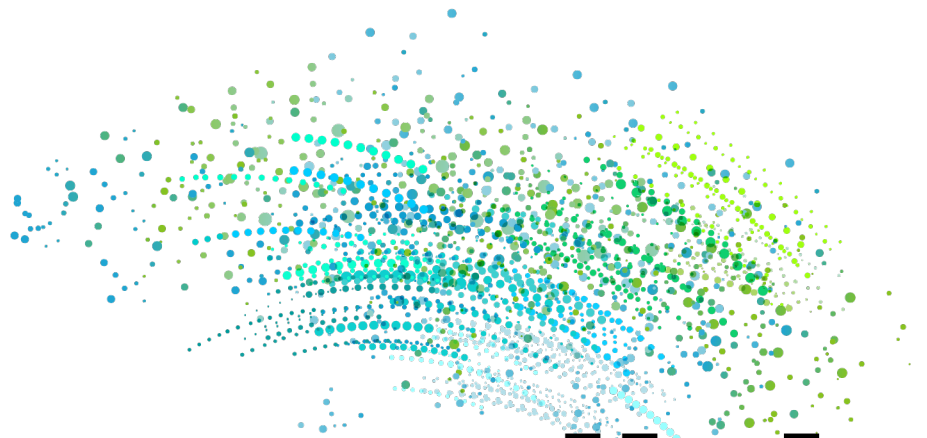


Teradici PCoIP® Graphics Agent for Linux

Version 2.11

Administrators' Guide



teradici®

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Who Should Read This Guide?

This guide is intended for administrators who are deploying the PColP Graphics Agent for Linux as part of the Teradici Cloud Access Software. It assumes thorough knowledge of Linux conventions and networking concepts, including firewall configuration.



Note: Understanding terms and conventions in Teradici guides

For information on the industry specific terms, abbreviations, text conventions, and graphic symbols used in this guide, see [Using Teradici Product and Component Guides](#) and the [Teradici Glossary](#).

About the PCoIP Graphics Agent

The PCoIP Graphics Agent for Linux is part of the Teradici Cloud Access Software. It enables Teradici customers to deliver GPU-powered virtual workstations to end users via remote clients.

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

A deployed PCoIP Graphics Agent requires these components:

- **A host machine** which provides the desktop to remote clients. The host must be a virtual machine in a data center or in the cloud. See [System Requirements on page 7](#) for more information.
- **The PCoIP Graphics Agent software** installed on the host machine.
- **A GPU.** The PCoIP Graphics Agent requires an NVIDIA GRID card. The GPU can be dedicated to the workstation, or shared among virtual workstations by a hypervisor. See [System Requirements on page 7](#) for more information.

What's New in This Release?

Release 2.11 of the PCoIP Graphics Agent for Linux includes the following new features:

Mobile client support

Mobile Clients can now connect to the PCoIP Graphics Agent for Linux.

Automatic time zone sync

The PCoIP Graphics Agent will now automatically retrieve the PCoIP client computer's time zone on connection and set the VM's time zone to match.

PCoIP statistics can be included in PCoIP server logs

The PCoIP Graphics Agent can now include PCoIP statistics in the PCoIP server log. To enable, set the following in `pcoip-agent.conf`:

```
pcoip.enable_perf_mon = 1
pcoip.server_statistics_interval_seconds = 5
```

Shut down idle machines via Cloud Access Manager

When used in combination with Teradici Cloud Access Manager, this release introduces a facility to automatically shut down the agent machine when idle, enabling cost savings on cloud infrastructures.

Improved settings documentation

This release now clearly documents which PCoIP settings take effect immediately and which settings require a PCoIP disconnect and reconnect.



Info: Known and resolved issues

For the latest known and resolved issues for this release, see:

- [PCoIP Graphics Agent 2.11 for Linux Release Notes](#)

Where to Find Information About Other Components

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

- Teradici All Access: [Teradici Cloud Access Architecture Guide](#)

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

- [Teradici PCoIP[®] Software Client 3.4 for Windows Administrators' Guide](#)
- [Teradici PCoIP[®] Software Client 3.4 for Mac Administrators' Guide](#)
- [Tera2 PCoIP Zero Client Firmware 6.0 Administrators' Guide](#)

This guide discusses only the PCoIP Graphics Agent for Linux.

System Requirements

This section lists system requirements for the PColP Graphics Agent for Linux.

Linux System Requirements

	Data Center Environments	Cloud Environments	
	VMware ESXi (6.0+)	AWS EC2	Microsoft Azure
System Requirements			
Instance Types	VMware Hardware Version 11	<ul style="list-style-type: none"> • G2 • G3 	<ul style="list-style-type: none"> • NV6 • NV12 • NV24
Operating Systems	<ul style="list-style-type: none"> • Ubuntu 16.04 LTS • RHEL 7.3 or later • CentOS 7.3 or later 		
Remote Host Memory	At least 2 GB of RAM is required on the host desktop. The PColP Graphics Agent should have at least 512 MB of available memory.		
Remote Host GPU Memory	At least 1 GB per 4K UHD display.		
Remote Host CPUs	At least 2 CPUs are required on the host desktop. Processors must support Streaming SIMD Extensions (SSE) 4.2.		
Network Ports	The following ports must be open on the host desktop: <ul style="list-style-type: none"> • TCP 443 • TCP 4172 • UDP 4172 • TCP 60443 		
Storage	At least 100 MB for installation and 100 MB for logging are recommended.		

	Data Center Environments	Cloud Environments	
	VMware ESXi (6.0+)	AWS EC2	Microsoft Azure
Supported GPUs			
GPU-accelerated PColP performance	All NVIDIA GPUs that support NVIDIA Capture SDK. Refer to the NVIDIA Capture SDK Release Notes for the current list.	NVIDIA GPUs: <ul style="list-style-type: none"> • K520 • M60 	NVIDIA M60
Supported GRID driver versions	GRID 5.2 (384.111)	GRID 4.3 (367.106). Driver and instructions provided by Amazon .	GRID 5.0 (384.73). Driver and instructions provided by Microsoft .

Installing the PColP Graphics Agent for Linux

This section contains instructions for installing and uninstalling the PColP Graphics Agent for Linux.

Installing on Ubuntu

Before proceeding with PColP Graphics Agent installation, install:

- Ubuntu 16.04 (any *buntu distribution will work)
- KDE desktop environment

**Note: KDE is bundled with Kubuntu distributions**

KDE is bundled with Kubuntu distributions, so Kubuntu users do not need to install it separately. To install KDE from a non-Kubuntu distribution, use the following command:

```
sudo apt install kubuntu-desktop
```

**Note: Supported desktop environments**

The PColP Graphics Agent for Linux has been tested and is supported with the KDE desktop environment. Other desktop environments, such as Gnome or XFCE, may be used but have not been tested and are not officially supported.

Before You Begin

Before starting, ensure the following requirements are met:

- SSH is enabled.
- You must have a license registration code from Teradici.
- You must have super user (root) privileges.
- The following ports must be available on the host desktop: TCP 443, TCP 60443, TCP 4172, and UDP 4172.

**Important: Protect your license registration code**

The license registration code you receive from Teradici is unique to your organization, and should be protected as you would any sensitive data.

Be careful that you do not inadvertently expose your registration code in forums or other public areas by pasting log messages without redacting sensitive information.

Installing NVIDIA GRID Drivers on Ubuntu

Before installing the PColP Graphics Agent, you must install the correct NVIDIA drivers for your system. For current version information, see [Linux System Requirements on page 7](#).

**Important: Installation reference and links subject to change**

The following reference and links are provided as a convenience for Teradici customers; your hypervisor or NVIDIA may change the reference links here without notice. Refer to your hypervisor and/or NVIDIA's documentation for updated information.

Installing NVIDIA GRID Drivers for AWS EC2 Instances

If you are installing NVIDIA driver for G2 instances, download the appropriate driver from <http://www.nvidia.com/Download/Find.aspx>.

If you are installing NVIDIA driver for G3 instances, you can download the NVIDIA driver from Amazon S3 using the AWS CLI or SDKs.

To install the driver, follow the instructions on Amazon Web Services Documentation:

- [Linux Accelerated Computing Instances](#)

Installing NVIDIA GRID Drivers for Azure NV-Series Instances

To install NVIDIA driver for Azure NV-Series, follow the instructions on Microsoft Azure online documentation:

- Ubuntu: [Install NVIDIA GPU drivers on N-series VMs running Linux](#)
- RHEL 7.3: [Install NVIDIA GPU drivers on N-series VMs running Linux](#)
- RHEL 7.4: go to [Linux Integration Services v4.2 for Hyper-V and Azure](#), download `lis-rpms-4.2.3-4.tar.gz`, and follow the installation instructions.

Installing NVIDIA GRID Drivers for Other Instances

To install NVIDIA driver for all other instances, including non-cloud instances:

1. Install tools required to install the NVIDIA drivers:

```
sudo apt install build-essential
```

2. Disable the Nouveau video driver (two commands):

```
echo 'blacklist nouveau' | sudo tee -a
/etc/modprobe.d/blacklist.conf
```

```
sudo reboot
```

3. Install the NVIDIA driver:

```
sudo ./NVIDIA-Linux-x86_64-xxx.xx-grid.run
```

Where **xxx.xx** is the NVIDIA driver version shown in [Linux System Requirements on page 7](#).

4. Respond to the installer prompts as follows:

- Accept the EULA
- Say **no** to installing 32-bit binaries
- Say **no** to modifying the x.org file

5. Verify the NVIDIA installation:

```
nvidia-smi
```

If the installation was successful, you will see your video card in the response.

Installing the PColP Graphics Agent on Ubuntu

To install the PColP Graphics Agent software:

1. Install the Teradici package key (one command):

```
sudo apt-key adv --keyserver pool.sks-keyservers.net --recv-key
67D7ADA8
```

2. Add the Teradici repository (one command):

```
sudo wget -O /etc/apt/sources.list.d/pcoip.list
https://downloads.teradici.com/ubuntu/pcoip.repo
```

3. Install the PCoIP Graphics Agent:

```
sudo apt update
sudo apt install pcoip-agent-graphics
```

4. Note your machine's local IP address. Clients connecting directly to the host desktop will need this number to connect.
5. Enter the license registration code you received from Teradici.



Note: These instructions are for Cloud Licensing

These instructions assume you are using Teradici Cloud Licensing to activate your PCoIP session licenses. If you are using the Teradici License Server instead, see the detailed instructions in the [Teradici PCoIP® Graphics Agent 2.11 for Linux Administrators' Guide](#).

- For unproxied internet connections, type:

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

- For proxied internet connections, type (one command):

```
pcoip-register-host --registration-code=<XXXXXXX@YYY-YYYY-YYY>
--proxy-server=<serverURL> --proxy-port=<port>
```

6. Reboot the Linux instance.



Note: No local graphical user interface

Once installed and running, the PCoIP Graphics Agent takes over the graphics subsystem which is then unavailable to hypervisors. You can only view the graphical user interface when connecting with a PCoIP client.

For example, you cannot view an ESXi virtual machine console through VSphere; you must connect to the machine using PCoIP.

Installing on RHEL or CentOS

Before proceeding with PCoIP Graphics Agent installation, install:

- RHEL/CentOS 7.2 or later
- KDE desktop environment



Note: Supported desktop environments

The PColP Graphics Agent for Linux has been tested and is supported with the KDE desktop environment. Other desktop environments, such as Gnome or XFCE, may be used but have not been tested and are not officially supported.



Note: Installing a desktop environment in RHEL

To install a desktop environment on a RHEL system, use the following command as a super user:

```
sudo yum groupinstall 'Server with GUI'
```

Before You Begin

Before starting, ensure the following requirements are met:

- SSH is enabled.
- You must have a license registration code from Teradici.
- You must have super user (root) privileges.
- The following ports must be available on the host desktop: TCP 443, TCP 60443, TCP 4172, and UDP 4172.



Important: Protect your license registration code

The license registration code you receive from Teradici is unique to your organization, and should be protected as you would any sensitive data.

Be careful that you do not inadvertently expose your registration code in forums or other public areas by pasting log messages without redacting sensitive information.

Installing NVIDIA GRID Drivers on RHEL/CentOS

Before installing the PColP Graphics Agent, you must install the correct NVIDIA drivers for your system. For current version information, see [Linux System Requirements on page 7](#).



Important: Installation reference and links subject to change

The following reference and links are provided as a convenience for Teradici customers; your hypervisor or NVIDIA may change the reference links here without notice. Refer to your hypervisor and/or NVIDIA's documentation for updated information.

Installing NVIDIA GRID Drivers for AWS EC2 Instances

If you are installing NVIDIA driver for G2 instances, download the appropriate driver from <http://www.nvidia.com/Download/Find.aspx>.

If you are installing NVIDIA driver for G3 instances, you can download the NVIDIA driver from Amazon S3 using the AWS CLI or SDKs.

To install the driver, follow the instructions on Amazon Web Services Documentation:

- [Linux Accelerated Computing Instances](#)

Installing NVIDIA GRID Drivers for Azure NV-Series Instances

To install NVIDIA driver for Azure NV-Series, follow the instructions on Microsoft Azure online documentation:

- Ubuntu: [Install NVIDIA GPU drivers on N-series VMs running Linux](#)
- RHEL 7.3: [Install NVIDIA GPU drivers on N-series VMs running Linux](#)
- RHEL 7.4: go to [Linux Integration Services v4.2 for Hyper-V and Azure](#), download `lis-rpms-4.2.3-4.tar.gz`, and follow the installation instructions.

Installing NVIDIA GRID Drivers for Other Instances

To install NVIDIA driver for all other instances, including non-cloud instances:

1. Install tools required to install the NVIDIA drivers:

```
sudo yum group install "Development Tools"
```

2. Disable the Nouveau video driver (two commands):

```
echo 'blacklist nouveau' | sudo tee -a  
/etc/modprobe.d/blacklist.conf
```

```
sudo reboot
```

3. Install the NVIDIA driver:

```
sudo ./NVIDIA-Linux-x86_64-xxx.xx-grid.run
```

Where `xxx.xx` is the NVIDIA driver version shown in [Linux System Requirements on page 7](#).

**Important: Azure installations require Hyper-V daemon installation**

If running on Azure, you also need to install the Azure Hyper-V daemon:

```
sudo yum install hyperv-daemons
```

4. Respond to the installer prompts as follows:

- Accept the EULA
- Say no to installing 32-bit binaries
- Say no to modifying the x.org file

5. Verify the NVIDIA installation:

```
nvidia-smi
```

If the installation was successful, you will see your video card in the response.

Installing the PCoIP Graphics Agent on RHEL or CentOS

To install the PCoIP Graphics Agent software on RHEL/CentOS:

1. Install the Teradici package key (one command):

```
sudo rpm --import  
https://downloads.teradici.com/rhel/teradici.pub.gpg
```

2. Install wget:

```
sudo yum install wget
```

3. Add the Teradici repository (one command):

```
sudo wget -O /etc/yum.repos.d/pcoip.repo  
https://downloads.teradici.com/rhel/pcoip.repo
```

4. Install the EPEL repository:

```
sudo wget https://dl.fedoraproject.org/pub/epel/epel-release-  
latest-7.noarch.rpm  
sudo rpm -i epel-release-latest-7.noarch.rpm
```

5. Install the PCoIP Graphics Agent:

```
sudo yum update
sudo yum install pcoip-agent-graphics
```

- 6. Note your machine's local IP address. Clients connecting directly to the host desktop will need this number to connect.
- 7. Enter the license registration code you received from Teradici.



Note: These instructions are for Cloud Licensing

These instructions assume you are using Teradici Cloud Licensing to activate your PCoIP session licenses. If you are using the Teradici License Server instead, see the detailed instructions in the [Teradici PCoIP® Graphics Agent 2.11 for Linux Administrators' Guide](#).

- For unproxied internet connections, type:

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

- For proxied internet connections, type (one command):

```
pcoip-register-host --registration-code=<XXXXXXX@YYY-YYYY-YYY>
--proxy-server=<serverURL> --proxy-port=<port>
```

8. Reboot the Linux instance.



Note: No local graphical user interface

Once installed and running, the PCoIP Graphics Agent takes over the graphics subsystem which is then unavailable to hypervisors. You can only view the graphical user interface when connecting with a PCoIP client.

For example, you cannot view an ESXi virtual machine console through VSphere; you must connect to the machine using PCoIP.

Updating the PCoIP Graphics Agent

Updates to the PCoIP Graphics Agent will be published on a regular basis. New stable builds will be produced approximately every three months.

Updating on Ubuntu

To upgrade to the latest version, use the following commands:


```
sudo apt update
sudo apt dist-upgrade
```

Updating on RHEL or CentOS

To upgrade to the latest version, use the following commands:

```
sudo yum makecache
sudo yum update
```

Uninstalling the PColP Graphics Agent

To uninstall the PColP Graphics Agent software, use the package manager uninstaller for your Linux distribution.

Uninstalling the PColP Graphics Agent on Ubuntu

Uninstall the PColP Graphics Agent using `apt remove`.

```
sudo apt remove pcoip-agent-graphics
```

Uninstalling the PColP Graphics Agent on RHEL or CentOS

Uninstall the PColP Graphics Agent using `yum remove`.

```
sudo yum remove pcoip-agent-graphics
```

Licensing Your PColP Graphics Agent for Linux

The PColP Graphics Agent must be assigned a valid PColP session license before it will accept a new PColP session. The agent can be licensed via Teradici's Cloud Licensing service, or by your own PColP license server.

Licensing PColP Agents with Cloud Licensing

Cloud licensing requires no configuration beyond providing a registration code for each PColP agent. The required registration code is provided by Teradici when PColP licenses are purchased. One registration code can be used to activate multiple PColP agents.



Note: Registration code format

Registration codes look like this: *YUOIFUSD32@AB33-H372-D78E-78XX*

To provide the registration code:

Invoke `pcoip-register-host` with the license registration code and proxy settings if required:

```
pcoip-register-host --registration-code=<registration-code> [--  
proxy-server=<proxy-server-address>] [--proxy-port=<proxy-port-number>]
```

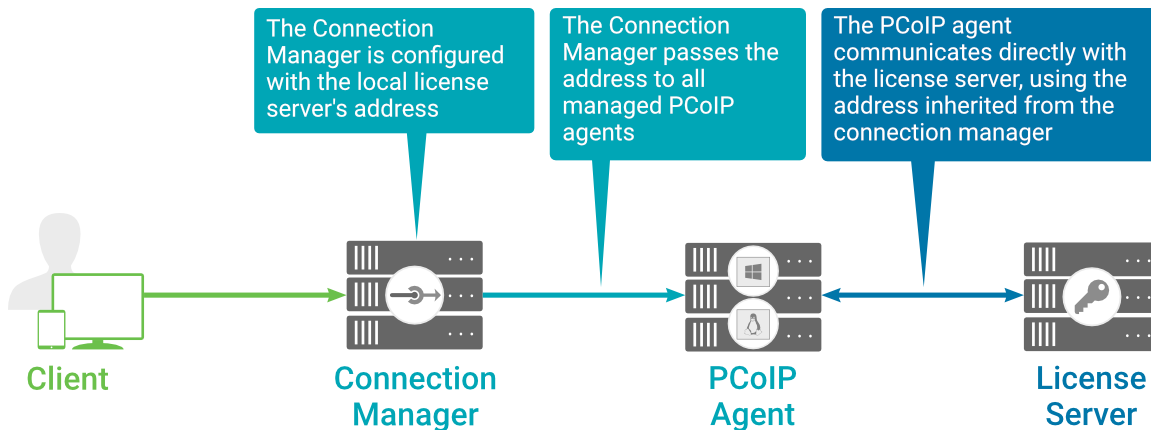
Licensing PColP Agents With a Local License Server

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

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

Licensing PCoIP Agents With a Local License Server in a Brokered Environment

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



When using a Connection Manager, the license server address is only configured once no matter how many PCoIP 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:
 - For License Server 1.x:


```
<port-number>@<ip-address-or-hostname>
```
 - For License Server 2.x:


```
http://<license-server-address>:<port>/request
```
3. Save and close the configuration file.
4. Restart the Connection Manager.

Verifying Your Licensing Configuration

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

```
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 for the license server version:

- For License Server 1.x:

```
<port-number>@<ip-address-or-hostname>
```

- For License Server 2.x:

```
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.

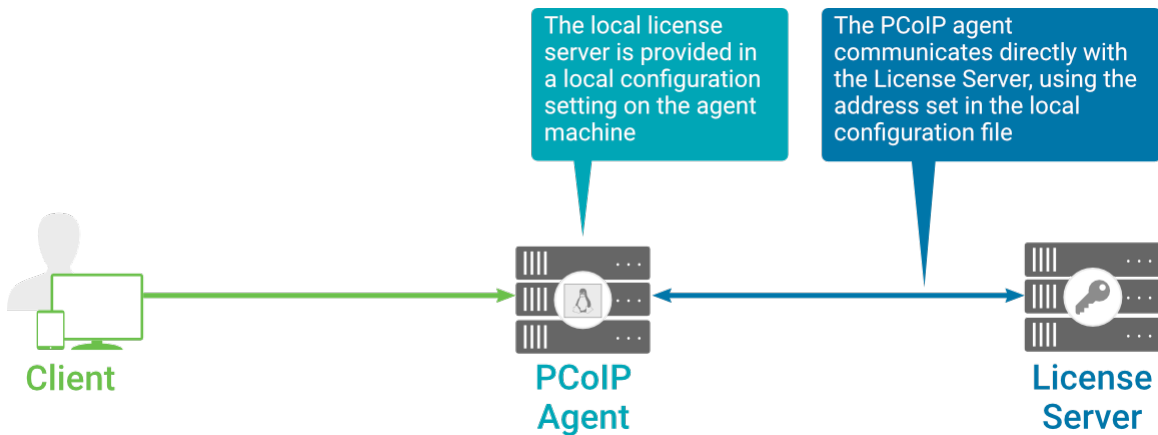
If successful, the response will show that a valid license was found on the license server, and its expiration date.

If the connection is unsuccessful, investigate the following possibilities:

- The license server address is incorrect, or in the wrong format (License server 1.x and 2.x use different address formats).
- The license server is inaccessible.
- There are no available licenses on the license server. This command 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 you are attempting this command from a PColP session, the command will fail because there are no free licenses available. In this scenario, disconnect your PColP session and try again from an ssh session instead.

Licensing Agents with a Local License Server in an Unbrokered Environment

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



Local license validation using a PCoIP Linux agent and a direct (unbrokered) connection

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

To configure the License Server URL on the PCoIP Graphics Agent:

1. Using a text editor, open `/etc/pcoip-agent/pcoip-agent.conf`.
2. Add or modify the `pcoip.license-server-path` directive:

```
pcoip.license-server-path = <license-server-address>
```

Where `<license-server-address>` is the address of the license server, formatted for the license server version:

- For License Server 1.x:

```
<port-number>@<ip-address-or-hostname>
```

- For License Server 2.x:

```
http://<license-server-address>:<port>/request
```

3. If the license server is behind a proxy server, provide the proxy information using the `pcoip.license_proxy_server` and `pcoip.license_proxy_port` directives.
4. Save and close `pcoip-agent.conf`.

The changes will take effect on the next PCoIP session.

Verifying Your Licensing Configuration

To verify your system's licensing configuration, run `pcoip-validate-license` from the console, including proxy parameters if required. The script will ping the license server using the local `pcoip-agent.conf` settings and attempt to retrieve information on an available license:

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

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 in the wrong format (License server 1.x and 2.x use different address formats).
- The license server is inaccessible.
- There are no available licenses on the license server. This command 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 you are attempting this command from a PCoIP session, the command will fail because there are no free licenses available. In this scenario, disconnect your PCoIP session and try again from an ssh session instead.

Configuring the PColP Graphics Agent

Configuration settings are stored in the `pcoip-agent.conf` file, located in the `/etc/pcoip-agent/` directory.

For detailed information and descriptions of each setting, consult the MAN page for `pcoip-agent.conf`:

```
man pcoip-agent.conf
```

PCoIP Graphics Agent Deployment and Client Connectivity Requirements

Your PCoIP Graphics Agent can connect to your chosen client via proof-of-concept, cloud, or datacenter deployments. Requirements and network security levels will vary depending on your deployment type. See [Supported PCoIP Architectures](#) for each deployment's components and requirements.

Centralized Connection Management

Large PCoIP systems can use Connection Managers and brokers to centrally manage connections. Connection brokers are third-party services that authenticate users and connect them to their configured PCoIP hosts.



Related: Connection managers and third-party brokers

For information about Connection Managers, including installation and configuration instructions, see the [Teradici PCoIP® Connection Manager and PCoIP® Security Gateway Administrators' Guide](#).

For a list of compatible third-party brokers, see [Teradici Technology Partners](#).

Connecting with PCoIP Clients

PCoIP clients are software- or firmware-based endpoints used to make secure PCoIP connections to the PCoIP Graphics Agent. For more information about PCoIP client connectivity requirements and complete usage instructions, see the following guides:

- **Software clients:**
 - [Teradici PCoIP® Software Client 3.4 for Windows Administrators' Guide](#)
 - [Teradici PCoIP® Software Client 3.4 for Mac Administrators' Guide](#)
- **Zero clients:** [Tera2 PCoIP Zero Client Firmware 6.0 Administrators' Guide](#)



Caution: Linux hosts do not support mobile clients

The PCoIP Graphics Agent for Linux does not support PCoIP mobile clients at this time.

PCoIP Graphics Agent For Linux Features

This section describes the features and configurable settings in the PCoIP Graphics Agent for Linux.

Supported Displays

The PCoIP Graphics Agent for Linux, in combination with a GPU, supports a maximum of four displays on the PCoIP client, and a maximum resolution of 4K UHD (3840×2160).



Important: Display acceleration requires a supported GPU

The PCoIP Graphics Agent must be deployed with one or more NVIDIA GRID GPUs. For a list of supported GPUs, see [Linux System Requirements on page 7](#).



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, licensed GPUs, and client capability to support your required display topology.



Important: Attaching monitors to the host machine is not supported

PCoIP client supports a maximum of four displays. Attaching extra monitors to the host machine will conflict with client display topologies.

The PCoIP Graphics Agent supports any of these monitor configurations:

- Vertical line
- Horizontal line
- Box display

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

The PCoIP Graphics Agent for Linux, in combination with one or more properly configured and licensed GPUs, provides the following benefits:

- **Display resolutions:** PCoIP Graphics Agents can provide any resolution a client asks for up to 4K UHD. The practical number of displays available at any given resolution is determined by the GPU, host system hardware, GPU profile

licensing, and the connecting client's version.

- **Hot-pluggable displays from Tera2 PCoIP Zero Clients:** Displays may be added and removed as needed during an active PCoIP session when using a Tera2 PCoIP Zero Client.
- **3D application support:** Full-screen 3D applications are supported.



Note: NVIDIA Tesla cards have license limitations

Systems using NVIDIA Tesla-based GPUs, including M60, M10, and M6, are subject to licensing restrictions which may further reduce the available number of monitors or their available resolutions. For systems using Tesla-based GPUs, only licensed displays and resolutions will use GRID functionality.

For more information, see NVIDIA’s Grid Licensing User Guide:

<http://images.nvidia.com/content/pdf/grid/guides/GRID-Licensing-Guide.pdf>

Configuring the Host Workstation to Use Graphics Cards

The PCoIP Graphics Agent does not require any special configuration for multiple monitor support, but your system must be configured to use your graphics card.

In datacenter or cloud deployments, this usually means configuring a hypervisor; consult your hypervisor’s documentation for instructions. For users deploying on VMware ESXi hosts, basic instructions are included in [Configuring Multiple Monitors on an ESXi Host for Virtualized Workstations on page 35](#).

Audio Support

The PCoIP Graphics Agent for Linux supports audio output from the host to the client. Audio can be enabled or disabled and audio bandwidth can be throttled by configuring the agent.

Enabling or Disabling Audio

Audio can be enabled or disabled by setting the `pcoip.enable_audio` directive in `poip-agent.conf`.

<code>pcoip.enable_audio</code>		
	Values	Default
Determines whether audio is enabled in PCoIP sessions. Both endpoints must have audio enabled.	boolean enabled: <code>1</code> disabled: <code>0</code>	enabled

Setting Allowed Audio Bandwidth

The host's audio output bandwidth can be constrained by setting the `pcoip.audio_bandwidth_limit` directive in `pcoip-agent.conf`.

For more detailed information, including audio compression algorithm selection criteria, see the MAN page for `pcoip-agent.conf`.

pcoip.audio_bandwidth_limit		
	Values: range	Default
Specifies the maximum bandwidth (not including network transport overhead) that can be used for audio output (sound playback) from the virtual desktop to the client in a PCoIP session.	number (kbit/s) 0-100000	500

USB Support

The PCoIP Graphics Agent does not support USB redirection between host and client, and so does not support local USB devices like flash drives or printers. Human interface devices, such as keyboards and mice, are supported.

Printing Support

The PCoIP Graphics Agent for Linux does not support local printing on remote clients.

Local, network, and cloud printers are supported in various ways:

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

Getting Support

If you experience difficulty in installing, configuring, or running your PCoIP Graphics Agent for Linux, Teradici can help. This section contains information about contacting Teradici support, generating support files, and connecting with the Teradici user community.

Contacting Support

If you encounter problems installing, configuring, or running the PCoIP Graphics Agent, you can submit a support ticket at <http://techsupport.teradici.com>.

Before creating a support ticket, be prepared with the following:

- A detailed description of the problem
- Your Agent version number. See [Finding your PCoIP Graphics Agent Version Number on page 28](#).
- A prepared log archive. See [Creating a Technical Support File on page 31](#).

Finding your PCoIP Graphics Agent Version Number

You can find your PCoIP Graphics Agent's version number using the Windows control panel.

To find your PCoIP Graphics Agent's version number:

1. Open the Windows Control Panel, and navigate to **Uninstall a program**.
2. Find the PCoIP agent type and version number in the program list.

To find your current PCoIP Graphics Agent version number in **Ubuntu**, use the following command:

```
dpkg -l "pcoip*"
```

To find your current PCoIP Graphics Agent version number in **RHEL**, use the following command:

```
rpm -qai "pcoip*"
```

The console will display a table of all registered PCoIP components and their version number, if they have one.

Creating a Technical Support File

Teradici may request a support file from your system in order to troubleshoot and diagnose PColP issues. The support file is a tar.gz archive containing PColP Graphics Agent for Linux logs and other diagnostic data that can help support diagnose your problem.

To create a support file, type the following command as a super user:

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

The support file will be created and placed in your `/tmp` directory. A message will display containing the full system path to the generated file.

The Teradici Community Forum

The PColP 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 Teradici PColP Technical Support Service team. Teradici staff are heavily involved in the forums.

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

Performing Diagnostics

Each PCoIP component creates and updates a log file which records its activity as the system is used. Most troubleshooting within a PCoIP 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 PCoIP Graphics Agent and other Teradici PCoIP components are saved to log directories.



Note: Bundling log files for support

When investigating issues with Teradici support, you may need to provide a set of log files. For instructions on creating a log file bundle for support, see [Creating a Technical Support File on page 31](#).

Troubleshooting License Issues

Teradici 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 [Welcome to Teradici PCoIP Cloud Licensing \(KB 15134-3136\)](#).

To run the license validation tool, type:

```
pcoip-validate-license
```

For more detailed instructions, type:

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

Locating PCoIP Graphics Agent for Linux Log Files

Log files for the LinuxPCoIP Graphics Agent are located in the `/var/log/pcoip-agent/` directory. The available log files are:

Component	Log File Location
Agent	<code>/var/log/pcoip-agent/agent.log</code>
Arbiter	<code>/var/log/pcoip-agent/arbiter.log</code>
Session Launcher	<code>/var/log/pcoip-agent/session-launcher.log</code>
Server/User	<code>/var/log/pcoip-agent/server.<user>.log</code>

Creating a Technical Support File

Teradici may request a support file from your system in order to troubleshoot and diagnose PColP issues. The support file is a tar.gz archive containing PColP Graphics Agent for Linux logs and other diagnostic data that can help support diagnose your problem.

To create a support file, type the following command as a super user:

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

The support file will be created and placed in your `/tmp` directory. A message will display containing the full system path to the generated file.

Setting Log Verbosity

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



Note: This is a global setting

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

To change the log verbosity level, set the `pcoip.event_filter_mode` directive in the `pcoip-agent.conf` file.

<code>pcoip.event_filter_mode</code>		
	Values: range	Default
Configures the PColP Event Log verbosity from 0 (least verbose) to 3 (most verbose).	number 0-3	2

PCoIP Graphics Agent for Linux Log Rotation

Log files in Linux are managed by `logrotate`. To manage how log files are rotated, edit the following files:

- `/etc/logrotate.d/pcoip-*`
- `/usr/share/pcoip-agent/pcoip-server.logrotate`

Session Log IDs

Log messages generated by the PCoIP Graphics Agent include a session ID prefix which is set automatically by the PCoIP client. All log messages generated during a single session, by any PCoIP 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 PCoIP component does not receive a session log ID from the PCoIP client, or receives an invalid value, it will generate a new session log ID and distribute it to the other components in the system.

Security Certificates in PCoIP Graphics Agents

PCoIP Graphics Agents use a self-signed certificate that is generated at runtime to secure PCoIP communications. The default self-signed certificates for the PCoIP components in your system will automatically work together without requiring any configuration from administrators.

If needed, you can create and deploy your own custom certificates instead of using the Teradici self-signed certificates. A certificate must be either generated or selected for a PCoIP session to be established.

This section explains how to create and implement custom certificates.

Custom Security Certificates

In order for a CA signed certificate to be loadable by PCoIP components, it must be stored at `/etc/pcoip-agent/ssl-certs` in three `.pem` files, owned by the `pcoip` user, and only readable by the owning user:

- `pcoip-key.pem` must contain an unlocked RSA key
- `pcoip-cert.pem` must contain a certificate that signs the key in `pcoip.pem`
- `pcoip-cacert.pem` must contain a CA certificate chain that validates the certificate in `pcoip-cert.pem`

Configure the PCoIP Graphics Agent to use custom certificates

The PCoIP Graphics Agent can be configured to look locally for certificates or to generate its own by setting the `pcoip.ssl_cert_type` directive in `pcoip-agent.conf`.

For more detailed information, see the MAN page for `pcoip-agent.conf`.

<code>pcoip.ssl_cert_type</code>				
Specifies where the PCoIP Graphics Agent should look for a certificate. By default, it creates its own self-signed certificate. If certificate storage is used, the certificates must be in <code>/etc/pcoip-agent/ssl-certs</code>	Values: one of		Default	
	<code>number</code>	1	From certificate storage	2
		2	Generate unique, self-signed certificate	
		0	From certificate storage if possible, otherwise generate	

Select a Security Key Length

When the PColP Graphics Agent is attempting to find a certificate in storage, the required key length can be set via the `pcoip.ssl_cert_min_key_length` directive in `pcoip-agent.conf`.

If the system cannot find a local certificate with the specified key length, it will either self-generate a certificate (if `pcoip.ssl_cert_type` is 0), or refuse the connection (if `pcoip.ssl_cert_type` is 1). This setting has no effect if `pcoip.ssl_cert_type` is set to 2.

For more detailed information, see the MAN page for `pcoip-agent.conf`.

<code>pcoip.ssl_cert_min_key_length</code>				
Specify the minimum key length (in bits) for a CA signed certificate. Longer length certificates will require more computing resources and may reduce performance, but will increase security. Shorter length certificates will provide better performance at the cost of lower security.	Values: one of		Default	
	number	1024	1024 bits	3072
		2048	2048 bits	
		3072	3072 bits	
		4096	4096 bits	

VMware vSphere Deployments

This section contains basic configuration instructions for users of VMware vSphere ESXi Hypervisors.

Configuring Multiple Monitors on an ESXi Host for Virtualized Workstations

ESXi hosts must be configured to use your GPU in virtualized workstations. The following sections provide basic instructions for:

- Adding an NVIDIA GRID graphics card to your ESXi virtual machine
- Configuring the number of monitors your virtual machine will use with non-GRID GPUs

ESXi hosts must be configured to use your GPU in virtualized workstations. The following sections provide basic instructions for adding an NVIDIA GRID graphics card to your ESXi virtual machine.

See VMware documentation for complete details.

Configuring Multiple Monitors for NVIDIA GRID vGPU

This section describes how to add a shared NVIDIA GRID PCI device to your virtual machine and specify its GPU profile. The following instructions are only required for virtualized workstations using a supported NVIDIA GRID vGPU video card. For details, see [System Requirements on page 7](#).

**Note: Monitor limitations**

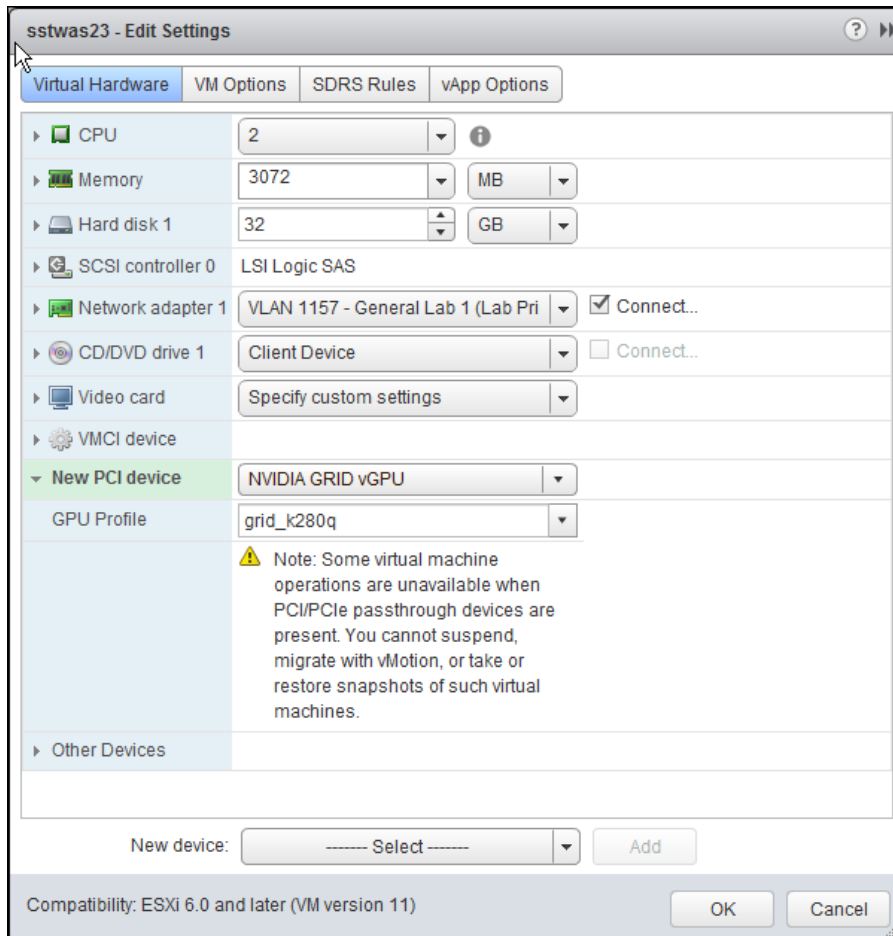
The PColP Graphics Agent supports up to four displays. Your video card may limit the actual number of displays you can have.

Before you begin, ensure the following prerequisites are met:

- You have installed the NVIDIA GRID graphics card and supported driver on the ESXi host.
- You have installed VMware Tools on your ESXi host and the VMware SVGA 3D driver on the virtual machine.
- You have local administrative permission to the workstation.
- You have disabled OS power management features on the workstation.

To add a shared PCI device and specify its GPU profile:

1. Using vSphere Web Client, right-click the virtual machine in the Navigator list and select **Power > Power Off**.
2. Right-click the virtual machine and select **Edit Settings**.



3. In the **New device** drop-down list, select **Shared PCI Device** and then click **Add**.
4. Click **Reserve all memory**.
5. In the **GPU Profile** drop-down list, select the profile for your card. This profile determines how many virtual display heads, or displays, are available for your card.
6. Click **OK**.
7. Start the virtual machine.

Configuring Displays for NVIDIA GRID with Pass-Through

This section describes how to add an NVIDIA GRID PCI device to your ESXi host. The following instructions are only required for virtualized workstations using a supported NVIDIA GRID video card with pass-through. For specific supported models, see [System Requirements on page 7](#).

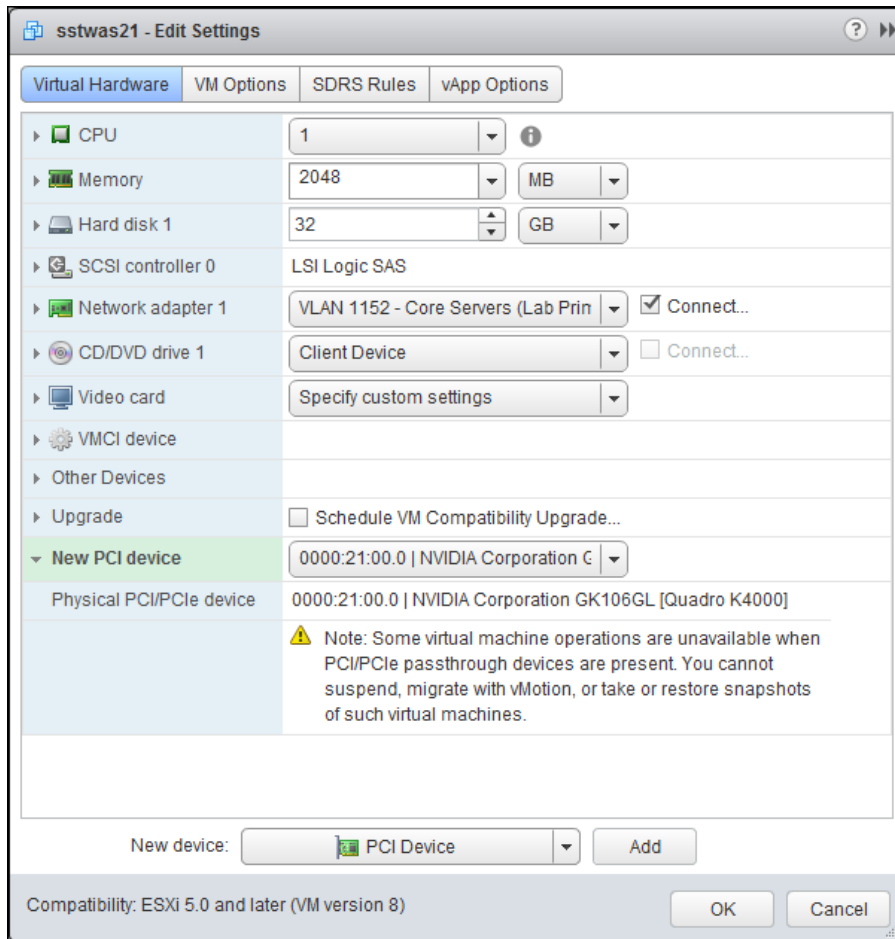
Before you begin, ensure the following prerequisites are met:

- You have installed the NVIDIA GRID graphics card.
- You have installed VMware Tools on your ESXi host and the VMware SVGA 3D driver on the virtual machine.
- You have local administrative permission to the workstation.
- You have disabled OS power management features on the workstation.

To add a PCI device:

1. Using vSphere Web Client, right-click the virtual machine in the Navigator list and select **Power > Power Off**.
2. Right-click the virtual machine and select **Edit Settings**.

3. In the **New device** drop-down list, select **PCI Device** and then click **Add**.



4. Click **OK**.
5. Start the virtual machine.

Frequently Asked Questions

Q: Can I use a screensaver?

A: Yes. However, a blank, static screensaver will provide the most efficient CPU and network bandwidth usage.

Q: Why can't I use the maximum number of monitors or monitor resolution?

A: GPU profile licensing, GPUs, or clients may limit monitor resolution and monitor count, which will prevent you from utilizing the full agent specification. For more information, see [Supported Displays on page 25](#).

Q: Which graphics rendering APIs are supported?

A: The PCoIP Graphics Agent captures and delivers the output from the GPU, which is responsible for providing rendering APIs like OpenGL. See the documentation for your GPU for more information about rendering APIs.

Q: How quickly does a PCoIP Graphics Agent complete a connection?

A: The Teradici PCoIP Graphics Agent can usually achieve a connection time in 15 to 30 seconds. Teradici uses the statistical value Top Percentile (TP) to measure the time to establish a session:

- TP99: Ninety-nine percent of connections complete in under 30 seconds.
- TP50: Fifty percent of connections complete in under 15 seconds.

Q: Why is my application not sending audio?

A: The PCoIP Graphics Agent delivers audio over PCoIP connections by reassigning the system's default audio device. Only applications that use the system default audio device will send or receive audio over PCoIP; applications that are configured to use non-default devices will not work. If you don't hear audio from your application, make sure it is configured to use the system default audio device.

Q: I'm using Teradici Cloud Licensing. What network blocks should I leave open?

A: If you are using Teradici Cloud Licensing, you will need to whitelist the following:

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

Alternatively, you can also ensure the following network blocks are whitelisted:

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

The following network blocks are not currently in use, but may also be used in the future:

- **Production:** 162.244.220.0/24
- **Disaster Recovery:** 162.244.222.0/24

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