware, including:</p> <ul style="list-style-type: none"> • Mac Pro • Mac Mini • Mac Studio • iMac Pro • iMac • MacBook Pro <p>Models older than 2017 may work, but have not been tested and are not supported.</p>
Remote Host Memory	<ul style="list-style-type: none"> • 8GB or greater
Network Ports	<p>The following ports must be open on the host desktop:</p> <ul style="list-style-type: none"> • TCP 443 • TCP 4172 • UDP 4172 • TCP 60443 <hr/> <p>Collaboration sessions require an open UDP port (default 64172)</p> <hr/> <p>For PCoIP Ultra Collaboration, incoming traffic on UDP 4173 must also be open.</p>
Storage	<p>At least 100MB for installation and 100MB for logging are recommended.</p>
User	<p>You must create a user account for PCoIP connections. The user name cannot contain spaces, and cannot be the <i>root user</i> account.</p>

Important: Many factors can impact performance

Actual performance depends on several factors, including available bandwidth, client and host machine capabilities, the number of monitors in use, and workload requirements.

Feature Support

Audio Support

The Graphics Agent for macOS supports audio input and output between the host and the client. To send audio to the Anyware client, you must select the **Anyware Virtual Speaker** audio device as the output device on the remote macOS system.

Audio can be enabled, disabled, and audio bandwidth throttled by [configuring the agent](#).

Multi-Channel Audio Output

Requirements

- **Client:** Anyware Client for macOS, version 22.01 or newer

Important: macOS Client is required

Multi-channel audio is only supported by the Anyware Client for macOS.

- **Agent:** Graphics Agent for macOS, version 22.01 or newer
- **Audio device:** Multi-Channel Audio device that supports 2.1, 5.1 or 7.1 channel configuration (connected to Anyware Client for macOS)

Current Limitations

- Only 2.1, 5.1, and 7.1 configurations are currently supported.

Enabling Multi-Channel Audio

To use multi-channel audio in a PCoIP session, the client Mac must be connected to a multi-channel audio device that is set as the system default. When a configured client establishes a PCoIP connection, the Graphics Agent for macOS will automatically detect the multi-channel system.

See the Anyware Software Client for macOS Administrators' Guide for setup instructions.

Collaboration

PCoIP Ultra Collaboration enables a PCoIP session user to share their session with multiple remote collaborators using Anyware Software Clients.

Note: Collaboration terminology

When discussing this feature, we'll refer to the first user as the *session owner*, and subsequent users who join the session as *collaborators*. The session owner's screens, audio, and input devices (if allowed) are shared with the collaborators when they join the session.

Up to 5 collaborators can join an ongoing PCoIP session using the same invitation. The maximum number of collaborators can be reduced by [configuring the agent](#).

Warning: Consider system resources

As the number of collaborators increases, the load on the Anyware agent's CPU, memory, and other resources will also increase. Test your system to ensure it can support all of your planned collaborators.

While connected, all collaborators can view and hear the session owner's screens and audio, and see the controlling collaborator's mouse movements. If permitted by the session owner, they can also share control of the session owner's keyboard and mouse using [input control](#).

During a collaboration session, *all* of the session owner's desktop screens may be shared depending on the session owner's Anyware software client display settings. See [Understanding Display Behavior](#) for more information.

Collaboration Requirements

PCoIP Ultra Collaboration is supported by all Anyware agents. Anyware software clients that support PCoIP Ultra can participate in collaboration sessions (all Anyware software clients 23.04 and higher meet this requirement).

Some collaboration features have specific version requirements for Anyware agents and Anyware software clients; [these are noted below](#).

 **Note: Only Anyware Software Clients are supported**

Anyware Tera2 Zero Clients and mobile clients do not support PCoIP Ultra and cannot join collaboration sessions.

Feature Version Requirements

PCoIP Ultra Collaboration features depend on coordinated updates in Anyware agents and Anyware clients, so review these requirements carefully to ensure the features you need are supported by your system. **We strongly recommend using the latest versions of both Anyware agent and Anyware client.**

Feature	Required versions	Notes
Collaborate menu	Anyware agent 23.06+ Anyware client 23.06+	Both client and agent must be 23.06 or higher, with Collaboration and PCoIP Ultra enabled.
Multiple collaborators	Anyware agent 23.04+ Anyware client 23.04+	HP Anyware versions 22.07–23.01 supported single collaborators only.
Input control	Anyware agent 23.01+ Anyware client 23.01+	See Input Control for more information.
Mouse visibility	Anyware agent 22.07+ Anyware client 22.07+	Session owner and collaborator software clients must be in <i>standard client mode</i> for mouse visibility to work.

Network Requirements

Each collaborator connection requires a separate UDP port. These ports are assigned in a range that *begins* with the configured UDP port (by default, 64172), and increments with each additional collaborator. All ports in this range must be open, both at the cloud provider network level and the local firewall at the host.

For example, using the default configuration and hosting three collaborators, the system would require inbound UDP ports 64172, 64173, and 64174 to be open.

Maximum number of collaborators	Required inbound UDP ports
1	64172
2	64172-64173
3	64172-64174
4	64172-64175
5 (default)	64172-64176

You can [change the starting port number](#) if desired. If you change the configured starting UDP port, adjust these ranges and ensure your host firewall configuration allows traffic on the new ports.

For direct connections, or brokered connections that do not use a Security Gateway, each collaborator's Anyware client must be able to reach these ports. For brokered connections using a Security Gateway, only the Security Gateway must be able to reach them.

Enabling Collaboration

Important: Anyware agent steps

Collaboration sessions are enabled and configured on the Anyware agent machine before starting collaboration sessions. Make sure the Anyware agent version you are using supports the collaboration features you expect. For details, see [Feature Version Requirements](#).

The following steps apply to the session owner's desktop machine.

PCoIP Ultra Collaboration is enabled, disabled, and configured on the Anyware agent machine. It is disabled by default, and must be enabled by activating both *PCoIP Ultra* and *Collaboration* on the remote desktop.

To enable PCoIP Ultra Collaboration:

1. Open a terminal window.

2. If PCoIP Ultra is not already enabled, enable it by specifying a PCoIP Ultra Offload mode:

```
sudo defaults write /Library/Preferences/com.teradici.pcoip-agent.plist pcoip.ultra <offload_mode>
```

...where `<offload_mode>` is 1, 2, or 3:

PCoIP Ultra mode	Write this value
CPU Offload	1
GPU Offload	2
Auto Offload	3

3. In the terminal window, enter the following command to enable collaboration:

```
sudo defaults write /Library/Preferences/com.teradici.pcoip-agent.plist pcoip.enable_collaboration 1
```

4. **Optional:** To enable *Collaboration Input Control*, stay in the Terminal window and follow the instructions in [Enabling Input Control](#) below.

5. **Optional:** You can change the UDP starting port if needed (the default starting port is UDP 64172). To set a new starting port number, run an additional Terminal command:

```
sudo defaults write /Library/Preferences/com.teradici.pcoip-agent.plist pcoip.collaboration_udpport <new_collaborator_port>
```

...where `<new_collaborator_port>` is your new starting port number.

6. Restart the Mac.

See [Configuration Guide - Configurable Settings](#) for more detailed information on setting configuration values.

Input Control

Collaborator input control allows collaborators to use their own mice and keyboards to control the session owner's desktop. **This feature is disabled by default**, and must be enabled on the Anyware agent before it is available.

ENABLING INPUT CONTROL

Input control is disabled by default, and the option to give collaborators input control cannot be selected.

To use Input Control, enable it on the Anyware agent. This change takes effect on the next PCoIP session:

1. Open a terminal window on the host's Anyware agent machine.
2. Turn on input control:

```
sudo defaults write /Library/Preferences/com.teradici.pcoip-agent.plist
pcoip.enable_collaboration_input_control 1
```

3. **Optional:** Provide a custom input control timeout value (specified in milliseconds; 3000ms is 3 seconds):

```
sudo defaults write /Library/Preferences/com.teradici.pcoip-agent.plist
pcoip.collaboration_input_control_timeout <timeout_value_in_ms>
```

DISABLING INPUT CONTROL

If Input Control has been enabled and you wish to disable it again:

1. Open a terminal window on the host's Anyware agent machine.
2. Type the following:

```
sudo defaults write /Library/Preferences/com.teradici.pcoip-agent.plist
pcoip.enable_collaboration_input_control 0
```

Configuring Collaboration

Changing the Collaboration Starting Port

The default *starting* UDP Port for collaborator sessions is 64172. You can change this value if needed. Remember that you must also open a range of UDP ports that *begin* with this value to accommodate all of your collaborators; see [Network Requirements](#) for examples.

To change the Collaboration session port:

1. Open a Terminal window, and type the following command specifying the new starting UDP port number to use:

```
sudo defaults write /Library/Preferences/com.teradici.pcoip-agent.plist  
pcoip.collaboration_udpport <new_collaborator_port>
```

2. Reboot the machine.

Changing the Maximum Number of Collaborators

PCoIP Ultra Collaboration supports up to 5 collaborators on the same PCoIP session. You can further limit the number of allowed collaborators by changing the *maximum collaborators* setting to a value from 1-5. By default, the system allows 5 collaborators.

To Change the Maximum Number of Collaborators:

1. Open a terminal window.
2. Type the following command, replacing `<maximum number of collaborators>` with your desired number:

```
sudo defaults write /Library/Preferences/com.teradici.pcoip-agent.plist  
pcoip.max_collaborators <maximum number of collaborators>
```

3. Restart the machine.

Changing the Input Control Timeout Value

Input control is released and made available to other collaborators by idling all input devices for a brief period. By default, this control timeout is 3 seconds (3000ms). You can change this value by configuring the Anyware agent machine as follows:

1. Open a terminal window on the host's Anyware agent machine.
2. Provide a custom input control timeout value (specified in milliseconds; 3000ms is 3 seconds):

```
sudo defaults write /Library/Preferences/com.teradici.pcoip-agent.plist  
pcoip.collaboration_input_control_timeout <timeout_value_in_ms>
```

3. Restart the machine.

Sharing Your Session With Collaborators

You can invite up to 5 collaborators to participate in your session, and optionally allow them to control your desktop.

Important: Anyware Client steps

Collaboration sessions are shared from Anyware clients in established PCoIP sessions. Make sure the software client version you are using supports the collaboration features you expect. For details, see [Feature Version Requirements](#).

Collaboration sessions are managed using the **Collaboration manager**. The collaboration manager shows you who is connected to your session, whether each collaborators can view or control the session, and allows you to invite new collaborators or stop collaborating.

Note: New Collaboration Manager menu option

The Collaboration manager can now be launched by using the client's in-session menu, in addition to the system menu bar.

To launch the Collaboration Manager:

1. Connect to a PCoIP session with PCoIP Ultra and Collaboration enabled.
2. From the remote session, open the **Collaboration Manager** using either of these methods:
 - **From the client menu:** From the client's in-session menu, select **Collaborate** > **Invite to Collaborate**.

Collaboration Manager Menu Option

The Collaborate menu appears if both the Anyware agent and Anyware client are version 23.06 and higher, and if both support Collaboration.

- **From the menu bar:** Click the **Anyware Collaboration** icon in the menu bar:

Launch collaboration manager

This example shows a macOS desktop; yours may vary depending on which operating system you are connecting to.

To invite collaborators, the session owner generates a *collaboration invitation* using the collaboration manager, and distributes the invitation to all collaborators.

About Collaboration Invitations

Collaboration invitations are created by the session owner and distributed to collaborators, who use them to join an established collaboration session.

Note: About collaboration invitations

A single collaboration invitation can be used by multiple collaborators (up to the maximum number configured). You do not need to generate a new invitation for each collaborator.

Collaboration invitations behave as follows:

- If an invitation is generated but no collaborators connect within one hour, it expires and can no longer be used. If this happens, generate a new invitation.
- If *any* collaborators connect using an invitation, the invitation is activated and its time limit is removed. Once activated, an invitation can be re-used until the session owner stops collaborating or ends the session.
- Collaborators can disconnect from a collaboration session and then rejoin it later using the same invitation.
- Collaboration sessions persist even if all collaborators leave and only the session owner remains. Until the session owner disconnects or stops the collaboration session, collaborators can rejoin the session using the same invitation.
- The collaboration invitation remains valid until the session owner disconnects or stops the collaboration session.

Inviting the First Collaborator

To begin a collaboration session, generate an invitation using the Collaboration Manager.

To generate a collaboration invitation:

1. Connect to a PCoIP session with PCoIP Ultra and Collaboration enabled.
2. From the remote session, open the **Collaboration Manager** using either of these methods:

- **From the client menu:** From the client's in-session menu, select **Collaborate > Invite to Collaborate**.

Collaboration Manager Menu Option

The Collaborate menu appears if both the Anyware agent and Anyware client are version 23.06 and higher, and if both support Collaboration.

- **From the menu bar:** Click the **Anyware Collaboration** icon in the menu bar:

Launch collaboration manager

This example shows a macOS desktop; yours may vary depending on which operating system you are connecting to.

3. The Collaboration manager generates and displays an invitation:

Collaboration invitation

The invitation contains two pieces of information that are used to invite the collaborator:

- **Invitation Link:** The collaborator will use this link to join your session. The link may be opened on any Mac, Windows or Linux machine with a Anyware Client 21.07 or newer.
- **Invitation passcode:** This is a 6-digit code that confirms the identity of the individual connecting to the collaboration session. A new code is generated along with each new token.

4. Share the *invitation link* and the *invitation passcode* with the collaborator.

- To share both the link and the code at once, click the **Copy invitation** button. This will create a single message containing both the link and the code and place it on your clipboard. Share this with your collaborators using any acceptable method.
- To share the link and code *separately*, click the *copy* button beside each item and share them using separate communications. Sharing the invitation this way reduces risk in the event that a message is inadvertently sent, forwarded, or intercepted by a third party.

Inviting Additional Collaborators

Once the collaboration session has been created, you can invite additional collaborators by sharing the same invitation link and passcode with them. You can also view the invitation, and copy its link and passcode for sharing, using the Collaboration Manager.

To view and copy the invitation link and passcode:

1. From the remote session, open the **Collaboration Manager** using either of these methods:

- **From the client menu:** From the client's in-session menu, select **Collaborate > Invite to Collaborate**.

Collaboration Manager Menu Option

The Collaborate menu appears if both the Anyware agent and Anyware client are version 23.06 and higher, and if both support Collaboration.

- **From the menu bar:** Click the **Anyware Collaboration** icon in the menu bar:

Launch collaboration manager

The collaboration manager shows a list of your active collaborators (if any).

2. In the Collaboration manager, below the list of active collaborators, click **Invite Collaborator**:

Collaboration Manager with No Collaborators

3. The Collaboration manager displays the generated invitation. Note that this is the *same* invitation link and passcode you used previously. It is not a new invitation:

Collaboration invitation

4. Share the *invitation link* and the *invitation passcode* with the additional collaborators.

Accepting or Declining Collaborators

Once distributed, the session owner's collaborators can [join the collaboration session](#). As collaborators use the invitation, the session owner is notified and can accept or reject each connection attempt.

To respond to a collaborator:

1. When the collaborator attempts to join the session, the Collaboration manager will display options to accept or reject the connection.

Accept or reject the invitation

2. Click **Accept** to start the collaboration session. Click **Decline** to deny the request. Whether you accept the request or not, the invitation has been used and is now disabled. Subsequent attempts will require a new invitation.

Ending a Collaboration Session

The collaboration session will end when the session owner disconnects their PCoIP session, or if they stop collaborating using the collaboration manager.

Ending the collaboration session invalidates the invitation. To start a new session, generate a new invitation by inviting another collaborator.

To stop collaborating:

1. From the remote session, open the **Collaboration Manager** using either of these methods:

- **From the client menu:** From the client's in-session menu, select **Collaborate > Invite to Collaborate**.

Collaboration Manager Menu Option

The Collaborate menu appears if both the Anyware agent and Anyware client are version 23.06 and higher, and if both support Collaboration.

- **From the menu bar:** Click the **Anyware Collaboration** icon in the menu bar:

Launch collaboration manager

This example shows a macOS desktop; yours may vary depending on which operating system you are connecting to.


2. Click the **Stop Collaboration** button.

Stop collaborating

Allowing Collaborators to Control the Session

Collaborator input control allows collaborators to use their own mice and keyboards to control the session owner's desktop. **This feature is disabled by default**, and must be enabled on the Anyware agent before it is available.

Once enabled, input control options are available from the collaboration manager. Input control can be granted (or retracted) for each user separately or for all users at once.

 **Note: Disabling input control globally**

You can disable Input Control on the Anyware agent, which turns the feature off entirely. When disabled this way, session owners will not be able to allow collaborators to take control, and all sessions will be view-only. For more information, see [Disabling Input Control](#).

 **Important: The session owner always has control of their Anyware client's in-session menu**

The session owner always has control of their Anyware client's in-session menu. If the owner is unable to reclaim session input control for any reason, they can disconnect the PCoIP session using the in-session menu option. When the owner disconnects from the session, the collaborator is immediately disconnected.

ENABLING INPUT CONTROL FOR COLLABORATORS

The following steps will allow one or more collaborators to take control of the session desktop. The collaborators will not immediately have control when this is granted; they must still take control using the [process described above](#).

This option will not be available if Input Control has been disabled on the Anyware agent.

To allow collaborators to control the session desktop:

1. From the remote session, open the **Collaboration Manager** using either of these methods:

- **From the client menu:** From the client's in-session menu, select **Collaborate > Invite to Collaborate**.

Collaboration Manager Menu Option

The Collaborate menu appears if both the Anyware agent and Anyware client are version 23.06 and higher, and if both support Collaboration.

- **From the menu bar:** Click the **Anyware Collaboration** icon in the menu bar:

Launch collaboration manager

This example shows a macOS desktop; yours may vary depending on which operating system you are connecting to.

2. Grant input control using one of these methods:

- To allow input control for *all collaborators*, click the dropdown menu at the top right and select **All can control**.

Grant control permission to all collaborators

- To allow input for *one collaborator*, click the dropdown menu beside the collaborator's name and select **Can control**.

STOPPING INPUT CONTROL

To return a user (or all users) to view-only mode:

1. From the remote session, open the **Collaboration Manager** using either of these methods:

- **From the client menu:** From the client's in-session menu, select **Collaborate > Invite to Collaborate**.

Collaboration Manager Menu Option

The Collaborate menu appears if both the Anyware agent and Anyware client are version 23.06 and higher, and if both support Collaboration.

- **From the menu bar:** Click the **Anyware Collaboration** icon in the menu bar:

Launch collaboration manager

This example shows a macOS desktop; yours may vary depending on which operating system you are connecting to.

2. Beside the collaborator's name, click the dropdown menu and select **Can View**.

Understanding Display Behavior

Collaboration sessions support sharing of multiple monitors, which varies by session owner's client setting as follows:

- **Windowed mode:** The session in the owner's client window will be shared.
- **Fullscreen One Monitor:** The single fullscreen session will be shared. The session owner should set their Anyware Client to *Fullscreen One Monitor* mode prior to starting the collaboration session.

- **Fullscreen All Monitors:** All monitors will be shared, beginning with the Session Owner's monitor 1 and continuing up to the number of displays in the collaborator's system. The monitors that are shared cannot be configured, and are shared in system order.

*When using this mode, the session owner should assume that collaborators can see **all** displays unless a specific configuration has been tested and verified.*

For example, if the session owner has four monitors and a collaborator only has two, the collaborator will see the session owner's first and second monitors. If different collaborators have a different number of screens, each will see as many displays their system supports; in this scenario, you may have some displays that are visible to certain collaborators but not others.

The session owner should set their Anyware Client to *Fullscreen All Monitors* mode prior to starting the collaboration session.

If the session owner's and collaborator's screen resolutions are different, the collaborator's screen will use scrollbars and letterboxing to display the shared content.

If *high performance client* mode is enabled, and if the session owner's resolution is greater than the collaborator's, the collaborator's screen will be clipped instead.

Joining a Collaboration Session

Collaborators receive the invitations generated by session owners, and use the invitation URI and passcode to connect to the session.

Important: Anyware Client steps

Collaborators join sessions using Anyware clients. Make sure the software client version you are using supports the collaboration features you require. For details, see [Feature Version Requirements](#).

Each collaborator can join the session with the collaboration link and the Collaboration Invitation passcode. The same URI and passcode are used for all collaborators on the same session.

To join a collaboration session as a collaborator:

1. Open a web browser and go to the collaboration link shared with you (you may be able to click this link directly, depending on how it was shared with you).

2. The web browser will warn you that the link is attempting to open the *Anyware Client* application. Allow the browser to open the Anyware client.
3. When the Anyware client opens, it will prompt you for your name and the Collaboration Invitation passcode. The name you provide here will identify you in the collaboration session. The collaboration invitation passcode is the six digit number provided by the session owner. Enter both values and click **Submit**.
4. Once the session owner accepts your connection request, the Collaboration screen share will start.
5. To leave the collaboration session, select **Connection > Disconnect** from the Anyware Client menu.

Collaborator Input Control

If the session owner has enabled input control for a collaborator, the collaborator can take control of the session owner's desktop including mouse, keyboard, and pointer activity. The session owner retains the ability to stop input control at any time.

USING INPUT CONTROL AS A COLLABORATOR

A collaborator who has input control can release it by idling—stopping all keyboard, mouse, and pointer activity—for a short time. Once the control timeout has elapsed, the floor is open, and whichever collaborator provides input next takes control.

By default, the control timeout is 3 seconds. The timeout value can be configured when enabling the input control feature.

For example: the session owner has initial control of the session. In order to give control to the collaborator, the owner takes their hands off the keyboard and mouse for three seconds, allowing the control timeout to pass. A collaborator then moves their mouse, which gives them control. To give control back to the session owner, the collaborator takes their hands off their keyboard and mouse for three seconds. This exchange continues as long as needed.

Supported Displays

The Graphics Agent for macOS supports a maximum of four displays on the Anyware client and a maximum resolution of 4K UHD (3840×2160).

If you are using a monitor that has more than 3840 pixels in either dimension, you must scale your display to 3840x2160 or lower *before* launching the Anyware Client.

Connected monitors, resolution scaling, and rotation should all be configured and fixed on the client computer *before* establishing a remote PCoIP session. Changing screen display scaling, rotation or number of displays during a PCoIP session is not supported, and can result in unexpected display or mouse behavior.

Monitors can be used in any standard rotation (0°, 90°, 180°, or 270°). Any monitor can be the primary.

The Graphics Agent for macOS provides the following benefits:

- **Display resolutions:** The Graphics Agent for macOS can provide any resolution a client asks for up to 4K UHD.
- **3D application support:** Full-screen 3D applications are supported.

Note: Using multiple high-resolution displays

Systems with multiple high-resolution displays, such as quad 4K UHD topologies, require powerful system infrastructure. Be sure to use a system with sufficient bandwidth, client capabilities, and host capabilities to support your required display topology.

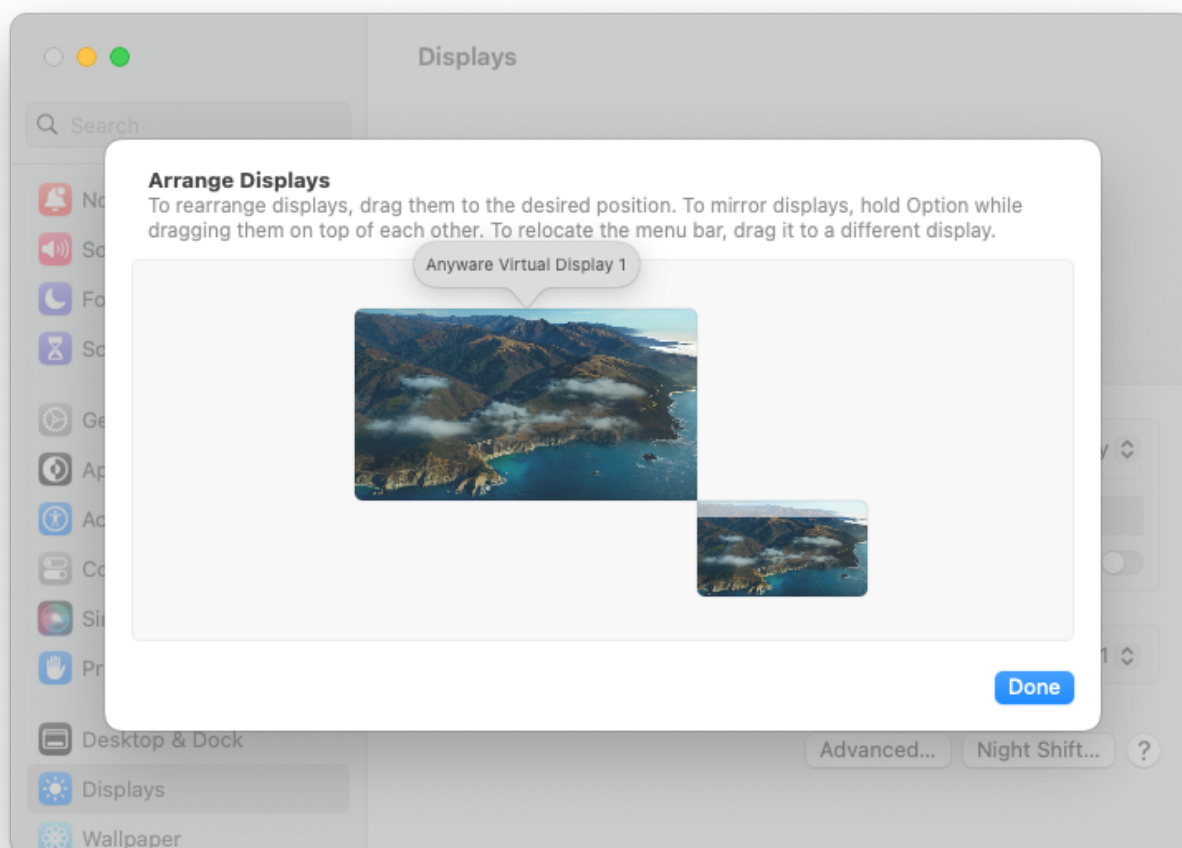
Anyware agents support any of these monitor configurations:

- Vertical line
- Horizontal line
- Box display

Disabling Displays

When a PCoIP session begins, all physical displays attached to the host machine — including built-in and connected external monitors — will show black screens. After the session ends, the host physical displays are re-enabled, and function as usual.

However, some monitor models cannot be reliably disabled. When physical monitors cannot be disabled, they are moved to the bottom right of the display arrangement as shown in the following image:



If applications are moved to monitors that cannot be disabled, they might not appear on them. This is because the content of these monitors is not displayed in the Anyware client and therefore, users cannot interact with such applications.

For certain monitors, connecting via USB-C ports instead of HDMI ports may allow the physical display to be disabled.

Note: Reliable Support for Disabling Displays

If you require reliable support for disabling displays, we recommend upgrading to macOS Sonoma.

Enabling Physical Displays

When a PCoIP session is disconnected, physical displays that were disabled during session will be enabled, and users will be able to use the physical monitors. In the event of the physical displays not being enabled, you can enable them by:

- Unplugging and plugging the monitor cables back again
- Rebooting the machine

PCoIP Ultra

The Graphics Agent for macOS provides support for PCoIP Ultra. PCoIP Ultra is optimized for truly lossless support with bit-exact color accuracy and preservation of content detail at the highest frame rates.

PCoIP Ultra protocol enhancements propels our industry-recognized performance into the future of remote computing, with faster, more interactive experience for users of remote workstations working with high-resolution content.

Note: PCoIP Ultra Default Value

For most users, the default PCoIP Ultra value will provide the best possible experience. Carefully review the recommended use cases in the next section to determine whether you should change the PCoIP Ultra value.

For additional detail on PCoIP Ultra technical requirements for various use cases and troubleshooting steps, refer to [KB 2109: PCoIP Ultra Troubleshooting](#).

About PCoIP Ultra

PCoIP Ultra is appropriate for users with the following requirements:

Note: Setting the Value of PCoIP Ultra

PCoIP Ultra is enabled by default. We recommend disabling it only if absolutely essential.

Auto Offload: Achieves the best balance between color accuracy and network efficiency. This setting is appropriate for work-from-home or WAN content creators who require optimized delivery of high resolution content, including video playback, while still achieving build-to-lossless color accuracy.

CPU Offload: Provides efficient scaling across multicore CPUs, leveraging AVX2 instruction sets. Appropriate for users that require CPU-optimized delivery of 4K UHD, high-framerate video playback

and build-to-lossless color accuracy. It is also useful when GPU encoding resources must be reserved for video encoding applications, typically in LAN environments.

GPU Offload: PCoIP encoding is always offloaded to a GPU. Appropriate for users who demand the highest possible CPU efficiency.

Note: Default Value of PCoIP Ultra

PCoIP Ultra defaults to **Auto Offload** (`pcoip.ultra = 3`) where client machines that support H.264 Hardware Decoding connect to Anyware Graphics agents, provided that both the agent and client machines are capable of both CPU and GPU Offload. To change the default PCoIP Ultra setting, set `pcoip.ultra` to the desired value:

- 0: PCoIP Ultra disabled
- 1: CPU Offload
- 2: GPU Offload

Requirements

To take advantage of PCoIP Ultra, you need:

- An **Anyware agent** (any supported version)
- An **Anyware Software Client** (any supported version)

Anyware Tera2 Zero Clients do not support PCoIP Ultra

PCoIP Ultra is only available through Anyware Software Clients.

- **CPU offload** requires the agent machine to be *either* Apple Silicon-based or an Intel-based Mac with AVX2 support. Connecting client machines must have CPU support for the AVX2 instruction set. Apple Silicon-based Mac clients are supported.
- **GPU offload** requires a GPU (all Macs have a GPU, so this requirement is normally met automatically).

Configuring PCoIP Ultra

To enable PCoIP Ultra features, open a Terminal window and enter the following command:

```
sudo defaults write "/Library/Preferences/com.teradici.pcoip-agent.plist"  
pcoip.ultra <ultra_mode_setting>;
```

...where `<ultra_mode_setting>` is one of the following:

- **1: PCoIP Ultra CPU Offload.**

CPU offload requires CPU support for the AVX2 instruction set on both the remote host and client. The Anyware Zero client is not supported. CPU offload is recommended for 4K UHD resolutions with video playback requirements of 30 fps (or more), and the highest possible image quality and color accuracy.

- **2: PCoIP Ultra GPU Offload.**

GPU Offload is recommended when the CPU impact of pixel encoding should be minimized.

- **3: PCoIP Ultra Auto Offload.**

This setting allows PCoIP to automatically switch between CPU and GPU Offload modes; CPU offload is used by default to provide the best image fidelity, and GPU offload is used during periods of high display activity to provide improved frame rates and bandwidth optimization.

This setting is only effective if the remote host and client endpoints are capable of both CPU and GPU Offload.

All PCoIP Ultra settings take effect on the next PCoIP session. No configuration is required on the Anyware Software Client.

i Turning PCoIP Ultra off

To disable PCoIP Ultra, set `pcoip.ultra` to 0.

i Setting configuration values

For more information on setting configuration values, refer to [Configuring the Graphics Agent for macOS](#).

Printing Support

Printing Support

The Graphics Agent for macOS does not support printing from local printers connected to Anyware clients. Similarly, printing from USB printers that are connected by means of the USB Bridging feature is also not supported.

The following printing options are available:

- macOS agents can print to any printer on the agent machines' local area network.
- If your host machine has access to the Internet, cloud-based printing is supported through cloud-printing services such as Google Cloud Print and HP Mobile Printing.

USB

USB Device Support

Connecting USB devices to the Graphics Agent for macOS is not supported. Keyboards, mice, and other pointer devices are managed by Anyware clients, and are always allowed.

Relative mouse movements, a feature used in many gaming applications or technologies built on Unity, is not supported.

Wacom Tablet Support

The Graphics Agent for macOS supports [locally terminated](#) Wacom tablets, where peripheral data is processed locally at the Anyware Client.

Locally terminated Wacom tablets are much more responsive and tolerate high-latency connections, but may not support advanced features like Touch. For information regarding feature support and Anyware client and agent requirements, see the following sections.

Locally Terminated Wacom Tablets

Locally-terminated tablets have greatly improved responsiveness, and tolerate higher-latency (including 25ms and higher) networks.

For the best experience and most complete device support, use the latest available Anyware agent, Anyware software client, and Anyware Zero Client firmware. To find out when support was added for individual Wacom device, refer to the release notes for your client.

The following Wacom tablet models have been tested and are supported with local termination mode:

Anyware client support for *locally terminated* Wacom tablets and the Graphics Agent for macOS

	Anyware Tera2 Zero Client	Anyware Software Client for Windows	Anyware Software Client for macOS	Anyware Software Client for Linux
Intuos Pro Small <i>PTH-460</i>	—	—	—	—
Intuos Pro Medium <i>PTH-660</i>	✓	✓	✓	✓
Intuos Pro Large <i>PTH-860</i>	✓	✓	✓	✓
Cintiq Pro 16 <i>DTH-167</i>	—	—	—	—
Cintiq Pro 16 <i>DTH-1621</i>	—	—	—	—
Cintiq 22 <i>DTK-2260</i>	—	—	—	—
Cintiq 22HD <i>DTK-2200</i>	—	—	—	—
Cintiq 22HDT - Pen & Touch <i>DTH-2200</i>	—	—	—	—
Cintiq Pro 24 <i>DTK-2420</i>	—	—	—	—
Cintiq Pro 24 - Pen & Touch <i>DTH-2420</i>	—	—	—	—
Cintiq Pro 27 <i>DTH-271</i>	—	—	—	—
Cintiq 32 Pro - Pen & Touch <i>DTH-3220</i>	—	—	—	—

Important: Touch is not supported

Touch features of Wacom devices are not supported with local termination.

Other Wacom tablets may work, but have not been tested and should not be used in production environments.

 **Caution: Do Not Calibrate Pen Displays from Wacom Center**

We recommend that you **NOT** calibrate your pen display from Wacom Center on the host machine. Doing so might result in the cursor getting offset when the tablet is used during a PCoIP session.

Installation Guide

Prerequisites for Installation

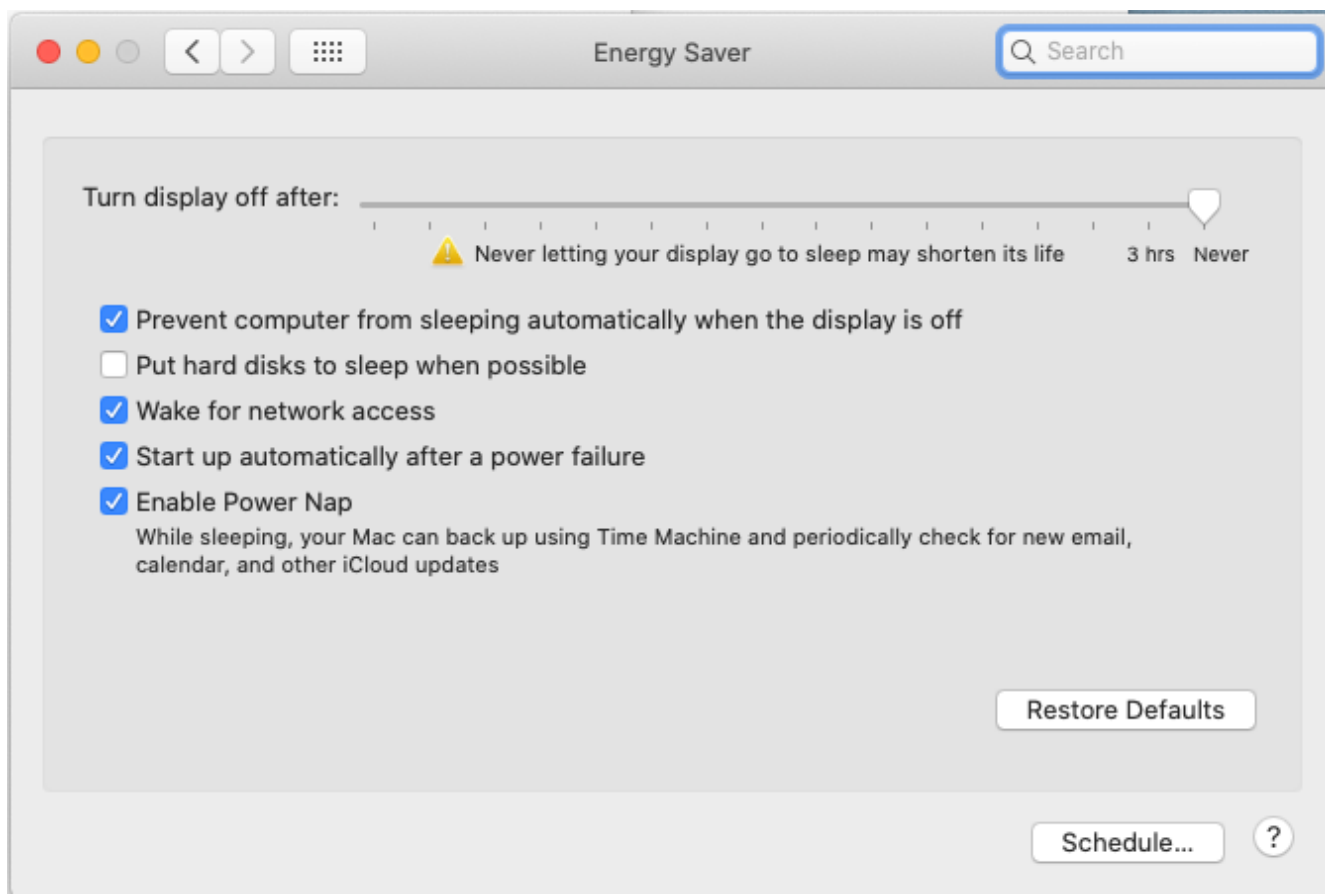
Before you begin, make sure that you perform the following tasks.

Configure Energy Saver Settings

Energy Saver features can cause the remote system to go to sleep or become unresponsive.

To prevent this, do the following:

1. Open **System Preferences > Energy Saver**.
2. Configure the settings as follows:



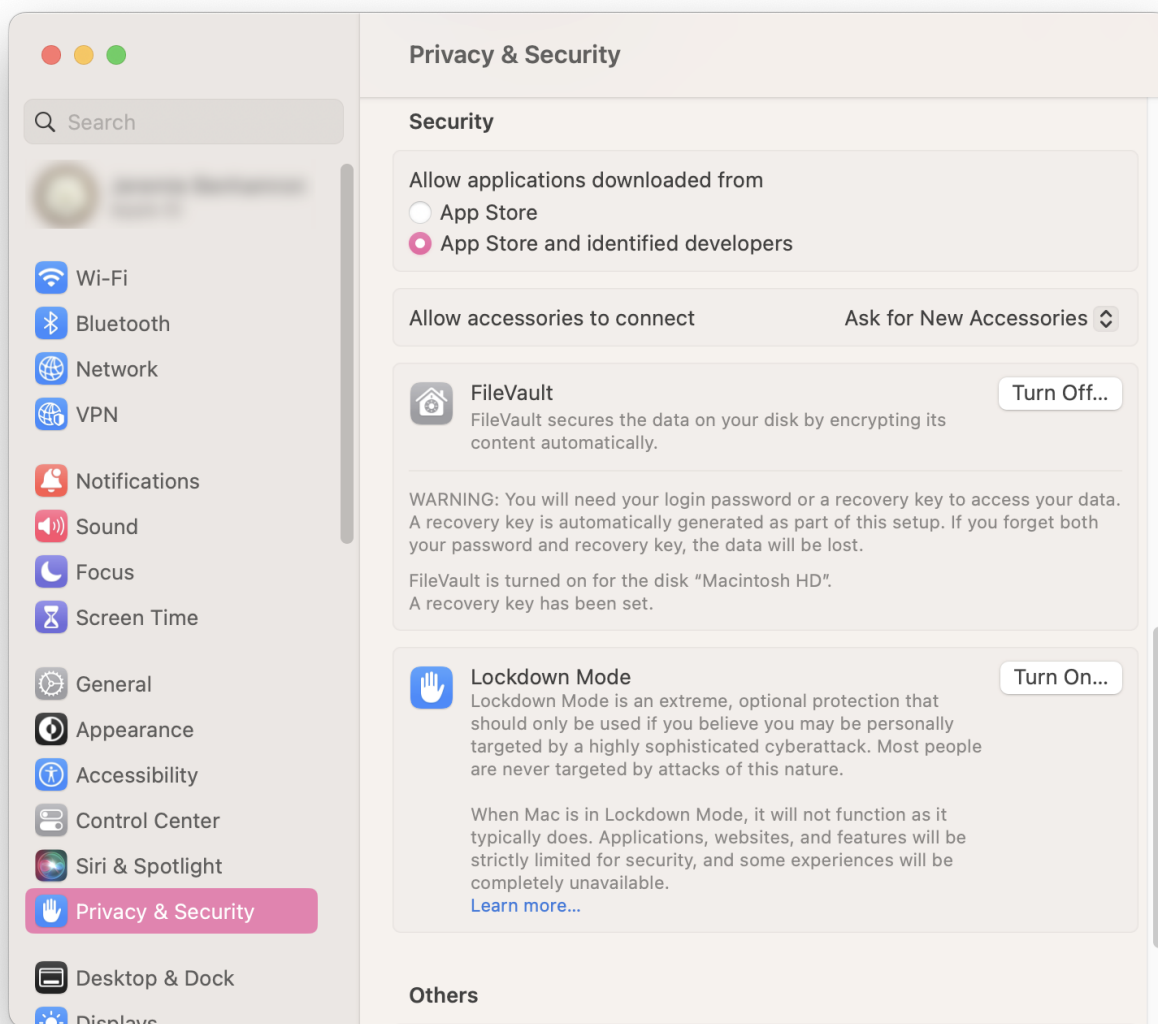
Setting	Value
Turn off display after	set slider to <i>Never</i>
Prevent computer from sleeping automatically when the display is off	<i>checked</i>
Put hard disks to sleep when possible	<i>unchecked</i>
Wake for network access	<i>checked</i>
Start up automatically after power failure	<i>checked</i>
Enable Power Nap	<i>checked</i>

Disable FileVault

If the **FileVault** setting is enabled on the PCoIP host Mac, files on the hard drive are encrypted and subsequently, unauthorized access is prevented. The hard drive remains locked every time the PCoIP host Mac is restarted. Until the hard drive is unlocked, client machines cannot establish PCoIP connections with the PCoIP host.

Therefore, to ensure that the FileVault setting does not prevent PCoIP connections, do one of the following:

- Unlock the hard drive by providing the user password and then allowing the PCoIP host to boot.
- Disable **FileVault** from **System Preferences > Privacy & Security** on the PCoIP host Mac.



Installing the Graphics Agent for macOS

This topic contains instructions for installing the Graphics Agent for macOS. Before you proceed, ensure that you performed the necessary [prerequisite tasks](#).

Note: Firewall Settings

During installation, the macOS agent installer updates the firewall settings on the macOS machine. This ensures that PCoIP traffic is allowed through its firewall.

Installing Using the Installation Package

1. [Download the installer](#) to the machine you'll be using as the Anyware host.
2. Run the installer `pkg`.
3. Click through the installer steps and accept the End User License Agreement. The installation begins.
4. If prompted, allow incoming network connections. This will ensure that `Anyware Agent.app`, `pcoip-agent`, and `pcoip-server` are allowed through the firewall.
5. Next, provide the license registration code you received from HP.

Important: This step does not apply for License Server users

If you are using a local [License Server](#), do not follow this step; refer to [Licensing the Graphics Agent for macOS](#).

If you are using Anyware Cloud Licensing, open a terminal window and type one of the following commands, depending on whether your host machine is behind a proxy server:

- If you use a proxy server to access the internet, provide this command (replace `<XXXXXX@YYY-YYYY-YYY>`, `<PROXY_SERVER_ADDRESS>`, and `<PROXY_PORT_NUMBER>` with your own values):

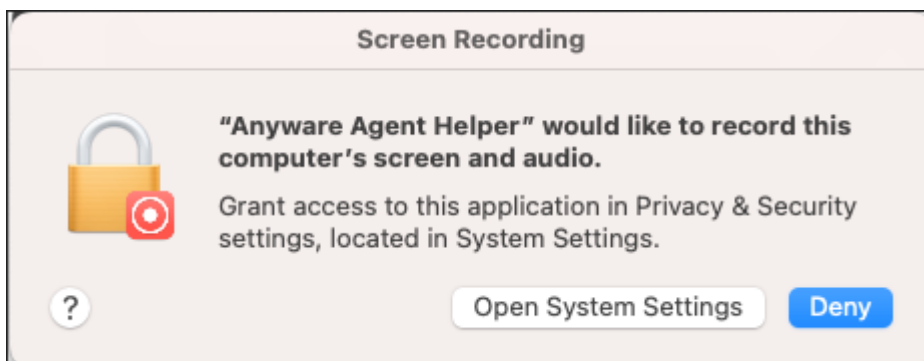
```
sudo pcoip-register-host --registration-code=<XXXXXX@YYY-YYYY-YYY> --  
proxy-server=<PROXY_SERVER_ADDRESS> --proxy-port=<PROXY_PORT_NUMBER>
```

- If your system does *not* use a proxy server, provide this command (replace `{REGISTRATION_CODE}` with your own value):

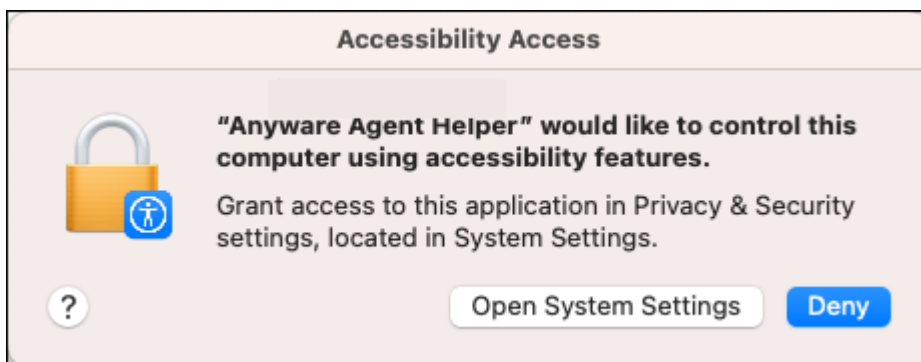
```
sudo pcoip-register-host --registration-code=<XXXXXX@YYY-YYYY-YYY>
```

If you are using a License Server, refer to [Licensing the Graphics Agent for macOS](#) for licensing instructions.

6. When prompted, grant the required permissions. A prompt will appear requiring you to grant **Screen Recording** permission to **Anyware Agent Helper**. The **Accessibility** prompt appears after you action the **Screen Recording** prompt.
 - a. On the **Screen Recording** prompt that appears, click **Open System Settings**.



- b. Go to **Privacy & Security**, and turn on **Screen Recording** for **Anyware Agent Helper**.
- c. On the **Accessibility** prompt that appears, click **Open System Settings**.



- d. Go to **Privacy & Security**, and turn on **Accessibility** for **Anyware Agent Helper**.
7. Confirm that **Anyware Agent Helper** has been granted the required permissions:
 - a. Go to **System Settings > Privacy & Security > Screen Recording**.
 - b. Ensure that screen recording is enabled for **Anyware Agent Helper**.
 - c. Go to **System Settings > Privacy & Security > Accessibility**.
 - d. Ensure that accessibility is enabled for **Anyware Agent Helper**.
8. Restart the machine.

Installing Using the Terminal

Important: Permissions Require GUI

In order to grant **Screen Recording** and **Accessibility** permissions, the macOS agent machine must display a graphical user interface. During installation, you must launch **Anyware Agent.app** to grant user permissions.

1. [Download the installer](#) to the machine you'll be using as the Anyware host.
2. Open a terminal window.
3. Run the installer using the following command. Replace {PACKAGE_NAME} with the name of the .pkg file you downloaded:

```
sudo installer -pkg {PACKAGE_NAME}.pkg -target /
```

The installer will return a 0 if successful. A return value of anything other than 0 indicates a failure. 1. Open the Anyware Agent application (Anyware Agent.app), found in /System/Volumes/Data/**Applications**. 1. Next, provide the license registration code you received from HP Anyware.

🔥 Important: This step does not apply for License Server users

If you are using a local [License Server](#), do not follow this step; refer to [Licensing the Graphics Agent for macOS](#).

If you are using Cloud Licensing, type one of the following commands, depending on whether your host machine is behind a proxy server:

- If you use a proxy server to access the internet, provide this command (replace `<XXXXXX@YYY-YYYY-YYY>`, `<PROXY_SERVER_ADDRESS>`, and `<PROXY_PORT_NUMBER>` with your own values):

```
sudo pcoip-register-host --registration-code=<XXXXXX@YYY-YYYY-YYY> --  
proxy-server=<PROXY_SERVER_ADDRESS> --proxy-port=<PROXY_PORT_NUMBER>
```

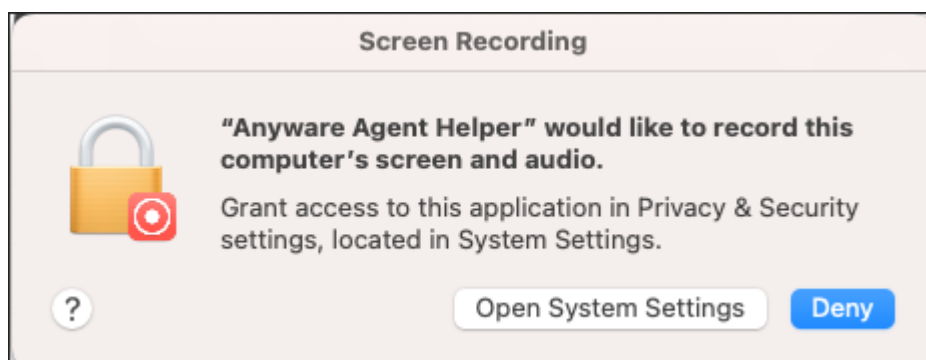
- If your system does *not* use a proxy server, provide this command (replace `<XXXXXX@YYY-YYYY-YYY>` with your own registration code value):

```
sudo pcoip-register-host --registration-code={REGISTRATION_CODE}
```

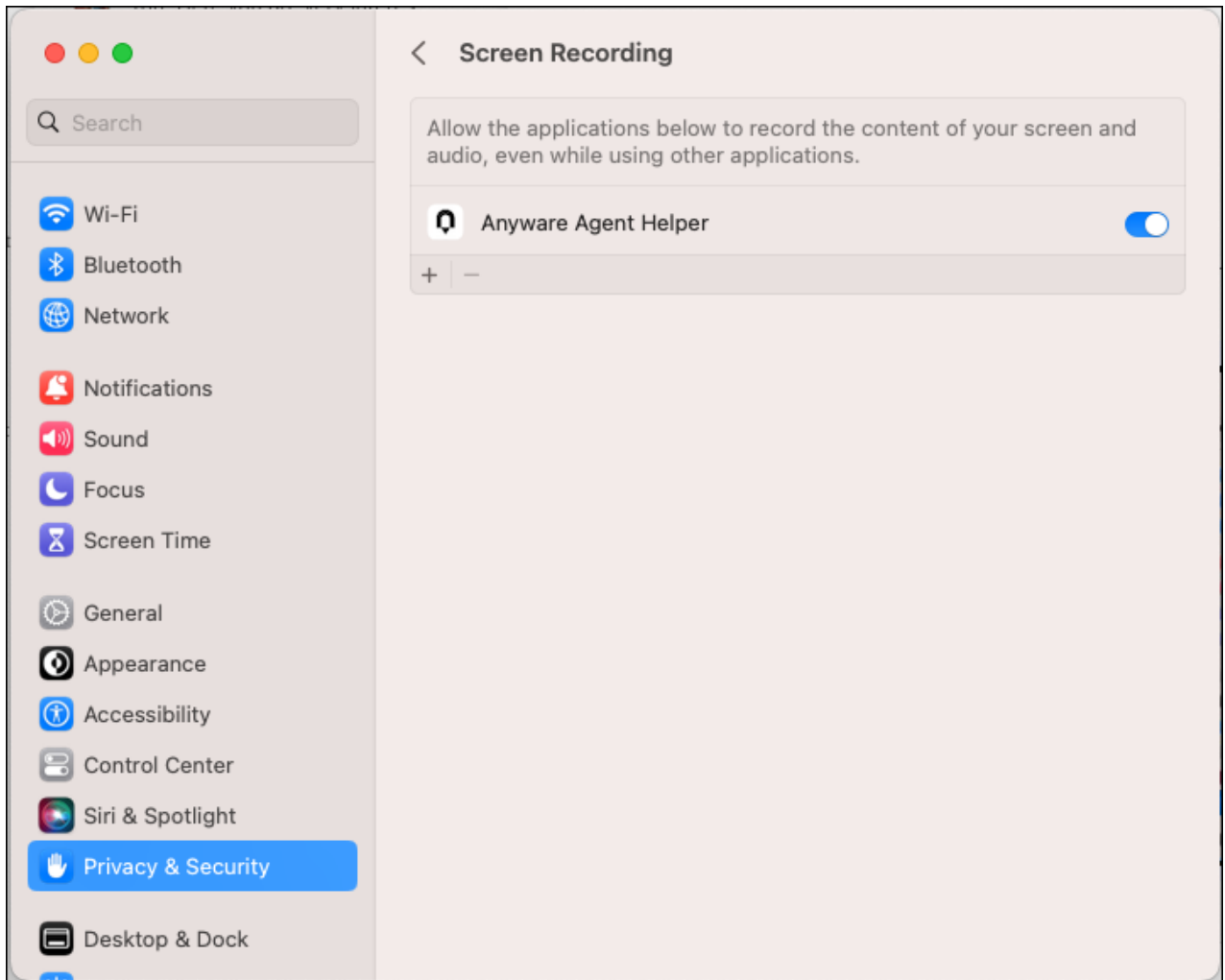
If you are using a License Server, refer to [Licensing the Graphics Agent for macOS](#) for licensing instructions.

4. Launch **Anyware Agent.app** to grant the required permissions. A prompt will appear requiring you to grant screen recording permission to **Anyware Agent Helper**. The **Accessibility** prompt appears after you action the **Screen Recording** prompt.

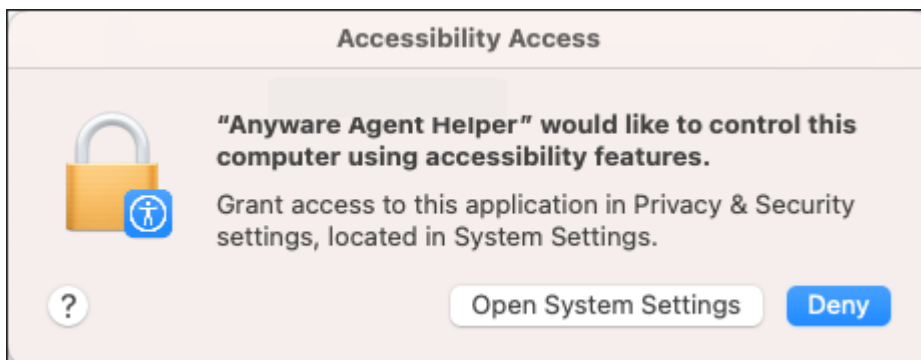
- a. On the **Screen Recording** prompt that appears, click **Open System Settings**.



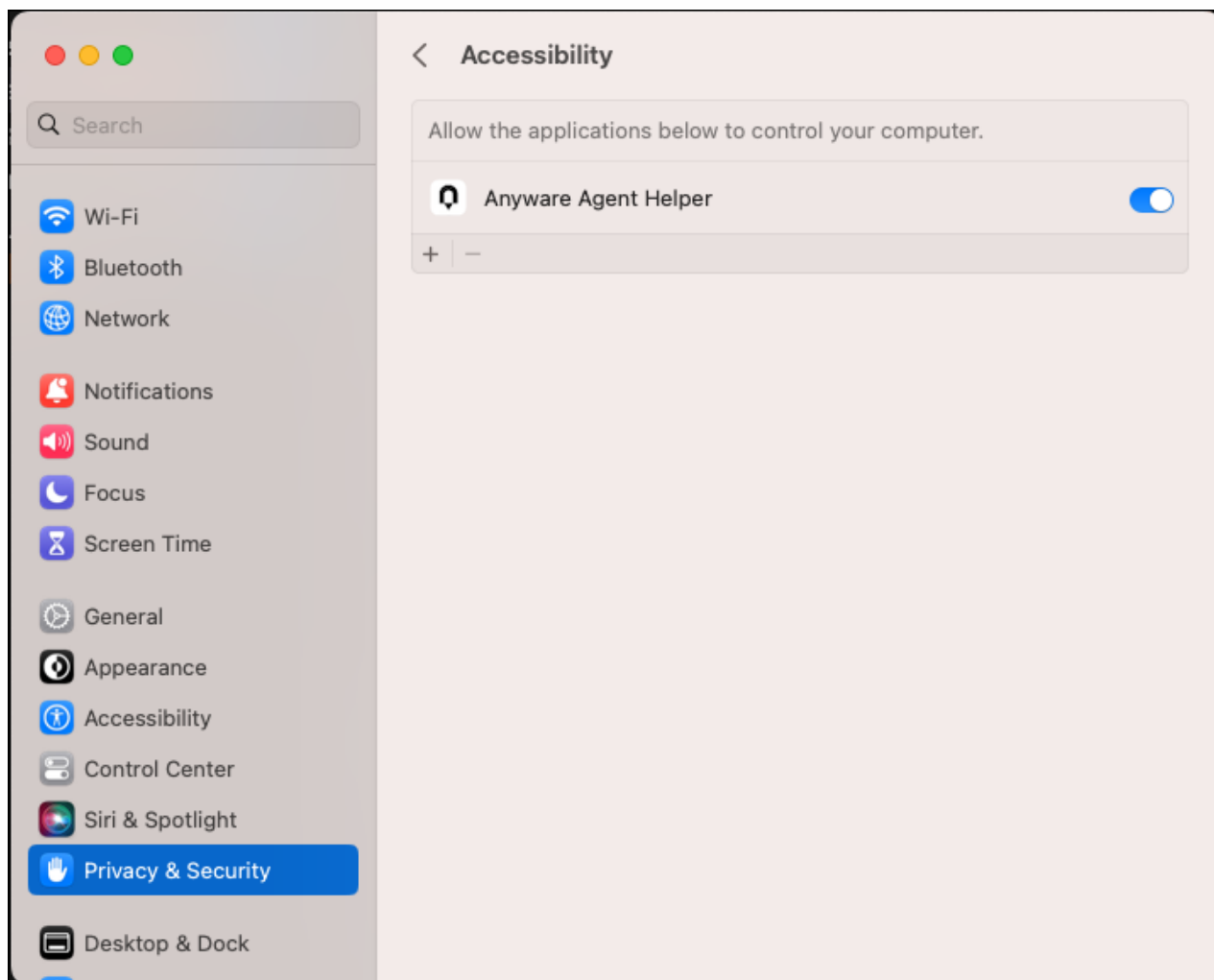
- b. Go to **Privacy & Security**, and turn on **Screen Recording** for **Anyware Agent Helper**.



c. On the **Accessibility** prompt that appears, click **Open System Settings**.



d. Go to **Privacy & Security**, and turn on **Accessibility** for **Anywhere Agent Helper**.



5. Confirm that **Anyware Agent Helper** has been granted the required permissions:

- a. Go to **System Settings > Privacy & Security > Screen Recording**.
- b. Ensure that screen recording is enabled for **Anyware Agent Helper**.
- c. Go to **System Settings > Privacy & Security > Accessibility**.
- d. Ensure that accessibility is enabled for **Anyware Agent Helper**.

6. Restart the machine.

Note: If Prompts Do Not Appear

If you are not prompted for permissions during installation, launch **Anyware Agent.app** to prompt for privacy permissions to **Anyware Agent Helper**. **Anyware Agent.app** is found at the following location: `/System/Volumes/Data/Applications`. For instructions, see [Screen Recording and Accessibility permissions](#). Once the permissions have been granted, you do not need to launch Anyware Agent.app again.

Uninstalling the Graphics Agent for macOS

Note: Deleting User Granted Permissions

User granted permissions are not deleted by the uninstaller. You must delete these permissions **BEFORE** uninstalling the macOS agent.

1. Run the following commands to delete the user granted permissions:

```
sudo tccutil reset ScreenCapture com.teradici.pcoip-user-agent;
```

```
sudo tccutil reset Accessibility com.teradici.pcoip-user-agent;
```

1. Uninstall the Graphics Agent by running the following command:

```
sudo /Library/Application\ Support/Teradici/pcoip/uninstaller
```


Licensing The Agent

The Graphics Agent for macOS must be assigned a valid PCoIP session license before it will work. Until you've registered it, you can't connect to the desktop using a Anyware client.

You receive a registration code when you purchase a pool of licenses from HP. Each registration code can be used multiple times; each use consumes one license in its pool.

Note: Registration code format

Registration codes look like this: `ABCDEFGH12@AB12-C345-D67E-89FG`

Anyware agent license registrations are managed automatically by HP's [Cloud Licensing service](#). If necessary, you can manage them yourself, using your own locally-installed [License server](#) instead.

If you need to purchase licenses, contact [HP](#).

Troubleshooting Licensing Issues

If you're encountering problems with HP licensing, refer to [Troubleshooting License Issues](#).

Using Anyware Cloud Licensing

To use Cloud Licensing, all you need to do is provide a registration code for each Anyware agent in your deployment (the same registration code can be used multiple times).

To provide the registration code:

SSH into the agent machine, and invoke `pcoip-register-host` with the license registration code and proxy settings if required:

```
sudo pcoip-register-host --registration-code=<XXXXXX@YYY-YYYY-YYY> [--proxy-server=<proxy-server-address>] [--proxy-port=<proxy-port-number>]
```

Important: Allowlist network blocks for Anyware Cloud Licensing

If you are using Anyware Cloud Licensing, you will need to add the following to your allowlist:

- `teradici.flexnetoperations.com`
- `teradici.compliance.flexnetoperations.com`

If you use an IP-based allowlist, we recommend your IT team add the following network blocks to your allowlist:

- IPv4: `185.146.155.64/27`
- IPv6: `2620:122:f005::/56`

Important: Migrating from the previous specification

Previously, our allowlist specification looked like this:

- **Production:** `64.14.29.0/24`
- **Disaster Recovery:** `64.27.162.0/24`

If you have an existing implementation using an IP-based allowlist like this, we recommend you leave it in place until the new allowlist is active and tested.

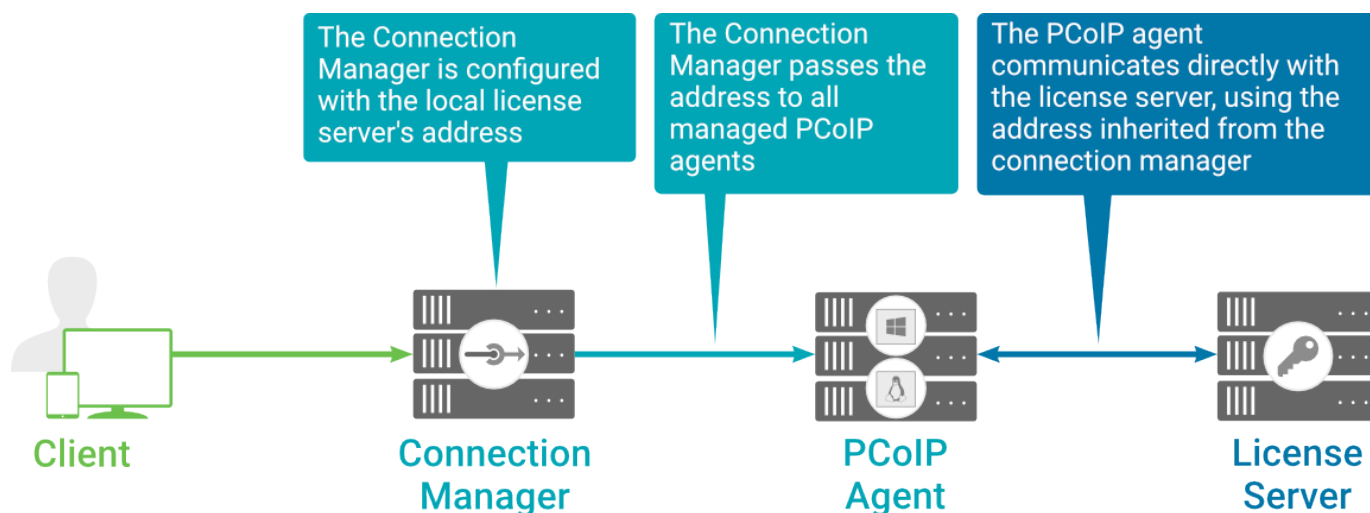
Licensing Anyware Agents With a Local License Server

In deployments where Anyware agents cannot access the internet, or where cloud-based licensing is not permitted or desired, a local License Server can be used instead. The License Server manages PCoIP session licenses within your private environment.

Configuring Anyware agents to use a local license server is done in one of two ways, depending on whether your deployment uses a PCoIP Connection Manager, or whether your Anyware clients connect directly to Anyware agents.

Brokered Environment Licensing

In *brokered* deployments, the license server address is configured in the Connection Manager, which passes it through to its managed Anyware agents.



Local license validation using a Graphics Agent for macOS and a brokered connection

When using a Connection Manager, the license server address is only configured once no matter how many Anyware agents are behind the Connection Manager.

To set the License Server URL in the Connection Manager:

1. On the Connection Manager machine, use a text editor to open `/etc/ConnectionManager.conf`.
2. Set the `LicenseServerAddress` parameter with the address of your local license server:
 - `http://{license-server-address}:{port}/request`
3. Save and close the configuration file.
4. Restart the Connection Manager.

VERIFYING YOUR BROKERED LICENSING CONFIGURATION

To verify your system's licensing configuration, run `pcoip-validate-license` from the console on the Graphics Agent for macOS machine. The command will ping the license server and attempt to retrieve information on an available license:

```
sudo pcoip-validate-license [-l]license-server-url <license-server-address>
[[-p]proxy-server <proxy-server-address>] [[-P]proxy-port <proxy-port-number>]
```

Where `<license-server-address>` is the address of the license server to ping, formatted as `http://{license-server-address}:{port}/request`

If the license server is behind a proxy server, provide the proxy information via the `-proxy-server` and `-proxy-port` parameters.

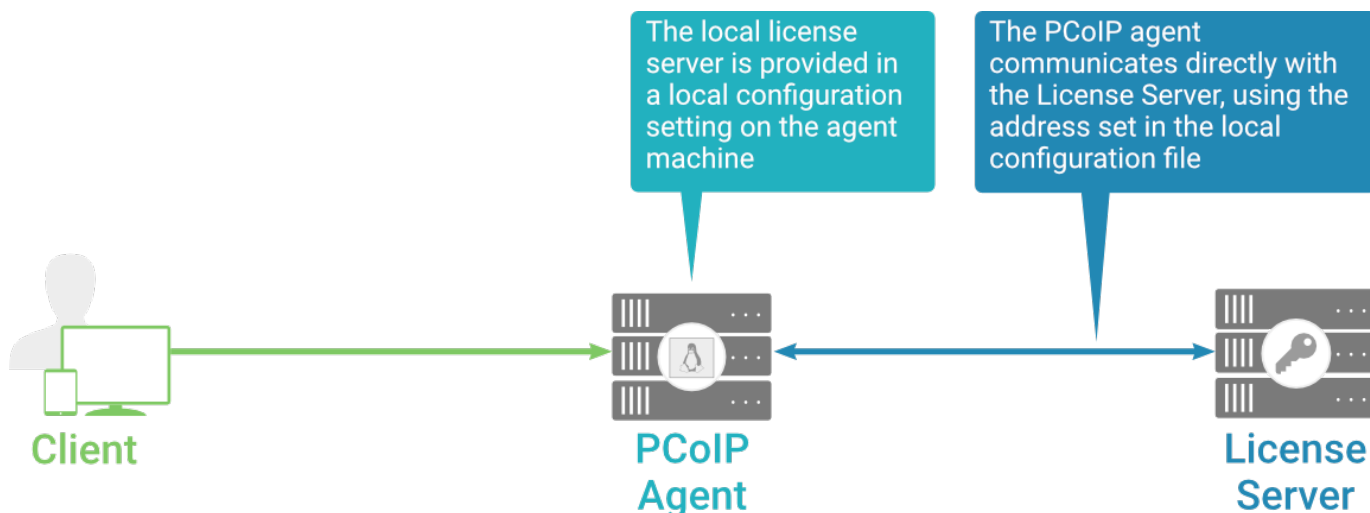
If successful, the response will show that a valid license was found on the license server, and its expiration date.

If the connection is unsuccessful, investigate the following possibilities:

- The license server address is incorrect, or formatted incorrectly.
- The license server is inaccessible.
- There are no available licenses on the license server. `pcoip-validate-license` will only return a positive response if there is at least one available session license.
- If you have only one license on the license server and run `pcoip-validate-license` from a PCoIP session, the command will fail because you are currently using the single license. In this scenario, disconnect your PCoIP session and try again from an SSH session instead.

Unbrokered Environment Licensing

In direct, or unbrokered, deployments, each v agent is configured with the license server address via a local agent setting. When a client initiates a new PCoIP session, the Anyware agent uses its local configuration to communicate with the license server.



Local license validation using a Graphics Agent for macOS and a direct (unbrokered) connection

Each Anyware agent in your environment must be individually configured with the license server's URL.

To configure the License Server URL on the Graphics Agent for macOS machine:

1. Add or modify the `pcoip.license_server_path` directive.

In this command, replace `{LICENSE_SERVER_PATH}` and `{LICENSE_SERVER_PORT}` with your own values:

```
sudo defaults write "/Library/Preferences/com.teradici.pcoip-agent.plist"  
pcoip.license_server_path "https://{LICENSE_SERVER_PATH}:"  
{LICENSE_SERVER_PORT}/request";
```

2. If the license server is behind a proxy server, provide the proxy information.

In this command, replace `{PROXY_SERVER_PATH}` and `{PROXY_PORT}` with your own values:

```
sudo defaults write "/Library/Preferences/com.teradici.pcoip-agent.plist"  
pcoip.license_proxy_server {PROXY_SERVER_PATH}  
sudo defaults write "/Library/Preferences/com.teradici.pcoip-agent.plist"  
pcoip.license_proxy port {PROXY_PORT};
```

The changes will take effect on the next PCoIP session.

VERIFYING YOUR UNBROKERED LICENSING CONFIGURATION

To verify your system's licensing configuration, run `pcoip-validate-license` from the console on the Graphics Agent for macOS machine. The command will ping the license server and attempt to retrieve information on an available license:

```
sudo pcoip-validate-license ##license-server-url <license-server-address>  
[##proxy-server <proxy-server-address>] [##proxy-port <proxy-port-number>]
```

Where `<license-server-address>` is the address of the license server to ping, formatted as `http://
{license-server-address} : {port} /request`

If the license server is behind a proxy server, provide the proxy information via the `##-proxy-server` and `##-proxy-port` parameters.

If successful, the response will show that a valid license was found on the license server, and its expiration date.

If the connection is unsuccessful, investigate the following possibilities:

- The license server address is incorrect, or formatted incorrectly.
- The license server is inaccessible.

- There are no available licenses on the license server. `pcoip-validate-license` will only return a positive response if there is at least one available session license.
- If you have only one license on the license server and run `pcoip-validate-license` from a PCoIP session, the command will fail because you are currently using the single license. In this scenario, disconnect your PCoIP session and try again from an SSH session instead.

Updating the Graphics Agent for macOS

To update the Graphics Agent for macOS to a new version, obtain the new installer and run it in place to replace the older version. Your configuration settings will be preserved.

Note: About Permissions

In versions prior to 23.08, the macOS agent package created the PCoIP Agent app on Mac machines. Therefore, **Screen Recording** and **Accessibility** permissions were granted to PCoIP Agent. The macOS agent package now creates the Anyware Agent Helper app instead of the PCoIP Agent app. After upgrading to version 23.08 or higher, you will see both the apps -- PCoIP Agent and Anyware Agent Helper -- in your permissions settings. Permissions can be safely deleted for the PCoIP Agent app. Since the permissions are not automatically applied to **Anyware Agent Helper**, they must be [granted again](#).

Before you Upgrade

Before you upgrade the macOS agent, make sure that you complete the tasks described in [Installation Prerequisites](#).

Important: Disconnect from Active PCoIP Sessions

If an upgrade is performed during an active PCoIP session, you might lose mouse control or keyboard control after the upgrade completes. To avoid this issue, we recommend that you first disconnect active PCoIP sessions, and then perform the upgrade.

Performing the Upgrade

You can perform the upgrade either:

- [By using the installer executable to install macOS agent](#), or
- [From the Terminal](#).

 Important: Upgrading from version 23.06

After an upgrade from version 23.06 completes, the mouse pointer on the agent machine might disappear. To fix this issue, reboot the agent machine.

Configuring the Anyware Agent

You can configure the Anyware agent, and optimize PCoIP protocol behavior for local network conditions, by adjusting configuration directives found in `/Library/Preferences/com.teradici.pcoip-agent.plist`.

You can find detailed information and descriptions about each setting [in the next section](#). You can also consult the `man` pages for `com.teradici.pcoip-agent.plist`:

```
man com.teradici.pcoip-agent.plist
```

Viewing Current Settings

To view the contents of your current settings file, open a Terminal window and run the following command:

```
defaults read "/Library/Preferences/com.teradici.pcoip-agent.plist";
```

The `com.teradici.pcoip-agent.plist` file only holds configuration overrides; it does not hold all configuration values. Values not specified in the file will use their defaults, as documented in the next section.

The configuration file will not exist until at least one setting has been written to it. If you try to read the file before it exists, you will receive a `Domain com.teradici.pcoip-agent.plist does not exist` error.

Applying Configuration Changes

To set or change a configuration value, use `defaults write` to modify directives in `com.teradici.pcoip-agent.plist`. The format is:

```
sudo defaults write /Library/Preferences/com.teradici.pcoip-agent.plist  
{directive} {value};
```

...where `{directive}` is one of the settings detailed in the next section, and `{value}` is the desired setting.

For example, to set the [maximum bandwidth](#) to *900000 kilobits/second*, and the [device bandwidth floor](#) to *5000 kilobits/second*, you would set values like this:

```
sudo defaults write /Library/Preferences/com.teradici.pcoip-agent.plist
pcoip.max_link_rate 900000;
sudo defaults write /Library/Preferences/com.teradici.pcoip-agent.plist
pcoip.device_bandwidth_floor 5000;
```

Note: Support for IPv6 Addresses

The Graphics Agent for macOS supports IPv6 addresses. No configuration is needed to switch between IPv4 and IPv6 modes.

H.264 Hardware Decode Requirements

For H.264 Hardware Decode, the **Graphics Agent** must have an NVIDIA Graphics Card that supports PCoIP Ultra GPU Offload, and PCoIP Ultra setting is either set to GPU Offload or Auto Offload.

Note: Default Values

In deployments with no existing PCoIP Ultra configuration, PCoIP Ultra defaults to "Auto Offload" and YUV Chroma subsampling defaults to 4:2:0.

The following NVIDIA graphics cards are supported:

- NVIDIA Quadro P400
- NVIDIA GeForce RTX 3060

Any Nvidia GPU with NVENC support are expected to work, but have not been tested.

Note: Configurable Values

A complete list of configurable values is shown next.

Configurable Settings

The following settings can be configured on the Graphics Agent for macOS. Refer to [Configuring the Anyware agent](#) to understand how to modify these settings.

Build-to-lossless

Directive	Options	Default
<code>pcoip.enable_build_to_lossless</code>	0 (off), 1 (on)	Off

This setting takes effect immediately. Specifies whether to turn the build-to-lossless feature of the PCoIP protocol off or on; this feature is turned off by default.

When build-to-lossless is turned off images and other desktop content may never build to a lossless state. In network environments with constrained bandwidth, turning off build-to-lossless can provide bandwidth savings. Build-to-lossless is recommended for environments that require images and desktop content to be built to a lossless state.

Clipboard redirection

Directive	Options	Default
<code>pcoip.server_clipboard_state</code>	0—Disabled in both directions 1—Enabled in both directions 2—Enabled client to agent only 3—Enabled agent to client only	—

This setting takes effect when you start the next session. Determines the direction in which clipboard redirection is allowed. You can select one of these values:

- Disabled in both directions
- Enabled in both directions (default setting)
- Enabled client to agent only (That is, allow copy and paste only from the client system to the host desktop.)
- Enabled agent to client only (That is, allow copy and paste only from the host desktop to the client system.)

Clipboard redirection is implemented as a virtual channel. If virtual channels are disabled, clipboard redirection does not function.

Collaboration

Directive	Options	Range	Increment	Default
<code>pcoip.enable_collaboration</code>	0 (off), 1 (on)			Off
<code>pcoip.max_collaborators</code>		1 – 5	1	5
<code>pcoip.collaboration_udpport</code>		1 – 65535	1	64172

This setting takes effect when the agent is restarted. This policy enables or disables user collaboration. When not configured, user collaboration is disabled by default.

The default maximum number of collaborators allowed is 5.

The default UDP starting port used for collaborator sessions is 64172. When a different starting port is used, ensure that firewall rules are adjusted so that PCoIP traffic can go through the new port.

If there is more than one collaborator, additional UDP ports will be needed for the collaborator sessions. For example, when the second collaborator connects, the next free UDP port will be opened on the host.

Collaboration input control

Directive	Options	Range	Increment	Default
<code>pcoip.enable_collaboration_input_control</code>	0 (off), 1 (on)			Off
<code>pcoip.collaboration_input_control_timeout</code>		100 – 10000	100	3000

This setting takes effect when you start the next PCoIP session. This policy enables or disables input control from the collaborators. When not configured, collaboration input control is disabled by default.

The input control timeout specifies the waiting period before any user with input control permission can acquire the input control of the host. The current input owner is the only one authorized to send mouse, keyboard and touch inputs to the host.

Connection addresses

Directive	Options	Default
<code>pcoip.connection_address</code>	string (up to 511 characters)	–
<code>pcoip.client_connection_address</code>	string (up to 511 characters)	–

This setting takes effect when you start the next session. Configuring this allows you to control the IPv4 or IPv6 address used by the agent or client in PCoIP sessions.

'Connection Address' controls the IP address used by the agent for the PCoIP session.

'Client Connection Address' controls the IP address the client is told to use when establishing the PCoIP session.

Please note that neither of these values should need to be set under normal circumstances.

Enable/disable audio in the PCoIP session

Directive	Options	Default
<code>pcoip.enable_audio</code>	0 (off), 1 (on)	On

This setting takes effect when you start the next session. Determines whether audio is enabled in PCoIP sessions. Both endpoints must have audio enabled. When this setting is enabled, PCoIP audio is allowed. When it is disabled, PCoIP audio is disabled. When this setting is not configured, audio is enabled by default.

Hide local cursor

Directive	Options	Default
<code>pcoip.disable_locally_rendered_cursor</code>	0 (off), 1 (on)	Off

This setting takes effect immediately. When this setting is enabled the local cursor on the client will be hidden. This may resolve duplicate cursor issues if there is a host rendered cursor within the host environment but may also result in no visible cursor. With this setting enabled there may be delays in mouse movements due to network latency and video processing times. By default, this setting is disabled, meaning that local cursors will be used, providing the most responsive user experience.

License server URL

Directive	Options	Default
<code>pcoip.license_server_path</code>	string (up to 511 characters)	–

This setting takes effect when you start the next session. This policy sets the license server path. Enter the license server path in '<https://address:port/request>' or '<http://address:port/request>' format.

Maximum PCoIP session bandwidth

Directive	Range	Increment	Default
<code>pcoip.max_link_rate</code>	104 – 900000	100	900000

This setting takes effect when you start the next session. Specifies the maximum bandwidth, in kilobits per second, in a PCoIP session. The bandwidth includes all imaging, audio, virtual channel, USB, and control PCoIP traffic.

Set this value based on the overall capacity of the link to which your endpoint is connected, taking into consideration the number of expected concurrent PCoIP sessions. For example, with a single user VDI configuration (e.g. a single PCoIP session) that connects through a 4Mbit/s Internet connection, set this value to 4Mbit (or 10% less than this value to leave some allowance for other network traffic).

Setting this value prevents the agent from attempting to transmit at a higher rate than the link capacity, which would cause excessive packet loss and a poorer user experience. This value is symmetric. It forces the client and agent to use the lower of the two values that are set on the client and agent side. For example, setting a 4Mbit/s maximum bandwidth forces the agent to transmit at a lower rate, even though the setting is configured on the client.

When this setting is disabled or not configured on an endpoint, the endpoint imposes no bandwidth constraints. When this setting is configured, the setting is used as the endpoint's maximum bandwidth constraint in kilobits per second.

The default value when this setting is not configured is 900000 kilobits per second.

This setting applies to the agent and client. If the two endpoints have different settings, the lower value is used.

PCoIP Ultra

Directive	Options	Range	Increment	Default
<code>pcoip.enable_ultra</code>	0 (off), 1 (on)			On
<code>pcoip.ultra</code>	0—Disabled 1—CPU Offload 2—GPU Offload 3—Automatic Offload			—
<code>pcoip.ultra_offload_mpps</code>		1 – 40	1	10

This setting takes effect when you start the next session. When this setting is disabled, PCoIP Ultra will not be used.

- PCoIP Ultra CPU Offload - these optimizations require CPU support for the AVX2 instruction set on both the remote host and client and are not compatible with the PCoIP Zero client. CPU Offload is recommended for 4K UHD resolutions with video playback requirements of 30 fps (or more) and highest image quality / color accuracy.
- PCoIP Ultra GPU Offload - these optimizations require an NVIDIA graphics card on the remote host capable of NVENC. GPU Offload is recommended when minimal CPU impact of pixel encoding is desired.
- PCoIP Ultra Auto Offload - enabling this setting allows PCoIP to automatically switch between CPU and GPU Offload modes; CPU Offload is used by default to provide the best image fidelity, GPU Offload is used during periods of high display activity to provide improved frame rates and bandwidth optimization. This setting is only effective if the remote host and client endpoints are capable of both CPU and GPU Offload.

The PCoIP Ultra Offload MPPS sets the Megapixels Per Second (MPPS) transition rate between PCoIP Ultra CPU Offload and PCoIP Ultra GPU Offload. Under Auto-Offload, PCoIP Ultra uses CPU Offload at lower pixel rates and switches to GPU Offload at the Offload MPPS. Increasing this value results in PCoIP Ultra transitioning to GPU Offload at a higher pixel rate and decreasing this value results in the transition at a lower pixel rate. The default PCoIP Ultra Offload MPPS is set to 10.

PCoIP event log verbosity

Directive	Range	Increment	Default
<code>pcoip.event_filter_mode</code>	0 – 3	1	2

This setting takes effect immediately. Configures the PCoIP event log verbosity ranging from 0 (least verbose) to 3 (most verbose).

PCoIP image quality levels

Directive	Options	Range	Increment	Default
<code>pcoip.minimum_image_quality</code>		30 – 100	10	40
<code>pcoip.maximum_initial_image_quality</code>		30 – 100	10	80
<code>pcoip.frame_rate_vs_quality_factor</code>		0 – 100	10	50
<code>pcoip.maximum_frame_rate</code>		0 – 60	1	–
<code>pcoip.use_client_img_settings</code>	0 (off), 1 (on)			Off

This setting takes effect immediately. Controls how PCoIP renders images during periods of network congestion. The Minimum Image Quality, Maximum Initial Image Quality, and Maximum Frame Rate values interoperate to provide fine control in network-bandwidth constrained environments.

Use the Minimum Image Quality value to balance image quality and frame rate for limited-bandwidth scenarios. You can specify a value between 30 and 100. The default value is 40. A lower value allows higher frame-rates, but with a potentially lower quality display. A higher value provides higher image quality, but with potentially lower frame rates when network bandwidth is constrained. When network bandwidth is not constrained, PCoIP maintains maximum quality regardless of this value.

Use the Maximum Initial Image Quality value to reduce the network bandwidth peaks required by PCoIP by limiting the initial quality of the changed regions of the display image. You can specify a value between 30 and 100. The default value is 80. A lower value reduces the image quality of content changes and decreases peak bandwidth requirements. A higher value increases the image quality of content changes and increases peak bandwidth requirements. Unchanged regions of the image progressively build to a lossless (perfect) quality regardless of this value. A value of 80 or lower best utilizes the available bandwidth.

The Minimum Image Quality value cannot exceed the Maximum Initial Image Quality value.

Use the Frame Rate vs Image Quality value to favor image sharpness over smooth motion during a PCoIP session when network bandwidth is limited. Lower values favor smoothness, higher values favor sharpness of image.

Use the Maximum Frame Rate value to manage the average bandwidth consumed per user by limiting the number of screen updates per second. You can specify a value between 1 and 60 frames per second. A higher value can use more bandwidth but provides less jitter, which allows smoother transitions in changing images such as video. A lower value uses less bandwidth but results in more jitter.

YUV chroma subsampling is set to 4:2:0 by default. It enables chroma subsampling to further compress the imaging to reduce bandwidth usage at the cost of reduced color accuracy. 4:2:0 subsampling is only supported in combination with PCoIP Ultra GPU optimization. Please note: 4:4:4 subsampling with PCoIP Ultra GPU optimization is GPU dependent and is not supported by all GPUs, in this case, PCoIP will fall back to 4:2:0 subsampling. Please see our support site for further details.

Set the 'Use image settings from zero client' when you want to use the 'Minimum Image Quality', 'Maximum Initial Image Quality', 'Maximum Frame Rate', 'Disable Build to Lossless' values from the client instead of the host. Currently, only Zero Client Firmware 3.5 and above support these settings on the client side.

These image quality values apply to the soft host only and have no effect on a soft client.

When this setting is disabled or not configured, the default values are used.

PCoIP session MTU

Directive	Range	Increment	Default
<code>pcoip.mtu_size</code>	500 – 1500	1	1200

This setting takes effect when you start the next session. Specifies the Maximum Transmission Unit (MTU) size for UDP packets for a PCoIP session.

The MTU size includes IP and UDP packet headers. TCP uses the standard MTU discovery mechanism to set MTU and is not affected by this setting. The maximum MTU size is 1500 bytes. The minimum MTU size is 500 bytes. The default value is 1200 bytes.

Typically, you do not have to change the MTU size. Change this value if you have an unusual network setup that causes PCoIP packet fragmentation.

This setting applies to the agent and client. If the two endpoints have different MTU size settings, the lowest size is used.

If this setting is disabled or not configured, the client uses the default value in the negotiation with the agent.

PCoIP session audio bandwidth limit

Directive	Range	Increment	Default
<code>pcoip.audio_bandwidth_limit</code>	0 - 100000	1	512

This setting takes effect immediately. Specifies the maximum audio bandwidth that can be used for audio output (sound playback) from the virtual desktop to the client in a PCoIP session. Note that the network transport overhead can add an additional 20-40% bandwidth to this number.

Audio processing monitors the bandwidth needed for audio and selects the audio compression algorithm that provides the best quality possible, without exceeding the bandwidth limit:

- 512 kbit/s or higher - 7.1 surround, high-quality, compressed audio
- 384 kbit/s or higher - 5.1 surround, high-quality, compressed audio
- 256 kbit/s or higher - stereo, high-quality, compressed audio
- 48 kbit/s to 255 kbit/s - stereo audio ranging between FM radio quality down to AM radio quality
- 32 kbit/s to 47 kbit/s - monaural AM radio or phone call quality
- Below 32 kbit/s - results in no audio playback

If this setting is not configured, a default audio bandwidth limit of 512 kbit/s is configured to constrain the audio compression algorithm selected.

Note that zero clients on older firmware have less efficient audio compression algorithms that may require setting this limit higher to achieve the same audio quality or upgrading the firmware.

PCoIP session bandwidth floor

Directive	Range	Increment	Default
<code>pcoip.device_bandwidth_floor</code>	0 – 100000	1	–

This setting takes effect immediately. Specifies a lower limit, in kilobits per second, for the bandwidth that is reserved by the PCoIP session.

This setting configures the minimum expected bandwidth transmission rate for the endpoint. When you use this setting to reserve bandwidth for an endpoint, the session does not have to wait for bandwidth to become available, which improves session responsiveness.

Make sure that you do not over-subscribe the total reserved bandwidth for all endpoints. Make sure that the sum of bandwidth floors for all connections in your configuration does not exceed the network capability.

The default value is 0, which means that no minimum bandwidth is reserved. When this setting is disabled or not configured, no minimum bandwidth is reserved.

This setting applies to the agent and client, but the setting only affects the endpoint on which it is configured.

PCoIP statistics interval

Directive	Range	Increment	Default
<code>pcoip.server_statistics_interval_seconds</code>	0 – 65535	1	–

This setting takes effect immediately. Configuring this allows you to set an interval in seconds for logging performance statistics to the PCoIP server log. When not configured, logging is disabled by default.

PCoIP transport header

Directive	Options	Default
<code>pcoip.transport_session_priority</code>	1—High Priority 2—Medium Priority (default) 3—Low Priority 4—Undefined Priority	—

This setting takes effect when you start the next session. Configures the PCoIP transport header.

PCoIP transport header is a 32-bit long header which is added to all PCoIP UDP packets (only if the transport header is enabled/supported by both sides). PCoIP transport header allows network devices to make better prioritization/Qos decisions when dealing with network congestions. The transport header is enabled by default.

The transport session priority determines the PCoIP session priority reported in the PCoIP Transport Header. Network devices make better prioritization/Qos decisions based on the specified transport session priority. The transport session priority value is negotiated by the PCoIP agent and client. If agent has specified a transport session priority value (high, medium, or low), then the session uses the agent specified session priority. If only the client has specified a transport session priority (high, medium, or low), then the session uses the client specified session priority. If neither agent nor client has specified a transport session priority (or specified 'undefined priority'), then the session uses/ defaults to the medium session priority.

PCoIP virtual channels

Directive	Options	Default
<code>pcoip.vchan_list</code>	string (up to 255 characters)	—

This setting takes effect when you start the next session. Specifies the virtual channels that can or cannot operate over a PCoIP session.

There are two modes of operation:

- Enable all virtual channels except for <list> (default setting)
- Disable all virtual channels except for <list>

When specifying which virtual channels to include or not include in the list, the following rules apply:

- An empty list is allowed
- Multiple virtual channel names in the list must be separated by the vertical bar (|) character. For example: channelA|channelB
- Vertical bar or backslash (\) characters in virtual channel names must be preceded by a backslash. For example: the channel name "awk|ward\channel" must be specified as "awk|ward\channel" (without the double quotes)
- A maximum of 15 virtual channels are allowed in a single PCoIP session

The virtual channel must be enabled on both agent and client for it to be used.

Proxy Access to a remote License Server

Directive	Options	Range	Increment	Default
<code>pcoip.license_proxy_server</code>	string (up to 511 characters)			–
<code>pcoip.license_proxy_port</code>		0 – 65535	1	–

This setting takes effect when you start the next session. If a proxy is required to access a local License Server or the Cloud License Server, enter those parameters here. These parameters are loaded only during agent startup.

Timezone redirection

Directive	Options	Default
<code>pcoip.enable_timezone_redirect</code>	0 (off), 1 (on)	On

This setting takes effect when you start the next session. Configuring this allows you to enable or disable timezone redirection. When not configured, timezone redirection is enabled by default.

Configurable Settings

The following settings can be configured on the Graphics Agent for macOS. Refer to [Configuring the Anyware agent](#) to understand how to modify these settings.

Build-to-lossless

Directive	Options	Default
<code>pcoip.enable_build_to_lossless</code>	0 (off), 1 (on)	Off

This setting takes effect immediately. Specifies whether to turn the build-to-lossless feature of the PCoIP protocol off or on; this feature is turned off by default.

When build-to-lossless is turned off images and other desktop content may never build to a lossless state. In network environments with constrained bandwidth, turning off build-to-lossless can provide bandwidth savings. Build-to-lossless is recommended for environments that require images and desktop content to be built to a lossless state.

Clipboard redirection

Directive	Options	Default
<code>pcoip.server_clipboard_state</code>	0—Disabled in both directions 1—Enabled in both directions 2—Enabled client to agent only 3—Enabled agent to client only	—

This setting takes effect when you start the next session. Determines the direction in which clipboard redirection is allowed. You can select one of these values:

- Disabled in both directions
- Enabled in both directions (default setting)
- Enabled client to agent only (That is, allow copy and paste only from the client system to the host desktop.)
- Enabled agent to client only (That is, allow copy and paste only from the host desktop to the client system.)

Clipboard redirection is implemented as a virtual channel. If virtual channels are disabled, clipboard redirection does not function.

Collaboration

Directive	Options	Range	Increment	Default
<code>pcoip.enable_collaboration</code>	0 (off), 1 (on)			Off
<code>pcoip.max_collaborators</code>		1 – 5	1	5
<code>pcoip.collaboration_udpport</code>		1 – 65535	1	64172

This setting takes effect when the agent is restarted. This policy enables or disables user collaboration. When not configured, user collaboration is disabled by default.

The default maximum number of collaborators allowed is 5.

The default UDP starting port used for collaborator sessions is 64172. When a different starting port is used, ensure that firewall rules are adjusted so that PCoIP traffic can go through the new port.

If there is more than one collaborator, additional UDP ports will be needed for the collaborator sessions. For example, when the second collaborator connects, the next free UDP port will be opened on the host.

Collaboration input control

Directive	Options	Range	Increment	Default
<code>pcoip.enable_collaboration_input_control</code>	0 (off), 1 (on)			Off
<code>pcoip.collaboration_input_control_timeout</code>		100 – 10000	100	3000

This setting takes effect when you start the next PCoIP session. This policy enables or disables input control from the collaborators. When not configured, collaboration input control is disabled by default.

The input control timeout specifies the waiting period before any user with input control permission can acquire the input control of the host. The current input owner is the only one authorized to send mouse, keyboard and touch inputs to the host.

Connection addresses

Directive	Options	Default
<code>pcoip.connection_address</code>	string (up to 511 characters)	–
<code>pcoip.client_connection_address</code>	string (up to 511 characters)	–

This setting takes effect when you start the next session. Configuring this allows you to control the IPv4 or IPv6 address used by the agent or client in PCoIP sessions.

'Connection Address' controls the IP address used by the agent for the PCoIP session.

'Client Connection Address' controls the IP address the client is told to use when establishing the PCoIP session.

Please note that neither of these values should need to be set under normal circumstances.

Enable/disable audio in the PCoIP session

Directive	Options	Default
<code>pcoip.enable_audio</code>	0 (off), 1 (on)	On

This setting takes effect when you start the next session. Determines whether audio is enabled in PCoIP sessions. Both endpoints must have audio enabled. When this setting is enabled, PCoIP audio is allowed. When it is disabled, PCoIP audio is disabled. When this setting is not configured, audio is enabled by default.

Hide local cursor

Directive	Options	Default
<code>pcoip.disable_locally_rendered_cursor</code>	0 (off), 1 (on)	Off

This setting takes effect immediately. When this setting is enabled the local cursor on the client will be hidden. This may resolve duplicate cursor issues if there is a host rendered cursor within the host environment but may also result in no visible cursor. With this setting enabled there may be delays in mouse movements due to network latency and video processing times. By default, this setting is disabled, meaning that local cursors will be used, providing the most responsive user experience.

License server URL

Directive	Options	Default
<code>pcoip.license_server_path</code>	string (up to 511 characters)	–

This setting takes effect when you start the next session. This policy sets the license server path. Enter the license server path in '<https://address:port/request>' or '<http://address:port/request>' format.

Maximum PCoIP session bandwidth

Directive	Range	Increment	Default
<code>pcoip.max_link_rate</code>	104 – 900000	100	900000

This setting takes effect when you start the next session. Specifies the maximum bandwidth, in kilobits per second, in a PCoIP session. The bandwidth includes all imaging, audio, virtual channel, USB, and control PCoIP traffic.

Set this value based on the overall capacity of the link to which your endpoint is connected, taking into consideration the number of expected concurrent PCoIP sessions. For example, with a single user VDI configuration (e.g. a single PCoIP session) that connects through a 4Mbit/s Internet connection, set this value to 4Mbit (or 10% less than this value to leave some allowance for other network traffic).

Setting this value prevents the agent from attempting to transmit at a higher rate than the link capacity, which would cause excessive packet loss and a poorer user experience. This value is symmetric. It forces the client and agent to use the lower of the two values that are set on the client and agent side. For example, setting a 4Mbit/s maximum bandwidth forces the agent to transmit at a lower rate, even though the setting is configured on the client.

When this setting is disabled or not configured on an endpoint, the endpoint imposes no bandwidth constraints. When this setting is configured, the setting is used as the endpoint's maximum bandwidth constraint in kilobits per second.

The default value when this setting is not configured is 900000 kilobits per second.

This setting applies to the agent and client. If the two endpoints have different settings, the lower value is used.

PCoIP Ultra

Directive	Options	Range	Increment	Default
<code>pcoip.enable_ultra</code>	0 (off), 1 (on)			On
<code>pcoip.ultra</code>	0—Disabled 1—CPU Offload 2—GPU Offload 3—Automatic Offload			—
<code>pcoip.ultra_offload_mpps</code>		1 – 40	1	10

This setting takes effect when you start the next session. When this setting is disabled, PCoIP Ultra will not be used.

- PCoIP Ultra CPU Offload - these optimizations require CPU support for the AVX2 instruction set on both the remote host and client and are not compatible with the PCoIP Zero client. CPU Offload is recommended for 4K UHD resolutions with video playback requirements of 30 fps (or more) and highest image quality / color accuracy.
- PCoIP Ultra GPU Offload - these optimizations require an NVIDIA graphics card on the remote host capable of NVENC. GPU Offload is recommended when minimal CPU impact of pixel encoding is desired.
- PCoIP Ultra Auto Offload - enabling this setting allows PCoIP to automatically switch between CPU and GPU Offload modes; CPU Offload is used by default to provide the best image fidelity, GPU Offload is used during periods of high display activity to provide improved frame rates and bandwidth optimization. This setting is only effective if the remote host and client endpoints are capable of both CPU and GPU Offload.

The PCoIP Ultra Offload MPPS sets the Megapixels Per Second (MPPS) transition rate between PCoIP Ultra CPU Offload and PCoIP Ultra GPU Offload. Under Auto-Offload, PCoIP Ultra uses CPU Offload at lower pixel rates and switches to GPU Offload at the Offload MPPS. Increasing this value results in PCoIP Ultra transitioning to GPU Offload at a higher pixel rate and decreasing this value results in the transition at a lower pixel rate. The default PCoIP Ultra Offload MPPS is set to 10.

PCoIP event log verbosity

Directive	Range	Increment	Default
<code>pcoip.event_filter_mode</code>	0 – 3	1	2

This setting takes effect immediately. Configures the PCoIP event log verbosity ranging from 0 (least verbose) to 3 (most verbose).

PCoIP image quality levels

Directive	Options	Range	Increment	Default
<code>pcoip.minimum_image_quality</code>		30 – 100	10	40
<code>pcoip.maximum_initial_image_quality</code>		30 – 100	10	80
<code>pcoip.frame_rate_vs_quality_factor</code>		0 – 100	10	50
<code>pcoip.maximum_frame_rate</code>		0 – 60	1	–
<code>pcoip.use_client_img_settings</code>	0 (off), 1 (on)			Off

This setting takes effect immediately. Controls how PCoIP renders images during periods of network congestion. The Minimum Image Quality, Maximum Initial Image Quality, and Maximum Frame Rate values interoperate to provide fine control in network-bandwidth constrained environments.

Use the Minimum Image Quality value to balance image quality and frame rate for limited-bandwidth scenarios. You can specify a value between 30 and 100. The default value is 40. A lower value allows higher frame-rates, but with a potentially lower quality display. A higher value provides higher image quality, but with potentially lower frame rates when network bandwidth is constrained. When network bandwidth is not constrained, PCoIP maintains maximum quality regardless of this value.

Use the Maximum Initial Image Quality value to reduce the network bandwidth peaks required by PCoIP by limiting the initial quality of the changed regions of the display image. You can specify a value between 30 and 100. The default value is 80. A lower value reduces the image quality of content changes and decreases peak bandwidth requirements. A higher value increases the image quality of content changes and increases peak bandwidth requirements. Unchanged regions of the image progressively build to a lossless (perfect) quality regardless of this value. A value of 80 or lower best utilizes the available bandwidth.

The Minimum Image Quality value cannot exceed the Maximum Initial Image Quality value.

Use the Frame Rate vs Image Quality value to favor image sharpness over smooth motion during a PCoIP session when network bandwidth is limited. Lower values favor smoothness, higher values favor sharpness of image.

Use the Maximum Frame Rate value to manage the average bandwidth consumed per user by limiting the number of screen updates per second. You can specify a value between 1 and 60 frames per second. A higher value can use more bandwidth but provides less jitter, which allows smoother transitions in changing images such as video. A lower value uses less bandwidth but results in more jitter.

YUV chroma subsampling is set to 4:2:0 by default. It enables chroma subsampling to further compress the imaging to reduce bandwidth usage at the cost of reduced color accuracy. 4:2:0 subsampling is only supported in combination with PCoIP Ultra GPU optimization. Please note: 4:4:4 subsampling with PCoIP Ultra GPU optimization is GPU dependent and is not supported by all GPUs, in this case, PCoIP will fall back to 4:2:0 subsampling. Please see our support site for further details.

Set the 'Use image settings from zero client' when you want to use the 'Minimum Image Quality', 'Maximum Initial Image Quality', 'Maximum Frame Rate', 'Disable Build to Lossless' values from the client instead of the host. Currently, only Zero Client Firmware 3.5 and above support these settings on the client side.

These image quality values apply to the soft host only and have no effect on a soft client.

When this setting is disabled or not configured, the default values are used.

PCoIP session MTU

Directive	Range	Increment	Default
<code>pcoip.mtu_size</code>	500 – 1500	1	1200

This setting takes effect when you start the next session. Specifies the Maximum Transmission Unit (MTU) size for UDP packets for a PCoIP session.

The MTU size includes IP and UDP packet headers. TCP uses the standard MTU discovery mechanism to set MTU and is not affected by this setting. The maximum MTU size is 1500 bytes. The minimum MTU size is 500 bytes. The default value is 1200 bytes.

Typically, you do not have to change the MTU size. Change this value if you have an unusual network setup that causes PCoIP packet fragmentation.

This setting applies to the agent and client. If the two endpoints have different MTU size settings, the lowest size is used.

If this setting is disabled or not configured, the client uses the default value in the negotiation with the agent.

PCoIP session audio bandwidth limit

Directive	Range	Increment	Default
<code>pcoip.audio_bandwidth_limit</code>	0 - 100000	1	512

This setting takes effect immediately. Specifies the maximum audio bandwidth that can be used for audio output (sound playback) from the virtual desktop to the client in a PCoIP session. Note that the network transport overhead can add an additional 20-40% bandwidth to this number.

Audio processing monitors the bandwidth needed for audio and selects the audio compression algorithm that provides the best quality possible, without exceeding the bandwidth limit:

- 512 kbit/s or higher - 7.1 surround, high-quality, compressed audio
- 384 kbit/s or higher - 5.1 surround, high-quality, compressed audio
- 256 kbit/s or higher - stereo, high-quality, compressed audio
- 48 kbit/s to 255 kbit/s - stereo audio ranging between FM radio quality down to AM radio quality
- 32 kbit/s to 47 kbit/s - monaural AM radio or phone call quality
- Below 32 kbit/s - results in no audio playback

If this setting is not configured, a default audio bandwidth limit of 512 kbit/s is configured to constrain the audio compression algorithm selected.

Note that zero clients on older firmware have less efficient audio compression algorithms that may require setting this limit higher to achieve the same audio quality or upgrading the firmware.

PCoIP session bandwidth floor

Directive	Range	Increment	Default
<code>pcoip.device_bandwidth_floor</code>	0 – 100000	1	–

This setting takes effect immediately. Specifies a lower limit, in kilobits per second, for the bandwidth that is reserved by the PCoIP session.

This setting configures the minimum expected bandwidth transmission rate for the endpoint. When you use this setting to reserve bandwidth for an endpoint, the session does not have to wait for bandwidth to become available, which improves session responsiveness.

Make sure that you do not over-subscribe the total reserved bandwidth for all endpoints. Make sure that the sum of bandwidth floors for all connections in your configuration does not exceed the network capability.

The default value is 0, which means that no minimum bandwidth is reserved. When this setting is disabled or not configured, no minimum bandwidth is reserved.

This setting applies to the agent and client, but the setting only affects the endpoint on which it is configured.

PCoIP statistics interval

Directive	Range	Increment	Default
<code>pcoip.server_statistics_interval_seconds</code>	0 – 65535	1	–

This setting takes effect immediately. Configuring this allows you to set an interval in seconds for logging performance statistics to the PCoIP server log. When not configured, logging is disabled by default.

PCoIP transport header

Directive	Options	Default
<code>pcoip.transport_session_priority</code>	1—High Priority 2—Medium Priority (default) 3—Low Priority 4—Undefined Priority	—

This setting takes effect when you start the next session. Configures the PCoIP transport header.

PCoIP transport header is a 32-bit long header which is added to all PCoIP UDP packets (only if the transport header is enabled/supported by both sides). PCoIP transport header allows network devices to make better prioritization/Qos decisions when dealing with network congestions. The transport header is enabled by default.

The transport session priority determines the PCoIP session priority reported in the PCoIP Transport Header. Network devices make better prioritization/Qos decisions based on the specified transport session priority. The transport session priority value is negotiated by the PCoIP agent and client. If agent has specified a transport session priority value (high, medium, or low), then the session uses the agent specified session priority. If only the client has specified a transport session priority (high, medium, or low), then the session uses the client specified session priority. If neither agent nor client has specified a transport session priority (or specified 'undefined priority'), then the session uses/ defaults to the medium session priority.

PCoIP virtual channels

Directive	Options	Default
<code>pcoip.vchan_list</code>	string (up to 255 characters)	—

This setting takes effect when you start the next session. Specifies the virtual channels that can or cannot operate over a PCoIP session.

There are two modes of operation:

- Enable all virtual channels except for <list> (default setting)
- Disable all virtual channels except for <list>

When specifying which virtual channels to include or not include in the list, the following rules apply:

- An empty list is allowed
- Multiple virtual channel names in the list must be separated by the vertical bar (|) character. For example: channelA|channelB
- Vertical bar or backslash (\) characters in virtual channel names must be preceded by a backslash. For example: the channel name "awk|ward\channel" must be specified as "awk|ward\channel" (without the double quotes)
- A maximum of 15 virtual channels are allowed in a single PCoIP session

The virtual channel must be enabled on both agent and client for it to be used.

Proxy Access to a remote License Server

Directive	Options	Range	Increment	Default
<code>pcoip.license_proxy_server</code>	string (up to 511 characters)			–
<code>pcoip.license_proxy_port</code>		0 – 65535	1	–

This setting takes effect when you start the next session. If a proxy is required to access a local License Server or the Cloud License Server, enter those parameters here. These parameters are loaded only during agent startup.

Timezone redirection

Directive	Options	Default
<code>pcoip.enable_timezone_redirect</code>	0 (off), 1 (on)	On

This setting takes effect when you start the next session. Configuring this allows you to enable or disable timezone redirection. When not configured, timezone redirection is enabled by default.

Connection Guide

Establishing a Connection from a PCoIP Client

Once you've installed and configured your Graphics Agent for macOS, you're ready to accept incoming connections from remote *Anyware Clients*. PCoIP clients are remote endpoint devices available in as software or firmware and make secure PCoIP connections to the remote desktop through the installed Graphics Agent for macOS.

Managing Client Connections

In most cases, Anyware clients connect to Anyware agents through a *connection broker*. The broker is responsible for matching users to their available desktops, and then establishing the PCoIP session with their selected resource.

Anyware agents do not need to be configured to use these brokering services. All relevant configuration is done at the broker, which then communicates with the agent.

Brokering Options

There are several ways you can manage client connections to remote desktops

Direct Connections

In direct connection scenarios—where a broker is not involved—the Anyware agent acts as its own broker. In these cases, a client user will provide the IP address or FQDN of the agent machine to their client, and the connection is made securely with no intermediate step.

Anyware Manager

[Anyware Manager](#) is a service, available as a cloud-based service or as an installable instance, that centrally manages PCoIP deployments. It enables highly scalable and cost-effective HP Anyware deployments by managing cloud compute costs and brokering PCoIP connections to remote Windows or Linux workstations.

Connection Manager

The **Connection Manager** is provided in a bundle with the **Security Gateway**, and allows self-managed brokering services. For information about the Connection Manager, including installation and configuration instructions, see the [Connection Manager and Security Gateway documentation](#).

Third-party Connection Brokers

Anyware agents also support third-party connection brokers. For a current list of brokering partners, see [Technology Partners](#) on the website.

Anyware Agent Deployment and Client Connectivity Requirements

Anyware clients can connect to your desktops hosted in proof-of-concept, cloud, or datacenter deployments. Requirements and network security levels will vary depending on your deployment type. See [Supported Anyware Architectures](#) for each deployment's components and requirements.

Connection troubleshooting

If you encounter issues while connecting, see the [Troubleshooting Connection Issues](#) for fixes to common issues.

Additional Information

Information about **Anyware client connectivity requirements and usage instructions**, is available in the following documentation:

- Software clients:
 - [Anyware Software Client for Windows](#)
 - [Anyware Software Client for macOS](#)
 - [Anyware Software Client for Linux](#)
- Mobile Clients:
 - [Anyware Mobile Client for iOS](#)

- [Anyware Mobile Client for Android](#)
- [Anyware Mobile Client for Chromebooks](#)
- Zero clients:
 - [Anyware Tera2 Anyware Zero Client](#)

User Account Considerations

User Account Considerations

The following types of accounts are supported for connecting to macOS agents:

- Local accounts
- Active Directory mobile accounts
- Active Directory network accounts

First time login of Active Directory accounts might become unresponsive if the Active Directory is **NOT configured** to either:

- Create a mobile account, or,
- Set up user accounts to have local home folders in the computer's or Users folder.

We recommend that you configure the Active Directory to create mobile accounts. Instructions for this can be found in the [macOS User Guide](#).

While connecting using a PCoIP session, the **Create Mobile Account Confirmation** dialog is not available by design. Users will not be prompted to confirm the creation of a mobile account, even if the **Require confirmation before creating a mobile account** option is selected.

!!! note "Note: Mobile Account Dialogs for Unlocking FileVault Do Not Appear"

Since PCoIP sessions are not compatible with FileVault, setup dialogs linking mobile accounts to administrator accounts for the purpose of unlocking FileVault will not appear.

User Account Restrictions

Create or use an existing user account for PCoIP connections. Make sure the account meets the following conditions:

- It is not the `root` user account. The `root` user is an administrative account with elevated permissions, and is disabled by default in macOS.
- It is not the `_pcoip` user.

- It is not any other standard macOS user.
- The user name does not contain spaces.

Handling Multiple Users

macOS agents permit only a single user to log on to a remote machine at a time. If a user is already connected to a remote machine, connection attempts by subsequent users will fail. The first user will be temporarily disconnected, but will be able to resume connection to the remote machine. Other users will only be able to connect to the remote machine after the first user logs out or reboots the machine.

If multiple users share a remote machine, they must log out or reboot the remote machine from within their PCoIP session each time after they are done. This will allow other users to connect to the remote machine using PCoIP sessions. If a user only disconnects their PCoIP session, then the remote machine will be locked until the user logs out or reboots the machine.

Note: Disable Fast User Switching

If users attempt to switch user accounts or switch quickly between user accounts (fast user switching) from within a PCoIP session, the remote agent might become unreachable. Therefore, we recommend disabling fast user switching in the menu bar and Control Center. For more information on disabling fast user switching, see [the macOS User Guide](#).

Display Experience During Login

Display Experience During Login

During remote login to a macOS agent machine, setup dialogs are displayed with which you can interact. If a user is not already logged in, establishing a PCoIP connection automatically logs the user in.

Note: First Time Login Behavior

When you connect to the macOS agent machine for the first time, a series of setup dialogs will be displayed. If you disconnect during this setup, the agent machine will restart, after which you can establish the PCoIP session.

Note: Workaround for Unresponsive Active Directory Account Login

If the first time login of Active Directory accounts becomes unresponsive, first reboot the machine and then ensure that your Active Directory is configured to create mobile accounts.

The following display behaviors are observed during login:

- The mouse only functions on the primary monitor.
- Physical monitors connected to remote machines might display some inconsistencies:
 - They cannot be seen in the PCoIP client.
 - Login dialogs might appear on the physical monitors instead of the remote machines. To avoid these inconsistent behaviors, we recommend that you disconnect physical monitors from remote machines during login.

The following functionalities will be available only after login:

- Clipboard
- Mouse scroll

 **Note: About the Create Mobile Account Confirmation Dialog**

While connecting using a PCoIP session, the **Create Mobile Account Confirmation** dialog becomes unavailable, and users are not prompted to confirm the creation of a mobile account, even if the **Require confirmation before creating a mobile account** option is selected. This is by design.

Security Guide

PCoIP requires a certificate to establish a session. The Graphics Agent for macOS generates a self-signed certificate that secures the PCoIP session. Each component in the Anyware system can generate these self-signed certificates, which will automatically work together without requiring any configuration.

The Graphics Agent for macOS does not support creating custom certificates.

Troubleshooting and Support

Support

Contacting Support

If you encounter any problems installing, configuring, or running the Graphics Agent for macOS, you can create a [support ticket](#).

Before creating a ticket, be prepared with the following:

- A detailed description of the problem
- Your agent version number ([how do I find my version number?](#))
- A prepared [support file](#)
- The local time when the problem occurred, in the HH:MM:SS format

The Community Forum

The PCoIP Community Forum enables users to have conversations with other IT professionals to learn how they resolved issues, find answers to common questions, have peer group discussions on various topics, and access the PCoIP Technical Support Service team. The HP staff are heavily involved in the forums.

To visit the community, go to <https://communities.teradici.com>.

Finding the Graphics Agent for macOS Version Number

To find the installed version number of the Graphics Agent for macOS, open a Terminal window and run the following command:

```
sudo grep "Software Build ID" /var/log/pcoip-agent/agent.log
```

The command output will contain your installed version.

Creating a Technical Support File

We may request a support file from your system in order to troubleshoot and diagnose issues. The support file is an archive containing Anyware Graphics Agent for macOS logs and other diagnostic data that can help support diagnose your problem.

Creating a Support Bundle

1. Ensure that you set the **log verbosity level to 3**. For more information, see "Setting Log Verbosity" in [Performing Diagnostics](#).
2. Delete the **logs** folder by running the following command:

```
sudo rm -rf /var/log/pcoip-agent
```

3. Reboot the agent.
4. Reproduce the issue.
5. Create a support bundle by running the following command:

```
sudo pcoip-support-bundler
```

Note: Time of Connection

Note the time you connect and the time of the issue in the HH:MM:SS format. Specify the timezone (local time or UTC time).

Troubleshooting

Performing Diagnostics

Each Anyware component creates and updates a log file which records its activity as the system is used. Most troubleshooting within an Anyware system begins by examining these log files and looking for error conditions or other indications that may explain why the system is not operating as expected.

Log files for the Graphics Agent for macOS and other Anyware components are saved to [specific directories](#).

Locating Agent Log Files

Log files for the Anyware agent are located in the following directories by default. If you changed your agent's location during installation, the log files will be in your custom location instead.

Component/Process	Log file location
Agent	/var/log/pcoip-agent/agent.log
User Agent	/var/log/pcoip-agent/user-agent.<userID>.log
Collaboration Manager	/var/log/pcoip-agent/collaboration-manager.<userID>.log
Authentication plugin	/var/log/pcoip-agent/auth-plugin.log
Audio Plugin	/var/log/pcoip-agent/audio-plugin.log
Server/User	/var/log/pcoip-agent/server.<userID>.log
Upgrade/Installation	/var/log/pcoip-agent/upgrade-uninstall.log

Note: Bundling log files for support

When investigating issues with HP support, you may need to provide a support file which includes system log files. Instructions are provided [here](#).

Setting Log Verbosity

Each Anyware component generates diagnostic log messages. The default log levels are recommended for use in a production deployment. When troubleshooting a particular problem, the HP Support Team may recommend adjusting the PCoIP event log verbosity level to obtain more information from certain parts of the system.

Note: Log Verbosity Level

If not specified, we recommend setting the **log verbosity level to 3** before generating a technical support file. Additionally, provide the HP Support team with the time when the issue was observed in the HH:MM:SS format. This will allow the support team to process your request faster.

To change the log verbosity:

To change the log verbosity level, set the `pcoip.event_filter_mode` directive in the `pcoip-agent.conf` file. See [Configuring the Anyware Agent](#) for instructions.

Note: This is a global setting

The `pcoip.event_filter_mode` directive is a global setting and affects the output levels of all Anyware components.

Session Log IDs

At the start of each PCoIP session, a unique session ID is generated by the Anyware Client and passed to all connected Anyware components (including the Graphics Agent for macOS). Log messages generated by the agent are prefixed with this session ID, making it easy to identify. All log messages generated during a single session, by any Anyware component, will be prefixed with the same session log ID in RFC-4122 format:

```
yyyy-mm-ddThh:mm:ss.ffffffZ xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx > ...
```

For example:

```
2015-11-06T08:01:18.688879Z 4208fb66-e22a-11d1-a7d7-00a0c982c00d > ...
```

Log messages that do not pertain to a specific session will show a string of zeroes in place of the session log ID number.

If a Anyware component does not receive a session log ID from the Anyware client, or receives an invalid value, it will generate a new session log ID and distribute it to the other components in the system.

Troubleshooting License Issues

HP includes a license validation utility that scans your local system and any connected physical or cloud-based license servers for active licenses, and informs you of when your license subscription expires. For more information, see [FAQ - Licensing HP Anyware](#) in our Knowledge Base.

To run the license validation tool, type:

```
pcoip-validate-license
```

For more detailed information on `pcoip-validate-license`, type:

```
man pcoip-validate-license
```

To list your licenses and their expiration status, type:

```
pcoip-list-licenses
```

For more detailed instructions on `pcoip-list-licenses`, type:

```
man pcoip-list-licenses
```

Tracking Usage Over Time

Local License Server users can use our open-source script, which displays the maximum HP Anyware license concurrent usage for a license server over time. For more information, refer to our [Github page](#).

Cloud Licensing users can write a short script that runs `pcoip-list-licenses` periodically (for example, every 60 minutes) on any Anyware agent machine to track license usage.

Troubleshooting Connection Issues

If you are unable to connect to your remote machine using a PCoIP session, investigate the following possible causes.

Except where noted, the following checks apply to the remote macOS machine, and to the remote user account that will be accepting PCoIP connections.

ENSURE THAT ONLY ONE USER IS LOGGED IN AT A TIME

PCoIP connections will be denied if another user is already logged into the remote machine (for example, via the remote machine's user interface). This is true whether the logged-in user is using PCoIP or not. To ensure that a remote user can log in, make sure all other users are logged out.

CHOOSE THE APPROPRIATE REMOTE USER

While connecting to macOS agents, make sure that you are NOT connecting using one of these user accounts:

- `root` user
- `_pcoip` user
- any other standard macOS user

If your remote username contains spaces, the Anyware agent will not be able to connect to it. You can either change the name to eliminate the space or create a new account that does not contain spaces.

CHECK IF PERMISSIONS ARE DENIED

If you have not authorized Anyware Agent Helper to access Mac, connections to the agent will fail. To confirm if the connectivity failure is a result of denied permissions, run the following command from the terminal:

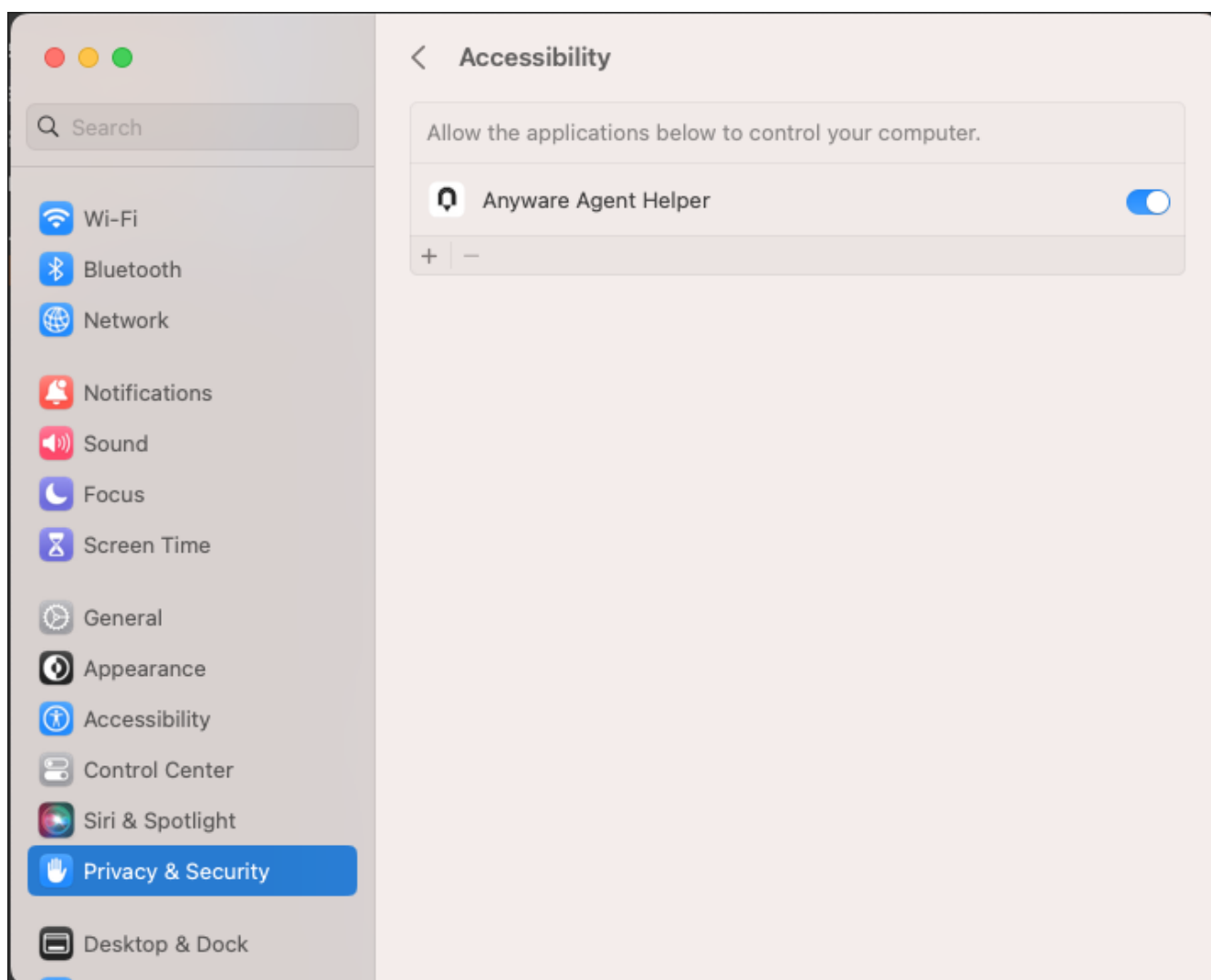
```
sudo cat /var/log/pcoip-agent/user-agent.*.log | grep -i "permission"
```

If you see missing permissions messages, refer to the sections below for troubleshooting instructions.

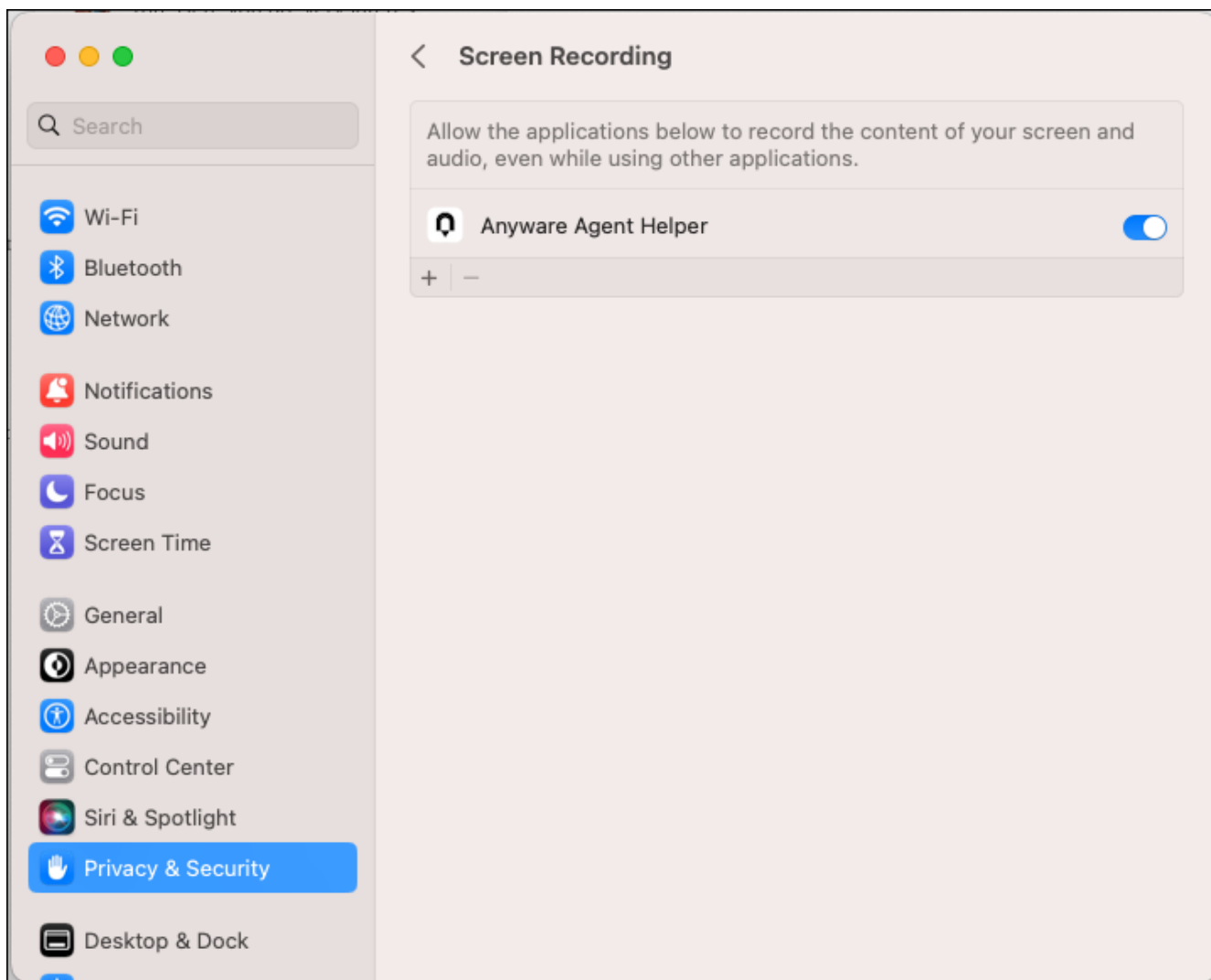
CONFIRM THAT THE PRIVACY PERMISSIONS ARE TURNED ON

On the remote machine, log in using the account that will host PCoIP connections and check that the following permissions are granted on the remote machine:

1. Open **System Settings > Privacy & Security**, and select **Accessibility** from the list of options.
2. Under *Allow the apps below to control your computer*, confirm that **Accessibility** is turned on for **Anywhere Agent Helper**.
3. If **Accessibility** is not turned on for **Anywhere Agent Helper**, turn it on. This is how the **Accessibility** screen will look:



4. Open **System Settings > Privacy & Security**, and select **Screen Recording** from the list of options.
5. Under *Allow the apps below to control your computer*, confirm that **Screen Recording** is turned on for **Anywhere Agent Helper**.
6. If **Screen Recording** is not turned on for **Anywhere Agent Helper**, turn it on. This is how the **Screen Recording** screen will look:



CONFIRM THAT A RESTART WAS PERFORMED

The remote machine must be restarted after the Anyware agent is installed. Until it is restarted, PCoIP connections will fail.

RESET PERMISSIONS TO ANYWARE AGENT

If the troubleshooting steps described above do not resolve the connectivity issue, reset the permissions given to Anyware Agent.

1. Disconnect from the PCoIP session.

2. Run the following commands from the terminal:

```
sudo tccutil reset ScreenCapture com.teradici.pcoip-agent;
```

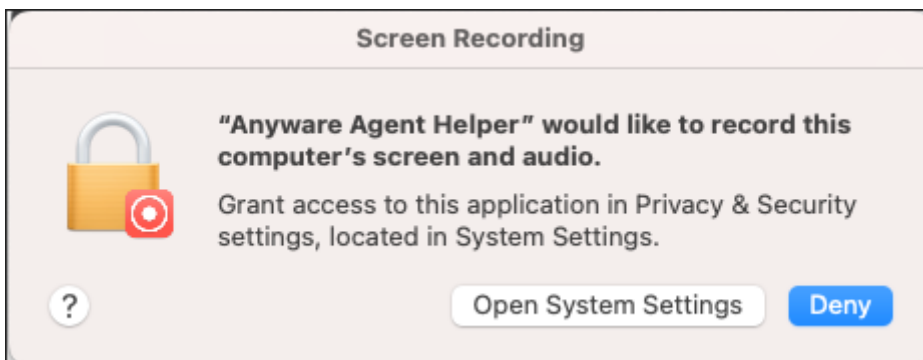
```
sudo tccutil reset Accessibility com.teradici.pcoip-agent;
```

```
sudo tccutil reset ScreenCapture com.teradici.pcoip-user-agent;
```

```
sudo tccutil reset Accessibility com.teradici.pcoip-user-agent;
```

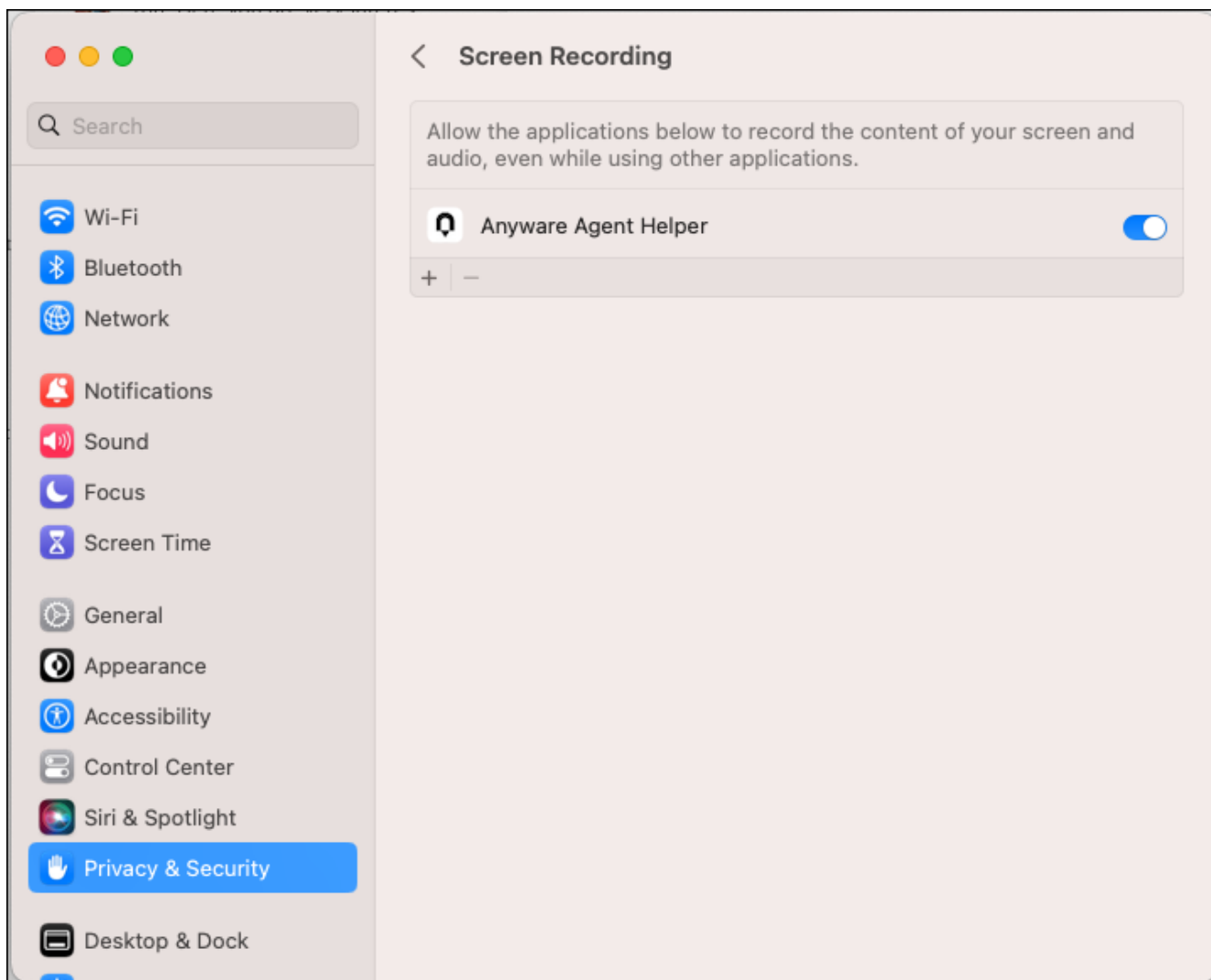
3. Reboot the system.

4. From the Finder, go to **Applications > Anyware Agent.app**. A prompt appears requesting the **Screen Recording** permission.

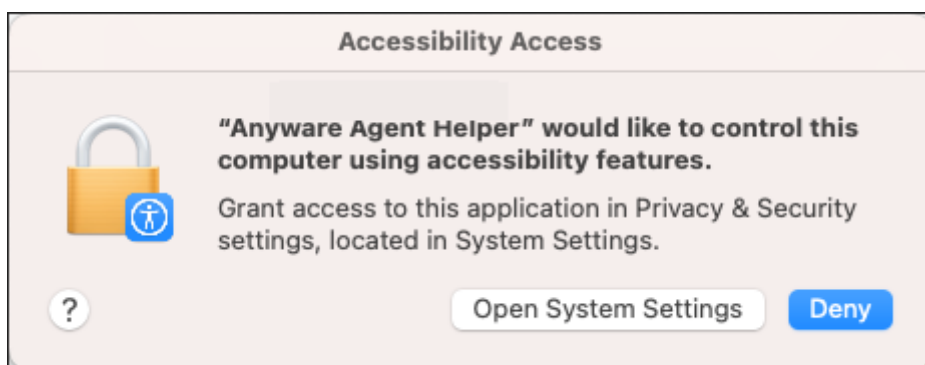


5. Click **Open System Settings**.

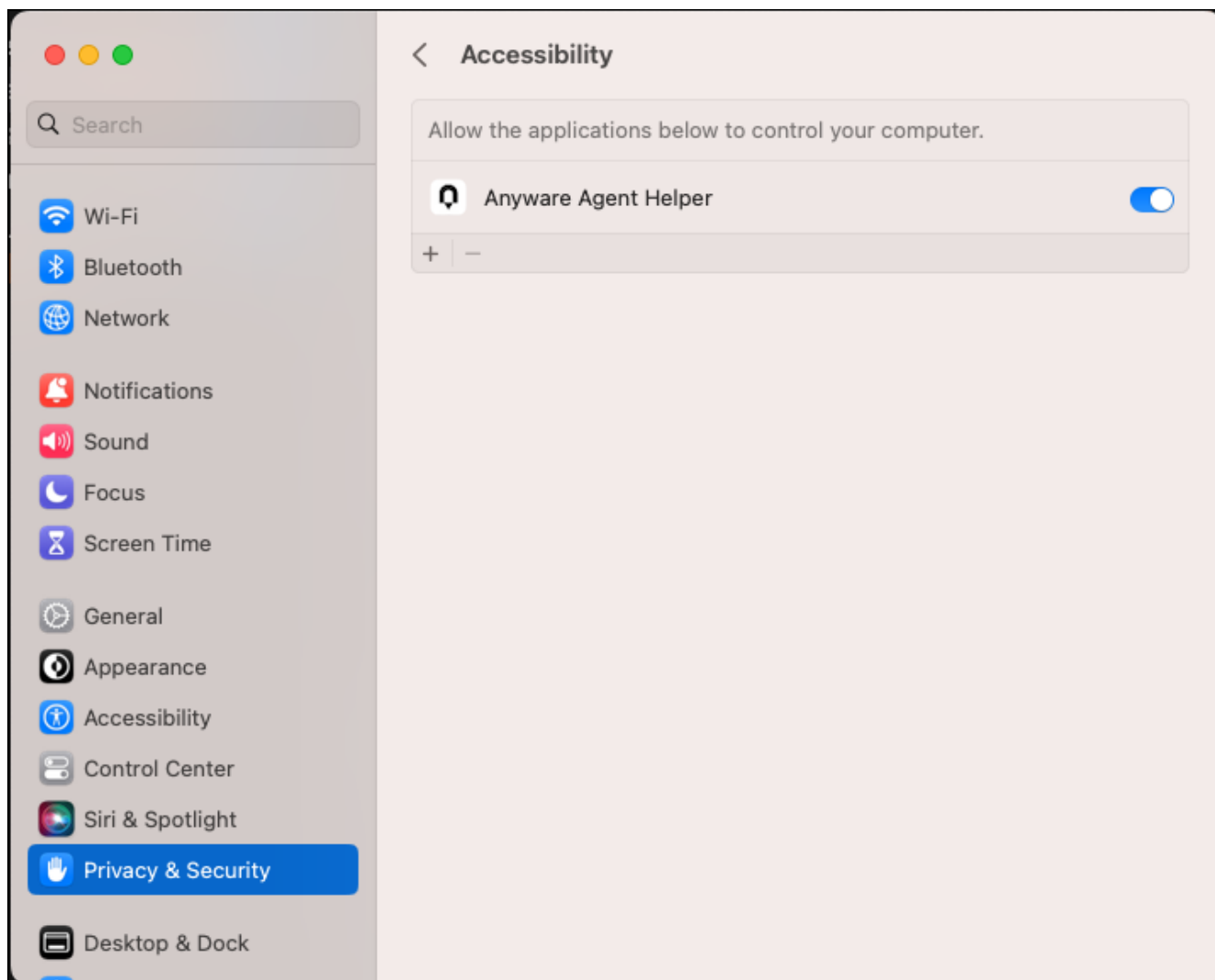
6. Go to **Privacy & Security**, and turn on **Screen Recording** for **Anyware Agent Helper**.



7. From the Finder, go to **Applications > Anyware Agent.app**. A prompt appears requesting the **Accessibility Access** permission.



8. Click **Open System Settings**.
9. Go to **Privacy & Security**, and turn on **Accessibility** for **Anyware Agent Helper**.



10. From the Finder, go to **Applications > Anyware Agent.app** to ensure that no permission prompt appears.

11. Reboot the system.

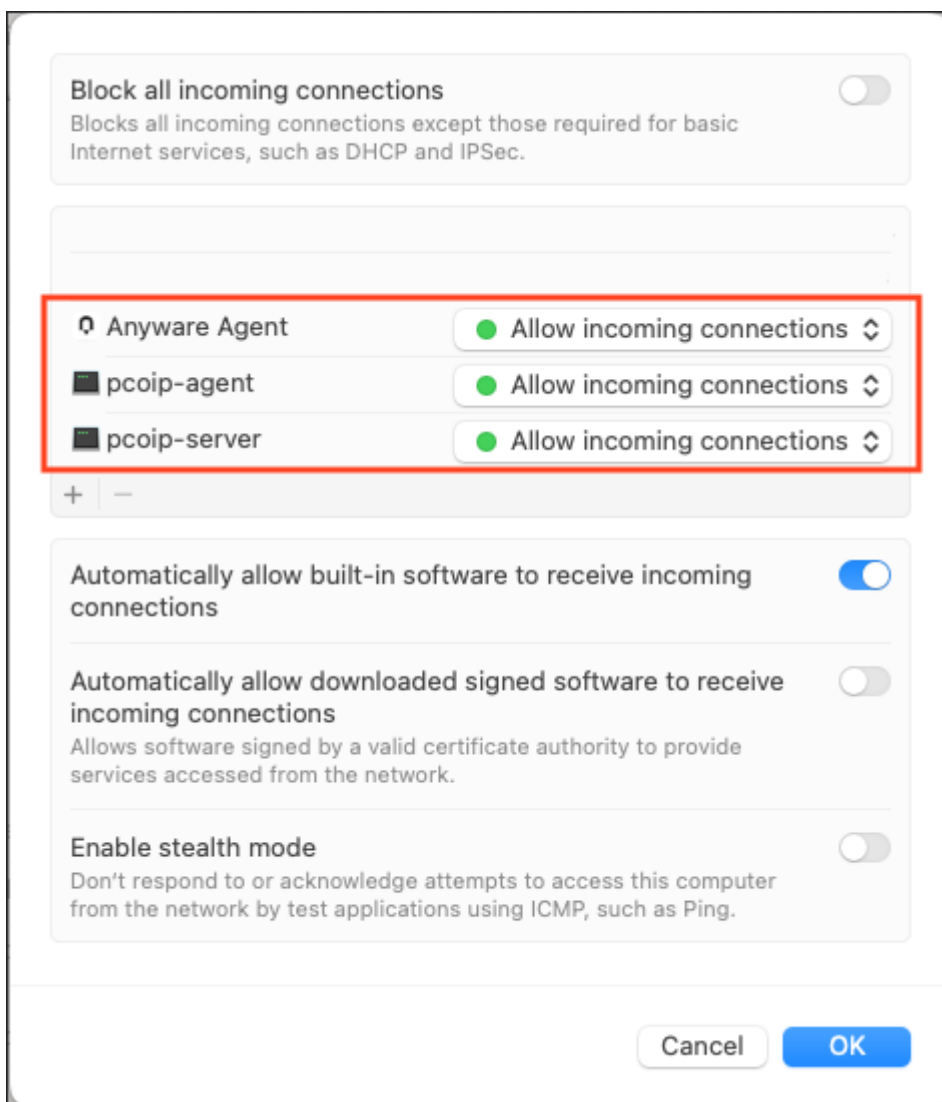
You should be able to connect to your remote machine using a PCoIP session.

CONFIRM FIREWALL SETTINGS

During installation, the macOS agent installer updates the firewall settings on the macOS machine, which enables the remote and client machines to reach one another. If you encounter connectivity issues, ensure that one of these firewall conditions is met:

- The firewall is *off*, or

- The firewall is *on*, and:
 - **Automatically allow downloaded signed software to receive incoming connections** is checked, *or*
 - On the remote machine, **Automatically allow downloaded signed software to receive incoming connections** is *not* checked, *and* the following executables are allowed through the firewall:
 - /Applications/Anyware Agent.app
 - /Applications/Anyware Agent.app/Contents/MacOS/pcoip-agent
 - /Applications/Anyware Agent.app/Contents/MacOS/pcoip-server

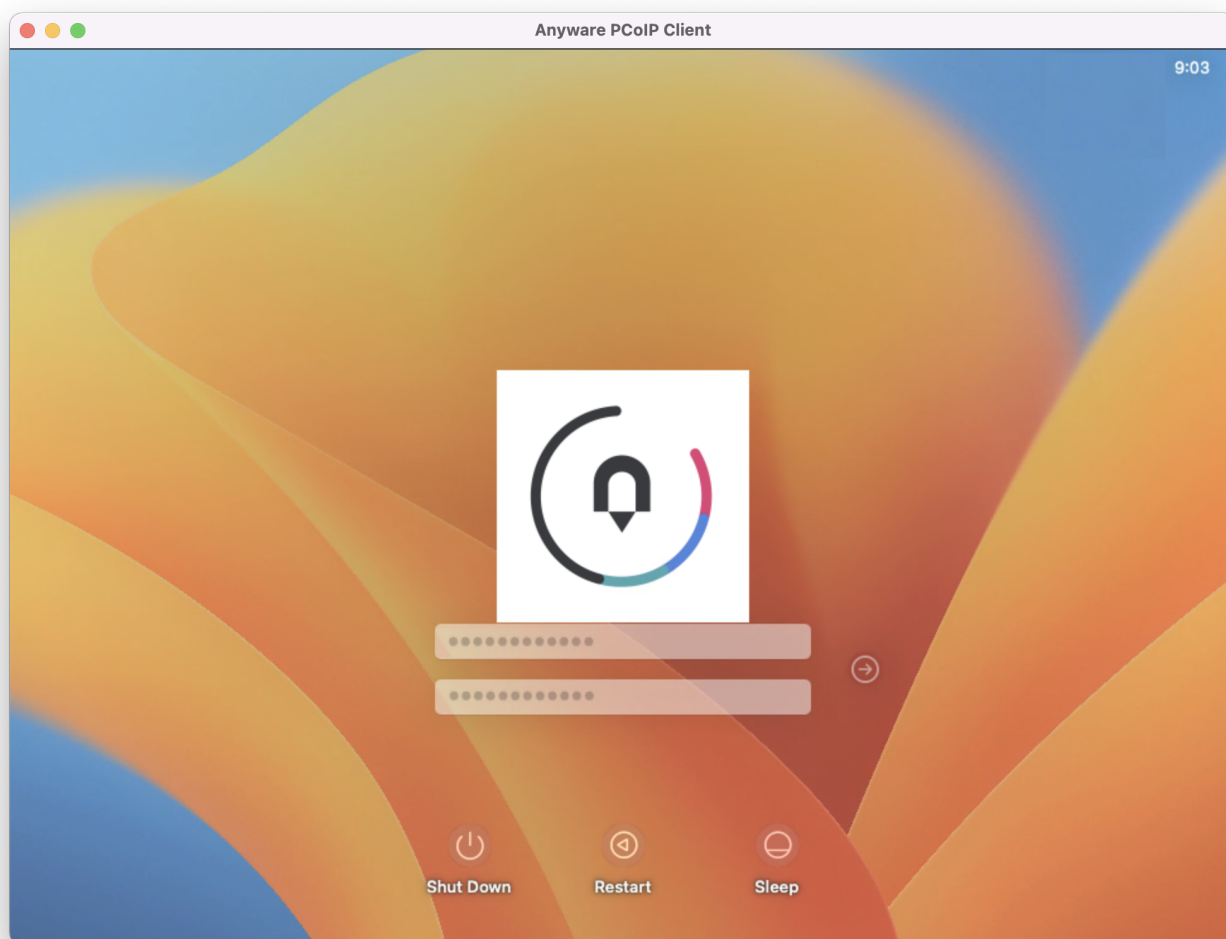


Note: Allowing the Executables Through the Firewall

If the firewall is on and **Automatically allow downloaded signed software to receive incoming connections** is NOT enabled, [during installation](#), when prompted, allow the incoming network connections.

ALLOW MACOS DIALOGS DURING LOGIN

During remote login to a macOS agent machine, setup dialogs are displayed with which you can interact. If the PCoIP login progress indicator is enabled, it might obfuscate the dialogs.



To ensure that the experience of interacting with these dialogs while connecting is identical to the experience when using a physical machine, disable the PCoIP progress indicator:

1. Set `pcoip.enable_login_animation` to 0.

2. Reboot the machine.

CHECK FOR CONNECTED DISPLAYS OR DISPLAY DONGLES

In some situations, connected displays or display dongles on the remote machine can prevent a PCoIP connection. This occurs because the real or simulated physical display interferes with the Anyware agent's ability to create virtual displays for remoting.

Disconnecting removable displays and any display dongles from the remote machine may resolve this problem and allow a remote connection to be established.

RESTART THE ANYWARE CLIENT

Quitting and re-launching the Anyware client application may resolve connection issues.

RESTART THE REMOTE MACHINE

Rebooting the remote macOS system may resolve connection issues.

REINSTALL THE ANYWARE AGENT

In some situations, including after macOS updates, you may need to [re-install the Graphics Agent for macOS](#) to resolve connection issues.