leostream

Remote Desktop Access Platform

The Leostream Installation Guide

Connection Broker, Leostream Gateway, Leostream Agent, and Leostream Connect

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Patents

Leostream software is protected by U.S. Patent 8,417,796.

Contents

Overview

This installation guide provides instructions for installing the Connection Broker, Leostream Gateway, Leostream Agent, and Leostream Connect clients that are part of the Leostream 9.0 platform.

For an introduction to Leostream, including a description of key concepts and components, please reference the Introduction to the Leostream Platform guide available on the Leostream web site. See the Quick Start Guides and Administrator's Guides for additional information on configuring Leostream after installation.

Installing the Connection Broker

Installation Requirements and Considerations

Leostream provides a Connection Broker package that can be installed on any virtual or physical machine running the latest 64-bit CentOS 7.x or Red Hat Enterprise Linux 7.x operating system.

⚠ The Connection Broker does not install on CentOS 8, Red Hat Enterprise Linux version 8, or any other Linux distribution.

> The Connection Broker and Leostream Gateway must be installed on separate machines. Both are designed to be the only application installed on their respective machine.

The Connection Broker and Leostream Gateway can be installed on a minimal operating system or on a machine running a desktop environment.

⚠ Ensure that you are not running an Apache HTTP Server on the machine that will run your Connection Broker. Leostream installs and manages Apache and any other HTTP Server process running on the machine results in Leostream web server failures.

Build your Linux machine to the specifications required by your selected operating system and apply the latest updates prior to installing Leostream. In addition to the operating system requirements, the Connection Broker requires the following:

- 2 vCPUs
- 8.0 GB of RAM
- At least 20 GB of hard drive space
- One NIC, optionally with Internet connectivity

📝 When installing into a VMware enviroment, ensure that you install VMware tools on to the virtual machine that will run the Connection Broker.

The Connection Broker installation process automatically creates a user named `leo` and installs the Connection Broker in the `/home/leo` directory.

⚠️ When installing the operating system, Leostream recommends that you do not define a user named `leo` on the system, as the Connection Broker installation process automatically creates this user and their home directory. If you manually add the `leo` user, ensure that they have their own group and that they are included in the `sudoers` file.

⚠️ You cannot install the Connection Broker in a different directory, and the `/home/leo` directory cannot be an NFS location.

Connection Broker 9.0 utilizes the time zone and networking configuration of the underlying operating system. The system time zone determines the time zone used by the internal Connection Broker PostgreSQL database, and continues to be the Connection Broker time zone until you switch your Connection Broker to an external database. At that point, the Connection Broker uses the time zone of the external database.

Installing from the Leostream Repository

If the machine on which you plan to install the Connection Broker has internet access, you can automatically download and install the Connection Broker package from the Leostream repository.

📝 If you are installing the Connection Broker onto a virtual machine, Leostream recommends taking a snaphot of the machine prior to proceeding with the installation.

Apply all updates to the base operating system, prior to installing the Connection Broker. Then, on a machine running any supported operating system, run the following command.

```
curl http://downloads.leostream.com/broker.prod.sh | bash
```

For Connection Brokers with internet access, you can upgrade your Connection Broker using the **Check for updates** option on the Connection Broker **> System > Maintenance** page.

Performing a Local Installation

If the Connection Broker machine does not have internet access, you can download the Connection Broker file from another machine, copy it to your Connection Broker machine, and manually install the file. After a local installation you cannot perform automatic updates until you attach to a Leostream repository using the **Switch the repository** option on the **> System > Maintenance** page.

You can download the Connection Broker installation file from the following page.

https://www.leostream.com/downloads/leostream-connection-broker

⚠️ The Leostream package attempts to install all dependencies prior to installing the Connection

Broker. In order for the Leostream package to install other dependencies, ensure that the machine has access to a local Linux repository or the internet.

If the `yum-utils` package is installed on your Connection Broker machine, you can run the following command to list the current Connection Broker dependencies.

```
yum deplist leostream-broker.x86_64
```

The `deplist` command returns version information for each component. Alternatively, you can run the following command for a flat list of packages.

```
rpm -q --requires leostream-broker
```

After building your base operating system and applying all updates, copy the downloaded Connection Broker RPM into your user's home directory. You can then use the following two commands to install or upgrade your Connection Broker.

```
sudo yum -y localinstall RPM_FILENAME
sudo /sbin/reboot
```

Where *RPM_FILENAME* is the name of the RPM file you copied onto the machine.

Updating a Locally-Installed Connection Broker

If you performed a local install of your initial Connection Broker version, you cannot use the Connection Broker Administrator web interface to update the Connection Broker unless you subsequently attached to a Leostream repository. Instead, download the latest RPM file from the Leostream website and perform a local upgrade.

Do not uninstall or stop your existing Connection Broker before performing the upgrade.

After downloading the latest RPM from the Leostream website, copy the file to your Connection Broker machine and run the following commands from the console.

```
sudo yum -y localinstall RPM-FILE-NAME
sudo /sbin/reboot
```

Licensing your Leostream Connection Broker

Your Connection Broker license is obtained using the serial number you received from Leostream Sales. If you did not receive your Connection Broker 9.0 serial number, please contact sales@leostream.com. To generate your license key:

1. Point a web browser at the IP address of the machine running the Connection Broker. The Connection Broker **Sign In** page opens.

2. Log into your Connection Broker using the default administrator credentials:

```
username=admin
password=leo
```

3. On the **Leostream License** page, click the link to go to https://license.leostream.com. The installation code for your Connection Broker is automatically populated.

4. Enter the serial number you obtained from Leostream sales.

5. Enter the email address associated with that serial number.

6. Click **Generate a license**.

7. Click the **Apply to the broker** button above the generated license key. The browser returns to the **Leostream License** page.

8. Select the **I have read and accept the License Agreement** check box.

9. Click **Save**.

If your Connection Broker does not have internet access, you can obtain your license key from another computer with internet access. To obtain your license, note your Connection Broker installation code to the right of the form on the **Leostream License** page. Go to https://license.leostream.com and manually enter your serial number, installation code, and email address. Copy the license key to a text file, then return to your Connection Broker and copy-and-paste the key into the **License key** field.

⚠️ The generated license key is linked to this Connection Broker installation or cluster. If you rebuild your Connection Broker or create a second Leostream environment, contact sales@leostream.com to obtain a new serial number for that environment.

Changing the Default Admin Password

For security reasons, change the default administrator password the first time you use your Connection Broker. To change the administrator password, log in to the Connection Broker as the default administrator and go to the **> Sign in > My Options** page, shown in the following figure.

1. Enter a new password in the **Password** edit field.

2. Reenter the new password in the **Re-type password** edit field.

3. Click **Save**.

⚠️ The Connection Broker cannot remind you of your password. If you forget your administrator password, reset it using the Connection Broker virtual machine console. See "Resetting the Default `admin` Password" in the Connection Broker Security Review document for complete instructions.

Configuring Firewall Ports

The Connection Broker uses `firewalld` to open the firewall ports required to access the Administrator Web interface and communicate with external sources.

Inbound Ports

The following inbound ports are used by the Connection Broker

- 443 for communicating with Leostream Agents and Leostream Connect clients, and HTTPS access to the Connection Broker Web interface

- 80 for HTTP access to the Connection Broker Web interface

- 514/UDP in order to receive syslog messages from PCoIP Zero clients and Remote Workstation cards.

The only network facing services used by the Connection Broker are Apache and SSH.

Outbound Ports

Depending on what third party systems are present in your environment, the Connection Broker needs outbound access to additional ports. The following figure provides a schematic of Connection Broker ports and their usage.

In addition, the Connection Broker uses `yum` to perform updates. The Connection Broker repository defaults to HTTPS, but if any of the repositories in `/etc/yum.repos.d` use HTTP, you must allow outbound port 80 to perform updates.
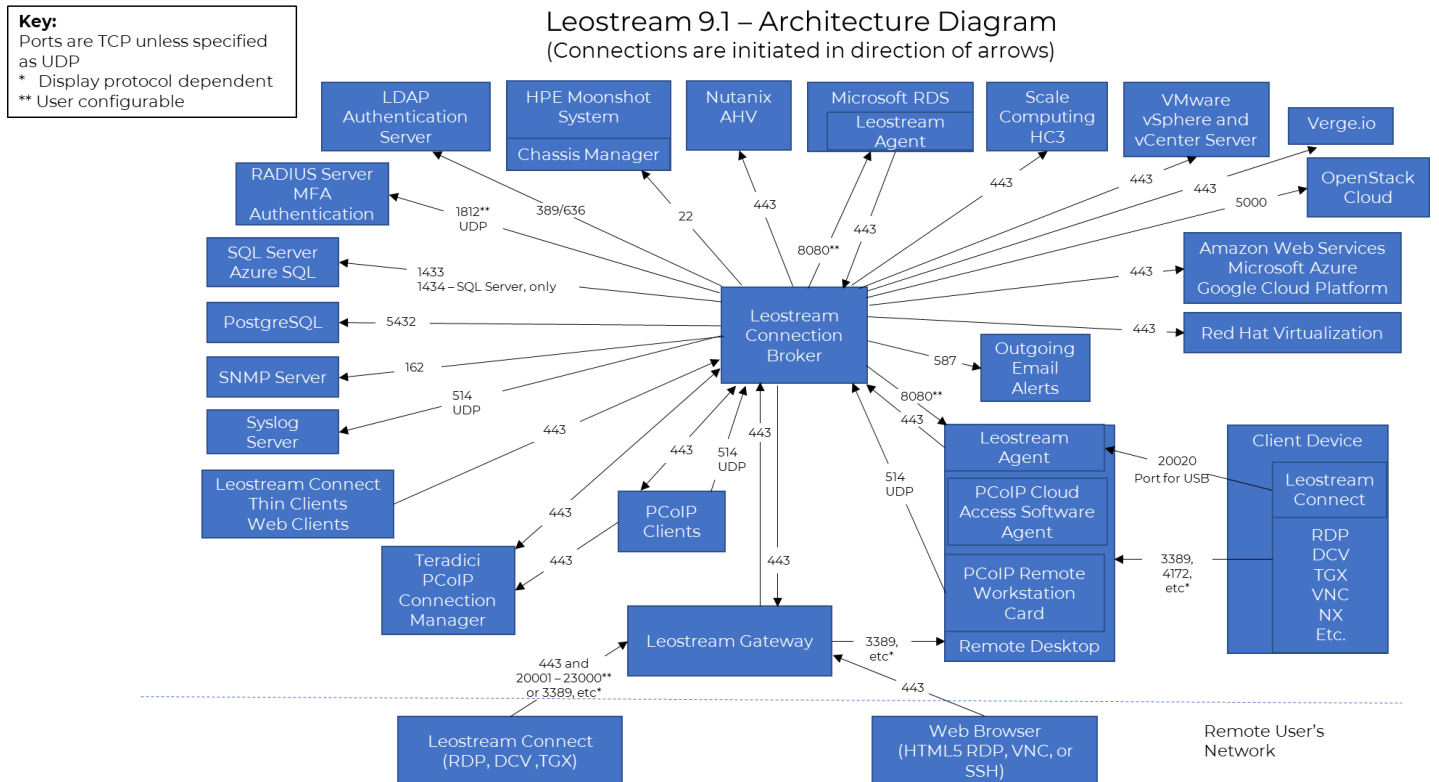
Key:
Ports are TCP unless specified as UDP
* Display protocol dependent
** User configurable

Leostream 9.1 – Architecture Diagram
(Connections are initiated in direction of arrows)

Node	Port
LDAP Authentication Server	389/636
HPE Moonshot System / Chassis Manager	
Nutanix AHV	22
Microsoft RDS / Leostream Agent	443
Scale Computing HC3	443
VMware vSphere and vCenter Server	443
Verge.io	443
OpenStack Cloud	5000
RADIUS Server MFA Authentication	1812** UDP
SQL Server Azure SQL	1433, 1434 – SQL Server, only
PostgreSQL	5432
SNMP Server	162
Syslog Server	514 UDP
Amazon Web Services / Microsoft Azure / Google Cloud Platform	443
Red Hat Virtualization	443
Outgoing Email Alerts	587
Leostream Agent / PCoIP Cloud Access Software Agent / PCoIP Remote Workstation Card / Remote Desktop	8080**, 443, 514 UDP
Client Device / Leostream Connect / RDP DCV TGX VNC NX Etc.	20020 Port for USB, 3389, 4172, etc*
Leostream Connect Thin Clients Web Clients	443
PCoIP Clients	443, 514 UDP
Teradici PCoIP Connection Manager	443
Leostream Gateway	3389, etc*
Leostream Connect (RDP, DCV ,TGX)	443 and 20001 – 23000** or 3389, etc*
Web Browser (HTML5 RDP, VNC, or SSH)	443

Leostream Connection Broker

8080**

Remote User's Network

Considerations for Cloud Environments

Assigning a Security Group

If you place your Leostream Connection Broker in a cloud environment such as AWS, Azure, Google Cloud Platform, or OpenStack, ensure that you assigned the instance to a security group that opens the necessary inbound ports, described in the following table.

Port	Required By	Purpose
22	Connection Broker	For SSH access to the Connection Broker. Alternatively, for some clouds, you can access the Connection Broker console via their management interface.
80 and 443	Connection Broker	For access to the Connection Broker web interface, and communication with the Leostream Agents and Leostream Connect. If you close port 80 on your Connection Broker, you may omit that port from the security group.
514	Connection Broker	If using PCoIP Zero clients to log into the Connection Broker, open this port to receive syslog events from the client device

Accessing a Connection Broker in a Virtual Private Network

The Connection Broker Administrator Web interface is available on the operating system's IP address. If you cannot access the private IP address for a Connection Broker that is installed in a cloud, you can associate a public IP address to your Connection Broker instance and use that IP address to access the Connection Broker Administrator Web interface.

Alternatively, you can use the Leostream Gateway to redirect traffic to the Connection Broker. In this case, assign a public IP address to the Leostream Gateway, and access the Connection Broker Web interface using a URL with the following format:

```
https://<Leostream-Gateway-Hostname-or-IP>
```

For information on configuring the Leostream Gateway to forward to the Connection Broker, see the "Forwarding Connection Broker Logins through the Gateway" section in the Leostream Gateway Guide.

Installing the Leostream Gateway

Leostream provides a Leostream Gateway package that can be installed on any virtual or physical machine running the latest 64-bit CentOS 7.x or Red Hat Enterprise Linux 7.x operating system. The following sections describe how to install and update the Leostream Gateway. You must apply security or upgrade patches to the underlying operating system, separately.

⚠ The Leostream Gateway does not install on CentOS 8 or Red Hat Enterprise Linux version 8.

📝 You do not need to apply a license to the Leostream Gateway, itself. Your Leostream Connection Broker license key must include Leostream Gateway support in order to register your Leostream Gateway with your Connection Broker.

Sizing the Leostream Gateway

The number of connections that can be handled by one Leostream Gateway is determined by the CPU available in the machine and the bandwidth of the network.

When using the Leostream HTML5 viewer, the Leostream Gateway utilizes CPU to translate the RDP, VNC, or SSH screens to HTML5. Therefore, if using the built-in Leostream HTML5 viewer, provision the machine that will host your Leostream Gateway with as much CPU as you can. Machines with higher CPU support more simultaneous connections.

For port-forwarded desktop connections, including third-party HTML5 viewers, the Leostream Gateway performs Linux kernel-based port forwarding, which places very little CPU load on the machine running the gateway. In this case, the limiting factor for the number of simultaneous connections that can be handled by a single Leostream Gateway is the bandwidth of the network. To maximize the number of simultaneous connections that can be handled by your Leostream Gateway, ensure that your network has sufficient bandwidth.

At a minimum, Leostream recommends the following for each Leostream Gateway:

- 2 or more CPUs or vCPUs at 2.5 GHz or higher
- 4 GB of RAM, more if using the built-in Leostream HTML5 viewer
- 4 GB of swap space
- 20 GB of free disk

Regardless of the size of the machine, Leostream recommends a maximum of 80 simultaneous connections. To handle larger environments, install multiple Leostream Gateways and use a load balancer to distribute user connections between the gateways.

You can view the CPU being used by the Leostream Gateway while connections are being established by monitoring the output of the following command on the gateway.

```
top -d -1
```

Installing from the Leostream Repository

After building and updating your base operating system, run the following command to install your Leostream Gateway.

```
curl http://downloads.leostream.com/gateway.sh | bash
```

The installation script downloads and installs any dependencies required by the gateway.

Performing a Local Installation

If your Leostream Gateway does not have internet access or you prefer to perform a manual installation, you can download the Leostream Gateway RPM from the Leostream Website.

https://www.leostream.com/downloads/leostream-gateway

After downloading the RPM, copy it to your Leostream Gateway machine and run the following three commands.

```
sudo yum -y install epel-release firewalld
sudo yum -y localinstall RPM_FILE_NAME
sudo /sbin/reboot
```

Where *RPM_FILE_NAME* is the name of the downloaded file you copied to the Leostream Gateway machine.

To upgrade an existing Leostream Gateway, run the following command.

```
sudo yum -y localinstall RPM_FILE_NAME
```

Installing the Leostream Agent

To maximize your policy control, Leostream recommends that you install the Leostream Agent on every virtual and physical machine running a supported operating system.

Installing on Microsoft® Windows® Operating Systems

The Leostream Agent installs on all Microsoft Windows operating system versions currently covered by Mainstream Support under the Microsoft Fixed Lifecycle Policy, or in service under the Microsoft Modern Lifecycle Policy.

 Do not install the Leostream Agent on desktops used as client devices.

In addition to monitoring user events such as logins, logouts, disconnects, and reconnects, the Leostream Agent provides the following functionality.

- Idle time monitoring for Release Plans

- USB management, network printer management, registry plans.

- Single sign-on to a remote desktop when connecting to the desktop console.

- Management for Remote Desktop Sessions or multi-user Linux sessions.

- Support for joining desktops to an Active Directory domain.

You can download the Leostream Agent from:

https://www.leostream.com/resource/leostream-agent-for-windows/

 If you uninstalled a previous version of the Leostream Agent, but did not restart the desktop, you may not be able to install a new Leostream Agent. The installer indicates if you need to restart the desktop prior to performing the installation.

To install the Leostream Agent:

1. Run the Leostream Agent installer. Appendix A lists options available for running the installation from the command line.

2. Select the language to use for the installer and click **OK**.

3. The **License Agreement** page opens, as shown in the following figure.
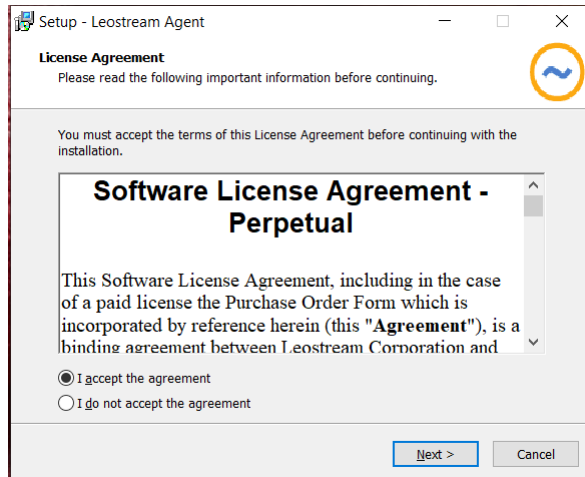
4. On the **License Agreement** page:

   - Read the license agreement.

   - If you accept the license agreement terms, select the **I accept the agreement** option.

   - Click **Next >**.

5. On the next page, enter or browse for the directory to install the Leostream Agent into, as shown in the following figure.
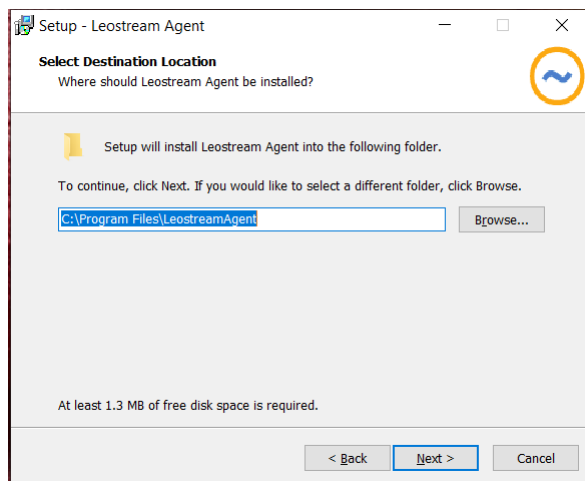
6. Click **Next >**.

7. On the page that appears, shown in the following figure, select any additional tasks to run during the installation.
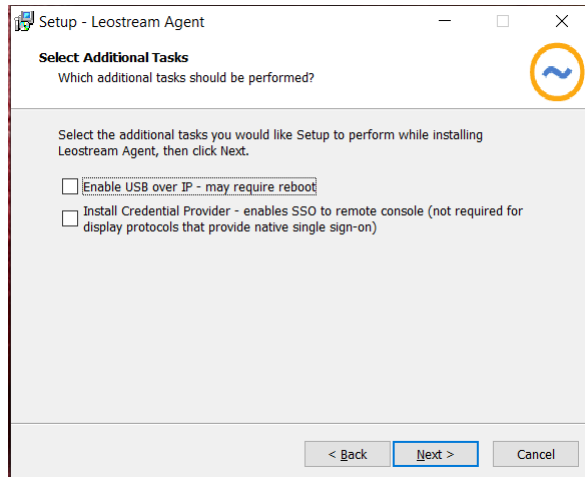
- **Enable USB over IP (may require reboot):** Select this task if you want USB devices attached to the client desktop to appear within this remote desktop. This feature is supported only for users logging in using Leostream Connect.

  ⚠ Do not select this task if you have another USB over IP solution installed, for example, the HP® ZCentral Remote Boost. If two USB solutions are installed side-by-side, you may not be able to predict which solution is managing the USB devices.

- **Install Credential Provider:** Select this task to enable single sign-on for users connecting to their desktops using a display protocol that connects to the remote console, such as VNC or PCoIP connections to PCoIP Remote Workstation cards.

  Do not install this task if you are using the Teradici Cloud Access Software. Single sign-on is provided by the PCoIP Agent, in that case.

  ⚠ Ensure that you enable the **Interactive logon: Do not require CTRL-ALT-DEL** group policy on your desktops. The Leostream Agent does not attempt single sign-on if CTRL-ALT-DEL is required to login.

8. Click **Next >**.

9. On the **Leostream Connection Broker** page, shown in the following figure, specify the Connection Broker address to use for this Leostream Agent.

   - If you have a DNS SRV record for your Connection Broker, select the **Obtain Connection Broker Address automatically using DNS** option. See the Leostream DNS Setup Guide for information on configuring a DNS SRV record for your Connection Broker.

   - To enter a static Connection Broker address, uncheck the **Obtain Connection Broker Address automatically using DNS** option and enter the address into the

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Address field. If you are using a load balancer for your Leostream cluster, enter the load balancer address.
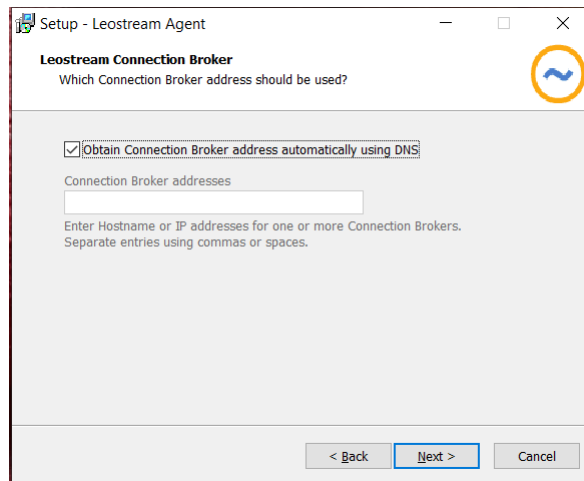
10. Review the installation setup, shown in the following figure, then click **Install**.
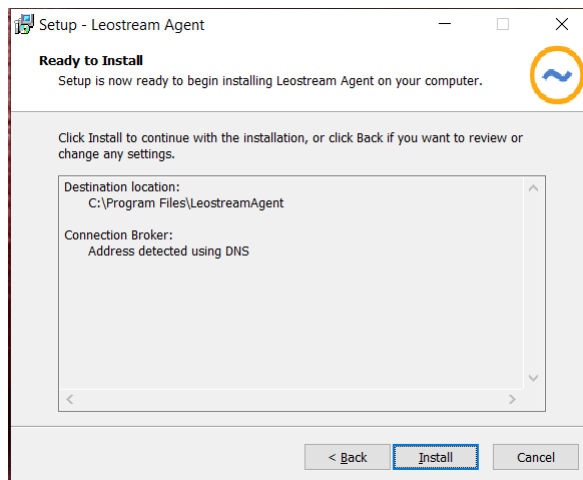
If the desktop does not prompt for a restart, the installation is complete. If you installed additional tasks, you may be prompted to restart your machine. In this case, the installation is complete only after you restart the desktop.

⚠ If you do not restart the desktop when prompted, you may encounter difficulties when subsequently upgrading the Leostream Agent.

The installer automatically starts the Leostream Agent when the installation completes.

Additional configuration for the Leostream Agent is available on the Control Panel dialog. To open the Leostream Agent Control Panel dialog, you must be logged into the desktop as a user with administrator privileges or run the Leostream Agent Config app with administrator privileges. On

desktops running Windows 7 or 10 operating systems, to run the Leostream Agent configuration with the necessary privileges, right-click on the Leostream Agent and select **Run as administrator**, as shown in the following figure.
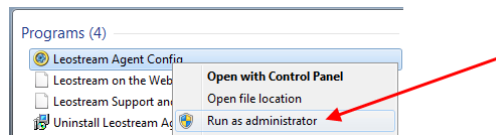
Starting and Stopping the Leostream Agent

The Leostream Agent must be running in order for the Connection Broker to perform the policy actions associated with user events, such as logouts and disconnects.

To start or stop the Leostream Agent:

1. Open the Leostream Agent Control Panel dialog as a user with administrator privileges.

2. Go to the **Status** tab.

    a. If the agent is running, stop the agent by clicking the **Stop** button.

    b. If the agent is not running, start the agent by clicking the **Start** button.

Registering the Leostream Agent with one or more Connection Brokers

All Leostream Agents version 7.0 and higher must first register with your Connection Broker before accepting communications from that Connection Broker. To register the Leostream Agent with a one or more Connection Brokers:

1. Open the Leostream Agent Control Panel dialog as a user with administrator privileges.

2. Go to the **Options** tab.

3. Uncheck the **Obtain Connection Broker address automatically** option. The **Address** edit field enables, as shown in the following figure.
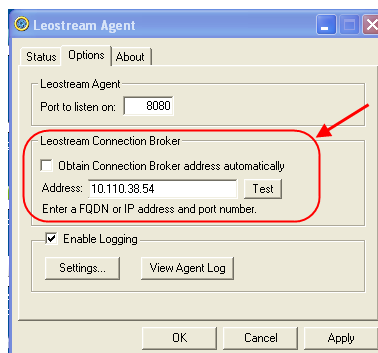
4. Enter the Connection Broker address in the edit fields.

   If you have a Connection Broker cluster, enter the VIP for the cluster, typically the load balancer address. If you have multiple Connection Brokers that are not members of the same cluster, for example separate test and production environments, you can enter multiple Connection Broker addresses separated by a comma.

   Click **Test** to check if the address you entered is valid. A dialog opens indicating if the Leostream Agent can contact the Connection Broker at the specified address.

5. Click **Apply** to accept the address and leave the Leostream Agent dialog open, or **OK** to accept the address and close the dialog.

Installing on Linux and Apple macOS Operating Systems

The Java version of the Leostream Agent allows you to manage users that connect to their remote Linux and macOS desktops using a variety of display protocols. The Leostream Agent provides single sign-on to Linux remote desktops with a PCoIP Remote Workstation Card.

 The Leostream Agent is a Java application that requires a JDK version 1.7 or higher.

You can download the Leostream Agent and manuals from:

https://www.leostream.com/resource/leostream-agent-for-linux-and-macos/

The Leostream Agent provides a graphical installer that runs on the following operating systems and any derivations of those operating systems.

- CentOS
- Debian
- Fedora
- SUSE Linux Enterprise
- Red Hat Enterprise Linux
- Ubuntu
- Apple macOS

You cannot use the graphical installer if the remote desktop does not have a graphical user interface or the X11 DISPLAY environment variable is not correctly set. In these cases, install the Leostream Agent at the console (see Installing at the Console). In some cases, if you are connected to the remote desktop using a display protocol you cannot run the graphical installer.

Prerequisites for Installing USB over IP Support

Leostream provides USB redirection for 32- and 64-bit Linux operating systems. On Linux operating systems, the Leostream Agent installer must build the required USB drivers. In order to build the drivers, Leostream Agent requires the following two header files:

- `hcd.h`
- `hub.h`

The Leostream Agent provides these header files for kernel versions 2.6.15 to 2.6.34. More recent kernel versions include these files in the kernel source.

⚠️ USB redirection is not supported for kernel version higher than 5.5.

The Leostream Agent uses files in the kernel source directory to execute the `make` command that builds the drivers. These files are typically located in `/usr/src/kernels`. Some operating systems provide the necessary directories. If your operating system does not provide the appropriate kernel files, you must download and install them, using the appropriate distribution method for your operating system.

For example, use the following commands for desktops running CentOS.

```
yum update kernel
yum install gcc kernel-devel
```

For Ubuntu 18, ensure `gcc` and the `build-essential` packages are installed.

You must install the kernel source that exactly matches your kernel version. To determine which kernel version your Linux desktop is running, execute the following command.

```
uname -r
```

Prerequisites for Installing the Desktop Experience

The Leostream Agent Desktop Experience task installs the Leostream Desktop component onto the remote workstation. Leostream Desktop runs in the user's space, providing information about the user's session to the Leostream Agent. The Desktop Experience is required if you want to use the idle-time actions in Connection Broker Release Plans, or provide single sign-on to Linux remote desktops when connecting using the PCoIP protocol.

On Linux machines, the Desktop Experience task requires the following two shared object files.

- `libX11.so`
- `libXss.so`

Ensure that your desktop includes these two files in the same directory before beginning the Leostream Agent installation. The files are typically located in either `/usr/lib` or `usr/lib64`. You can use the following commands to locate the directory containing both files.

```
find /usr -name 'libX11*'
find /usr -name 'libXss*'
```

If either of the files is missing, locate and install the package that contains the file. For example, on CentOS you can use the following command to locate the `libXss` file.

```
yum provides 'libXss*'
```

You can then install the required files using the standard method for your Linux distribution. For example, the following command installs the X screen saver on CentOS.

```
yum install libXScrnSaver
```

Using the Graphical Installer

To run the graphical installer:

1. Login to the desktop using the `root` account, or with an account that has permission to use the `sudo` command.
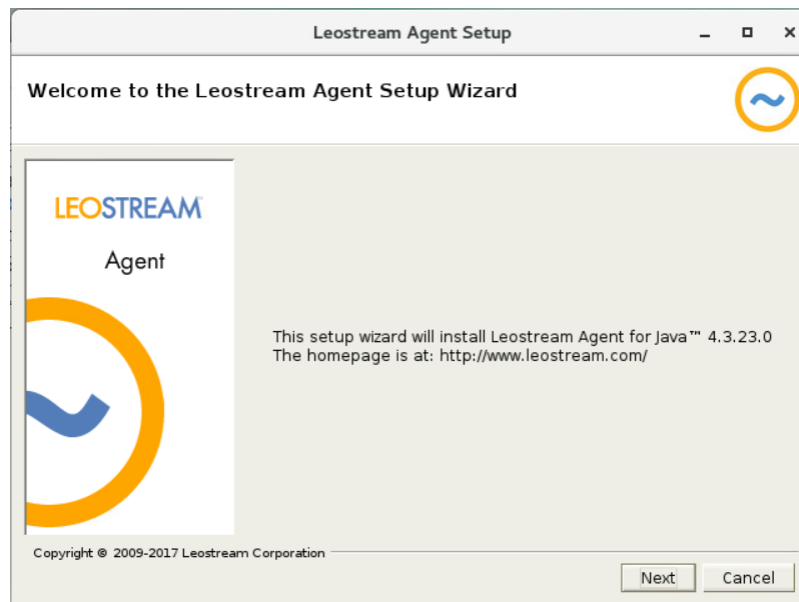
   📝If you plan to install the Leostream feature for USB device management, you must install the Leostream Agent as the `root` user.

2. From the directory that contains the installer, issue the following command:

   ```
   java -jar LeostreamAgentJava-x.x.x.x.jar
   ```

   Where `x.x.x.x` is the version number at the end of the installer file name. Run this command using `sudo` if you are not logged in with the `root` account. If the desktop has multiple JDK versions, enter the full path to the correct Java installation.

   The installer **Welcome** page, shown in the following figure, opens.

   To run the installer with debugging trace turned on, include the following text in the command line:

   ```
   -DTRACE=true
   ```

For example:

   ```
   java -DTRACE=true -jar LeostreamAgentJava-x.x.x.x.jar
   ```

3. Click **Next** in the **Welcome** page.

4. The **License Agreement** page opens, as shown in the following figure.

In this page:

    a. Read the license agreement.

    b. If you accept the license agreement terms, select the **I accept the terms of the license agreement** option.

    c. Click **Next**.

5. In the **Additional Tasks** page, shown in the following figure, select the appropriate tasks to complete during installation.
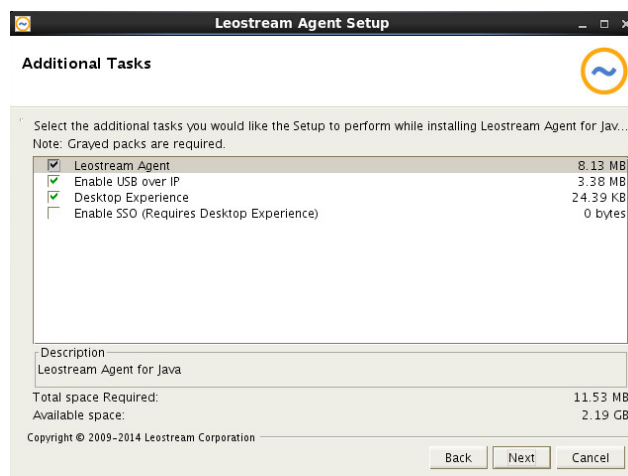
    a. You must select the **Leostream Agent** task, which installs the core Leostream Agent components.

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b. To use Leostream to manage USB devices, select the **Enable USB over IP** task (not available for macOS).

c. To monitor and perform Release Plan actions based on user idle time, select the **Desktop Experience** task.

If you plan to install the Desktop Experience component, first ensure you meet the prerequisites by checking for the required shared object files. See Prerequisites for Installing the Desktop Experience for more information.

d. To support single sign-on in a PCoIP environment, select the **Enable SSO** and the **Desktop Experience** tasks (not available for macOS).

Do not install single sign-on when installing on a Linux machine running the PCoIP Cloud Access Software.

6. In the **Installation Directory** page, shown in the following figure, enter or browse for the location to install the Leostream Agent.
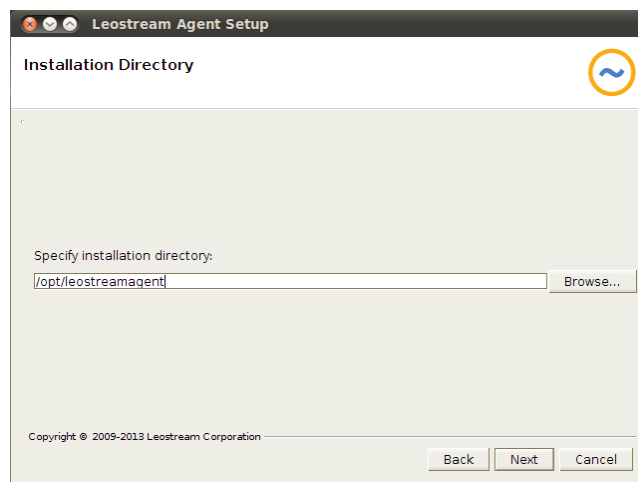
7. Click **Next**.

8. If necessary, the installer warns you that it will create or over write the installation directory. Click **OK** to accept the warning to move on with the installation, or click **Cancel** to enter a different directory.

9. If you selected the **Enable USB over IP** task, specify the full path to the Linux kernel build directory, as shown in the following figure.
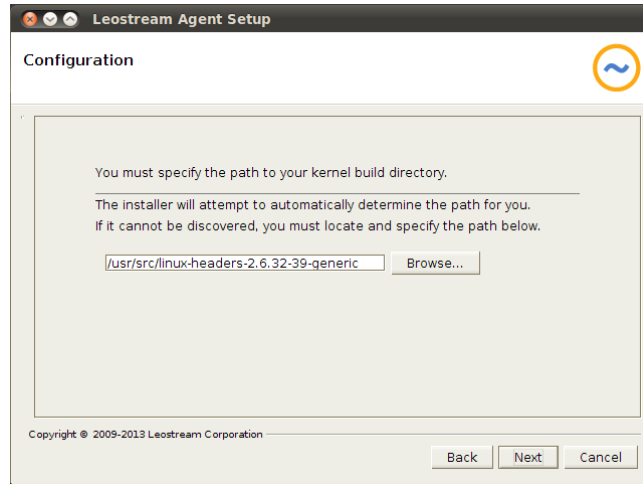
The installer validates this directory by looking for the `module.symvers` file. If this file does not exist in the specified directory, you cannot continue with the installation.

10. Click **Next**.

11. In the **Agent Configuration** page:

    a. Specify the Connection Broker address to use for this Leostream Agent. If you have a DNS SRV record for your Connection Broker, leave the **Connection Broker Address** field empty and select the **Enable auto-detection of broker using DNS** option.

        To enter a static Connection Broker address, clear the selection in the **Enable auto-detection of broker using DNS** option and enter the address into the **Connection Broker Address** field.

        See the Leostream DNS Setup Guide for information on configuring a DNS SRV record for your Connection Broker.

        Ensure that the `resolve.conf` file on the desktop contains information for the correct domain. If the DNS SRV record exists in a different domain from that specified in the `resolve.conf` file, the Leostream Agent cannot discover the Connection Broker address.

    b. In the **Leostream Agent Port** edit field, specify the port used for incoming communications from the Connection Broker to the Leostream Agent.
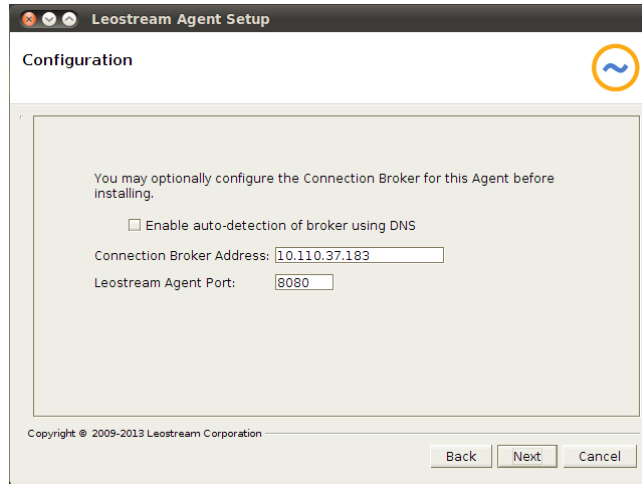
You can specify or change the Connection Broker address and port associated with this Leostream Agent at any time, by modifying the `leostreamagent.conf` file. See the Leostream Agent Administrator's Guide for information on using this file.

12. Click **Next**.

13. The **Ready to Install** page provides a summary of the settings you provided to the installer. Click **Next** to begin the installation.

14. The installer displays the progress in the **Installing Leostream Agent** page. If you are installing the USB-over-IP task, the installer appears to pause halfway through the installation. At this point, the installer is building the Linux kernel object for the USB drivers, which may take a couple minutes. When the installation completes, click **Next**.

15. In the **Installation Finished** window, click **Generate an automatic installation script** if you want to generate an XML-file that can be used to perform silent installations of the Leostream Agent on other desktops.

16. Click **Done** to exit the installer.

When running the installer from a terminal, you may see the following message in standard out:

```
/usr/src/linux-headers...-generic/ - isDir: true - mustExist: true - canCreate: false:
```

This message can be ignored.

If you installed the USB drivers, check that the daemon is live by running the following command:

```
cat /proc/modules |grep lsusbd
```

If the daemon is not live, the remote desktop cannot accept USB devices. Contact support@leostream.com for a resolution.

Silent Installations using XML-Files

The Java version of the Leostream Agent supports silent installation using an XML-file. You must perform the installation once using the Graphical Installer and click the **Generate an automatic installation script** option on the final panel in the installer to generate the required XML-file.

⚠️ If you generated an XML-file from an older version of the Leostream Agent and are now installing version 5.0.9 or higher, perform one manual installation to generate a new XML-file and use that file for subsequent upgrades. Leostream Agent 5.0.9 resolves issues installing newer features using the silent installer, which require the updated XML-file.

📝 Use the `AGENT_PORT` parameter in to the XML-file to specify a non-standard port for the Leostream Agent.

To perform silent installs, copy the XML-file and the original Leostream Agent installer to the new desktop. Use the following command to run the silent installation.

```
sudo java –jar LeostreamAgentJava-x.x.x.0.jar auto-install-xml-path
```

Where:

- `java` is the full path to the `java` binary
- `x.x.x.0` is the version number at the end of the installer file name
- `auto-install-xml-path` is the full path to your XML-file

Installing at the Console

To install the Leostream Agent into an environment that does not have a graphical user interface, invoke the installer with the `-console` option, as described in the following procedure. Note that this procedure is for general guidance, only, and omits additional prompts that may occur when confirming the installation directory, etc.

1. Login to the desktop using the `root` account, or with an account that has permission to use the `sudo` command.

2. From the directory that contains the installer, issue the following command:

    ```
    java -jar LeostreamAgentJava-x.x.x.x.jar -console
    ```

    Where `x.x.x.x` is the version number at the end of the installer file name. Run this command using `sudo` if you are not logged in with the `root` account. If the desktop has multiple JDK versions, enter the full path to the correct Java installation.

    The following instructions appear at the console.

    ```
    Command line arguments: -console
    ───────────────────────────────────────────────────
    Welcome to the Leostream Agent Setup Wizard
    ───────────────────────────────────────────────────
    This setup wizard will install Leostream Agent for Java™ 5.1.13.0
    The homepage is at: http://www.leostream.com/

    Press 1 to continue, 2 to quit, 3 to redisplay
    ▄
    ```

3. Enter `1` to continue the installation. The Leostream End User License Agreement displays.

4. Read through the Leostream End User License Agreement. Enter `1` to accept the license agreement and continue the installation.

5. Enter the target path for the installation, typically `/opt/leostreamagent`.

6. Select the tasks that should be installed, starting with the Enable USB over IP task. Enter N to skip the task or Y to install the task.

7. Enter `1` to continue the installation.

8. If required, enter in the path to additional files needed to install the USB drivers or Desktop Experience.

9. Configure the Connection Broker address

    a. Enter `1` to instruct the Leostream Agent to look for a Connection Broker DNS SRV record, in order to discover the Connection Broker address. See the Leostream DNS

Setup Guide for information on configuring a DNS SRV record for your Connection Broker.

     b. Enter `0` to manually configure the Connection Broker address.

10. Enter the Connection Broker address. If you entered `1` in step 10, enter the Connection Broker address to use in the event a DNS SRV record cannot be found.

11. Press `1` to accept the Connection Broker address and complete the installation

Starting the Leostream Agent Service

The Leostream Agent service automatically starts after installation. Should you need to restart the service on a Linux desktop, use the associated `service` command for the given operating system on which the Leostream Agent is installed.

For example, on CentOS and Red Hat Enterprise Linux, use the `service` command.

```
systemctl start leostreamagentd
```

When installing the Leostream Agent on a macOS desktop, use the `launchctl` command, for example, to start the Leostream Agent:

```
sudo launchctl load /Library/LaunchDaemons/com.leostream.leostreamagentd.plist
```

To stop the Leostream Agent:

```
sudo launchctl unload /Library/LaunchDaemons/com.leostream.leostreamagentd.plist
```

Leostream Agent Files

In addition to the files in the installation directory, the installation adds the following files to the desktop.

- `/etc/leostreamagent.release`
- `/var/run/leostreamagentd.pid`
- `/var/log/leostreamagent.log`
- `/etc/init.d/leostreamagentd`
- `/etc/init.d/lsusbd` (when installing the USB component)

Installing Leostream Connect

## Installing on Microsoft® Windows® Operating Systems

You can install Leostream Connect on any Microsoft Windows operating system version currently covered by Mainstream Support under the Microsoft Fixed Lifecycle Policy, or in service under the Microsoft Modern Lifecycle Policy.

To install Leostream Connect, log into the client device with an account that has Administrator privileges for the desktop. Then, follow through the installation, as follows:

1. Run the Leostream Connect installer. Appendix A lists options available when running the installation from the command line. The Encoding the Connection Broker IP Address section shows how to change the name of the executable to encode your Connection Broker IP address into the installation.

2. Select the language to use during installation from the drop-down menu on the **Select Setup Language** dialog that opens.

3. Click **OK**.

4. On the page that appears, shown in the following figure:

   - Read the license agreement.

   - If you accept the license agreement terms, select the **I accept the agreement** option.
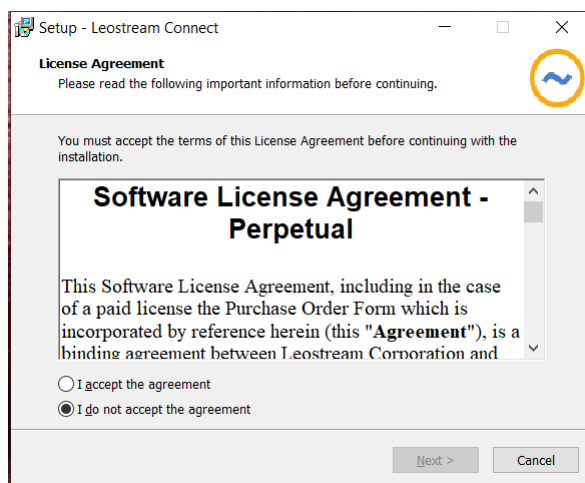
   - Click **Next >**.

5. If this is a new installation, enter or browse for the directory to install Leostream Connect into, as shown in the following figure:
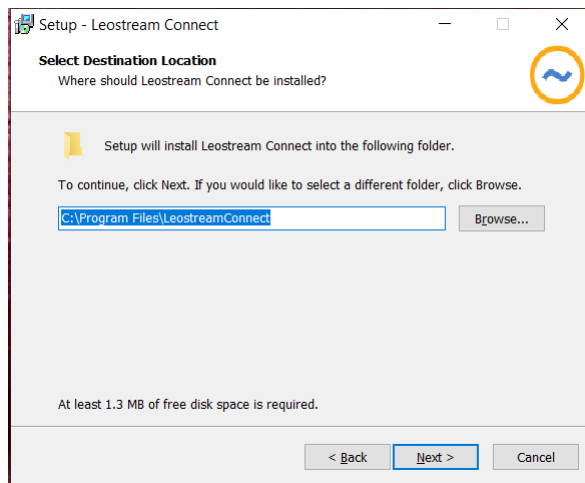
6. Click **Next >**.

7. On the page that appears, shown in the following figure, select any additional tasks to run. If you do not have administrator privileges on the desktop, you cannot select any additional tasks.
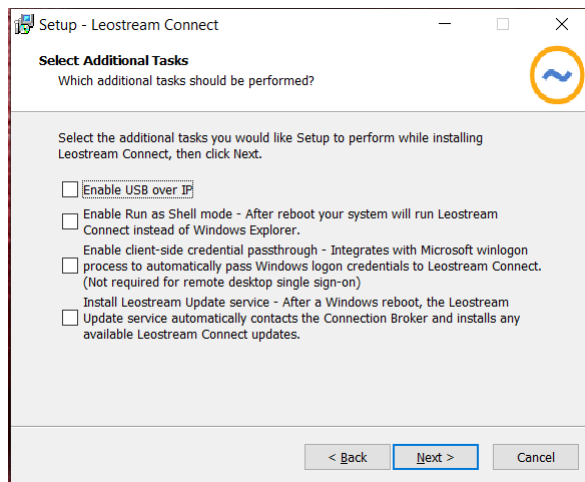
- **Enable USB over IP:** Select this task if you want USB devices attached to this client desktop to appear within the connected remote desktop. You must also install the Leostream Agent on the remote desktop with the USB over IP task selected.

  The installer installs either 32-bit or 64-bit drivers depending on the type of operating system that you are running. If you install the files for USB over IP support, you may have to reboot your Windows operating system.

  ⚠ Do not install this option if you have another USB-over-IP solution installed, for example, the HP® RGS solution. If two USB solutions are installed side-by-side, you may not be able to predict which solution is managing the USB devices.

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- **Enable Run as Shell mode:** Select this option to install Leostream Connect in shell mode. In shell mode, Leostream Connect replaces the `Winlogon` shell command, which is normally the Windows Explorer (explore.exe). See "Running Leostream Connect for Windows in Shell Mode" in the Leostream Connect Administrator's Guide and End User's Manual for more information on using, configuring, and removing shell mode support.

- **Enable client-side credential passthrough:** Select this option to install the Leostream Credential Provider on the client device. Client-side credential passthrough allows Leostream Connect to store the user's Windows login credentials, and automatically use those credentials when the user launches Leostream Connect.

  If client-side credential passthrough is used with shell mode, when the user logs into the client device, Leostream Connect automatically launches, logs the user into the Connection Broker using the credentials provided at login and, if the user is assigned a single desktop, launches the desktop connection.

- **Install Leostream Update service:** Select this task to instruct Leostream Connect to contact the Connection Broker and automatically install any available Leostream Connect updates. The Leostream Update service runs in the system context, therefore the user does not require administrator privileges on the client to upgrade Leostream Connect.

8. Click **Next>.**

9. On the **Leostream Connection Broker** page, shown in the following figure, specify the Connection Broker address to use for this Leostream Agent.

   - If you have a DNS SRV record for your Connection Broker, select the **Obtain Connection Broker Address automatically using DNS** option. See the Leostream DNS Setup Guide for information on configuring a DNS SRV record for your Connection Broker.

   - To enter a static Connection Broker address, clear the selection in the **Obtain Connection Broker Address automatically using DNS** option and enter the address into the **Address** field.

   - If you selected the **Enable Run as Shell mode** task, use the **Store Connection Broker address** drop-down menu to indicate if the default Leostream address is stored in the current user or local machine registry. If the device where you are installing Leostream Connect is used by multiple users, switch to the local machine registry to ensure that all users log into the same Leostream environment from this client device. This option is not shown if the **Enable Run as Shell mode** task is not being installed.
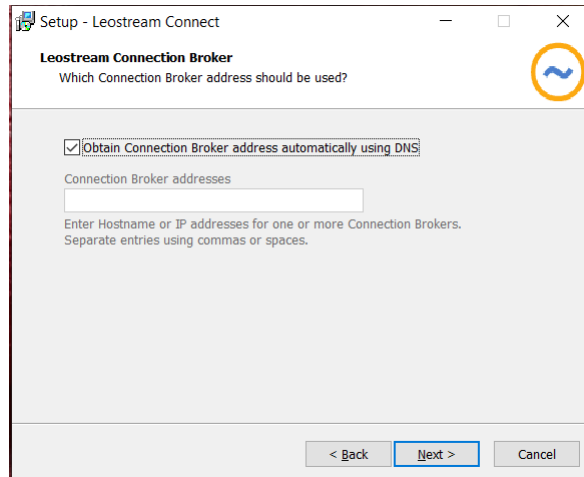
10. Review the installation setup in the **Ready to Install** page, and click **Install**.

11. When the installation completes, you may be given the option of restarting your computer. Select an option to restart now or later.

⚠️ If you do not restart the desktop when prompted, you may encounter difficulties when subsequently upgrading Leostream Connect.

12. If Leostream Connect does not require you to restart your computer, the following dialog opens:
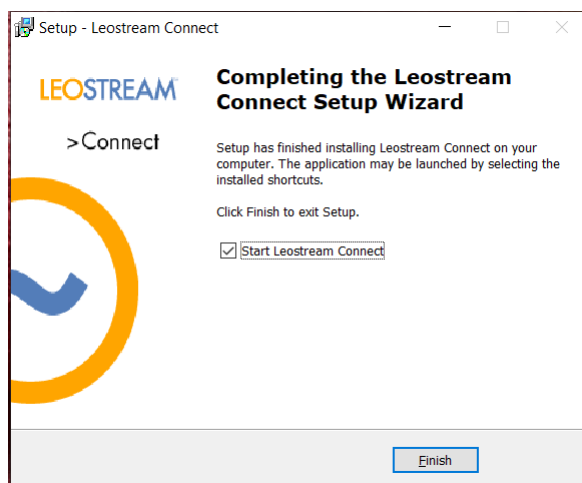

13. Click **Finish**, and the Leostream Connect icon appears on your desktop and in your **Start** menu.

Entering the Connection Broker IP Address

Leostream Connect can automatically determine the Connection Broker address by querying the DNS SRV records. See the Leostream DNS Setup Guide for information on configuring a DNS SRV

record for your Connection Broker. If you do not want to configure an SRV record, you can manually enter the Connection Broker IP address, as follows:

1. Launch Leostream Connect, for example, by double-clicking on the Leostream Connect icon.

2. Click **Cancel** on the **Login User** dialog. Alternatively, if you installed Leostream Connect in shell mode, press `Ctrl-Shift-O` to open the **Options** dialog, and skip to step 4.

3. Select **Options** from the Leostream Connect system tray menu.

4. In the **Broker** tab, uncheck the **Obtain Connection Broker address automatically** option. The **Address** edit field enables, as shown in the following figure.
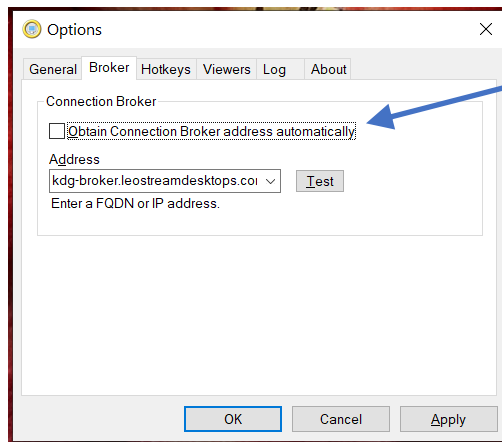
5. Enter the Connection Broker address in the **Address** edit field.

6. Click **Apply** to accept the address, or **OK** to accept the address and close the dialog.

You can click **Test** to check if the Connection Broker address you entered is valid. A dialog opens, indicating if the Leostream Connect client can contact the Connection Broker at the specified address.

Installing on Linux® and Apple® macOS® Operating Systems

The Java version of Leostream Connect can be downloaded from the Leostream **Downloads** Web page:

https://www.leostream.com/resource/leostream-connect-for-linux-and-macos/

The Java version of Leostream Connect on Linux requires the following additional software be installed on your client device.

- A desktop environment
- A JDK version 1.7 or higher

Leostream Connect is packaged with a graphical installer that runs on the following operating systems or derivation of these operating systems.

- Apple macOS
- CentOS
- Debian
- Fedora
- SUSE Linux Enterprise
- Red Hat Enterprise Linux
- Ubuntu

⚠️ You cannot perform a network install of the Java version of Leostream Connect.

Prerequisites for Installing USB over IP Support on Linux

Leostream provides USB redirection for 32- and 64-bit Linux operating systems. On Linux operating systems, the Leostream Connect installer must build the USB drivers. In order to build the drivers, Leostream Connect requires the following two header files:

- `hcd.h`
- `hub.h`

Leostream Connect provides these header files for kernel versions 2.6.15 through 2.6.34. Higher kernel versions include these header files in the kernel source.

⚠️ USB redirection is not supported for kernel versions higher than 5.5.

Leostream Connect uses files in the kernel source directory to execute the `make` command to builds the drivers. These files are typically located in `/usr/src/kernels`. If your operating system does not provide the required kernel files, use the appropriate distribution method for your operating system to download and install the files.

For example, use the following commands for desktops running CentOS.

```
yum update kernel
yum install gcc kernel-devel
```

For Ubuntu 18, ensure `gcc` and the `build-essential` packages are installed.

You must install the kernel source that exactly machines your kernel version. To determine which kernel version your Linux desktop is running, execute the following command.

```
uname -r
```

Installation Instructions

📝If you plan to install the Leostream USB over IP feature, you must install Leostream Connect as `root.`

To install Leostream Connect:

1. From the directory that contains the installer, issue the following command:

   ```
   java -jar LeostreamConnectJava-x.x.x.x.jar
   ```

   Where $x.x.x.x$ is the version number at the end of the installer file name. If the desktop has multiple JDK versions, enter the full path to the correct Java installation. The installer **Welcome** page, shown in the following figure, opens.
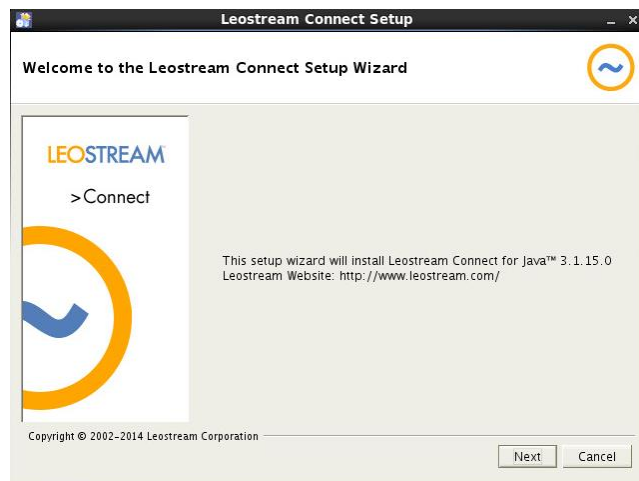
2. To run the installer with debugging trace turned on, include the following text in the command line:

   ```
   -DTRACE=true
   ```

   For example:

   ```
   java -DTRACE=true -jar LeostreamConnectJava-x.x.x.x.jar
   ```

3. Click **Next**.

4. The **License Agreement** page opens, as shown in the following figure.

In this page:

a. Read the license agreement.

b. If you accept the license agreement terms, select the **I accept the terms of the license agreement** option.

c. Click **Next**.

5. In the **Additional Tasks** page, shown in the following figure, select the appropriate tasks to complete during installation. By default, you must install the **Leostream Connect for Java** task.
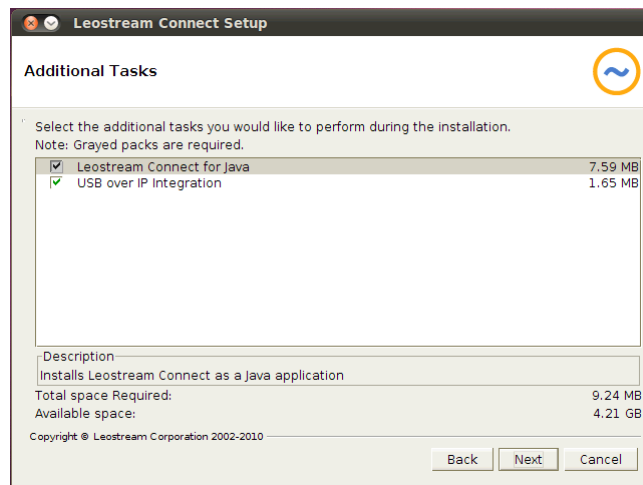

a. If you are using Leostream to redirect USB devices from the client to the remote desktop, select the **USB over IP integration** option. This option is not available when installing on macOS.

b. After selecting the appropriate tasks, click **Next**.

6. In the **Installation Directory** page, enter or browse for the location to install Leostream Connect.
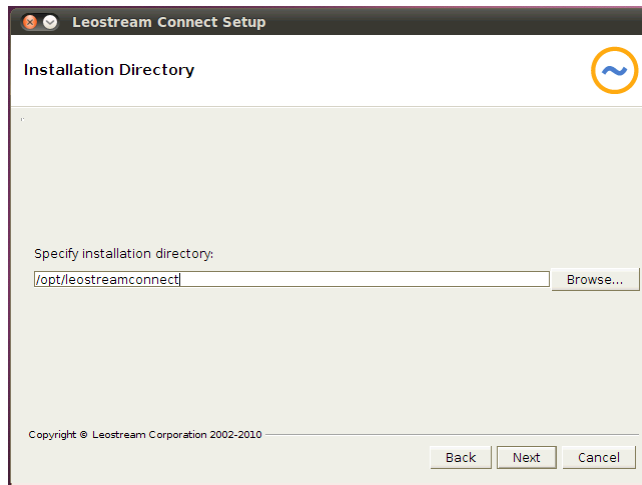
7. Click **Next**.

8. If necessary, the installer warns you that it will create or over write the installation directory. Click **OK** to accept the warning and move on with the installation, or **Cancel** to enter a different directory.

9. In the **Configuration** page, specify the Connection Broker address to use with Leostream Connect. If you have a DNS SRV record for your Connection Broker, leave the **Connection Broker Address** field empty and select the **Enable auto-detection of broker using DNS** option. See the Leostream DNS Setup Guide for information on configuring a DNS SRV record for your Connection Broker.

   To enter a static Connection Broker address, uncheck the **Enable auto-detection of broker using DNS** option and enter the address into the **Connection Broker Address** field.
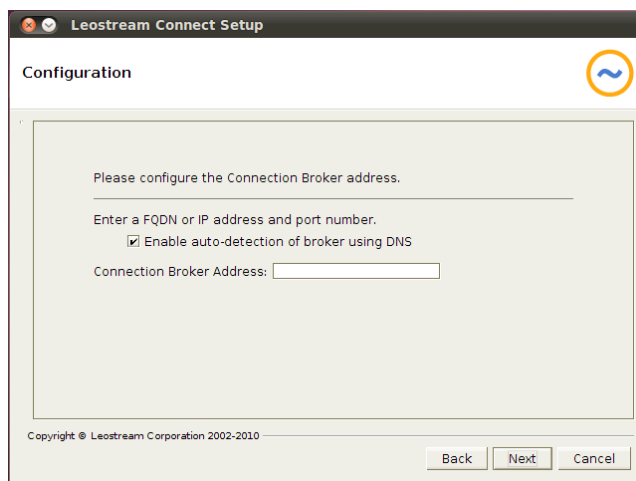
   You can specify or change the Connection Broker address associated with Leostream

Connect at any time, by modifying the `lc.conf` file. See the <u>Leostream Connect Administrator's Guide and End User's Manual</u> for information on using this file.

10. Click **Next**.

11. If you selected the **USB over IP integration** task, specify the full path to the Linux kernel build directory, as shown in the following figure.
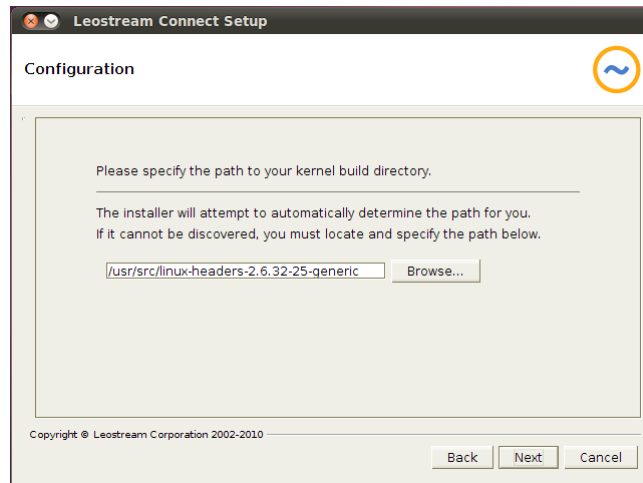
The installer validates this directory by looking for the `module.symvers` file. If this file does not exist in the specified directory, you cannot continue with the installation.

12. Click **Next**.

13. The **Ready to Install** page, shown in the following figure, provides a summary of the settings you set in the installer. Click **Next** to begin the installation.
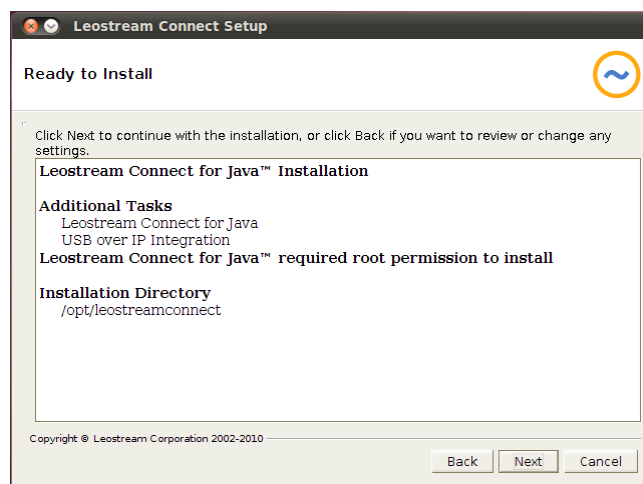
14. The installer displays the progress of the installation. If you are installing the USB over IP feature, the installer appears to pause halfway through the installation. At this point, the installer is building the drivers necessary for USB support, which may take a couple

minutes. After the installation completes, click **Next**.

15. In the **Installation Finished** window, click **Generate an automatic installation script** if you want to generate an XML-file that can be used to perform silent installations of Leostream Connect on other clients.

16. Click **Done** to exit the installer.

If you installed the USB drivers, check that the daemon is live by running the following command:

```
cat /proc/modules |grep lsusbd
```

If the daemon is not live, contact support@leostream.com for a resolution.

Leostream Connect Files

In addition to the files in the Leostream Connect installation folder, the installer adds the release information file `leostreamconnect.release` to the client device. The location of this file depends on whether the installer was run as `root`, or not.

- If installing as `root`, the file is located in `/etc/leostreamconnect.release`

- If not installing as `root`, the file is located in the `.leostream` directory, found in the home directory of the user who ran the installer.

Leostream Connect creates a `.leostream` directory in the user's home directory. This directory has the following purposes.

- When Leostream Connect runs, it creates a `.lock` file in the `.leostream` directory to prevent simultaneously running multiple instances of Leostream Connect.

- By default, Leostream Connect stores logs in the Leostream Connect installation directory. If Leostream Connect cannot write logs to the specified log directory, then Leostream Connect creates an `lc.log` file in the user's `.leostream` folder to keep track of errors and debugging information.

- If the user running Leostream Connect cannot write to the `lc.conf` file found in the installation directory, or cannot write to the `lc.conf` file in the directory specified when running Leostream Connect, then Leostream Connect creates an `lc.conf` file in the user's `.leostream` folder.

Silent Installations using XML-Files

The Java version of Leostream Connect supports silent installation using an XML-file. You must perform the installation once using the Graphical Installer and click the **Generate an automatic installation script** option on the final panel in the installer to generate the required XML-file.

⚠️ If you generated an XML-file from a version of Leostream Connect older than version 3.5.13,

perform one manual installation of the new version of Leostream Connect to generate a new XML-file. Use the new file for subsequent upgrades.

To perform a silent installation, copy the generated XML-file and the original Leostream Connect installer to the new client device. Use the following command to run the silent installation.

```
sudo java –jar LeostreamConnectJava-x.x.x.0.jar auto-install-xml-path
```

Where:

- `java` is the full path to the `java` binary
- `x.x.x.0` is the version number at the end of the installer file name
- `auto-install-xml-path` is the full path to your XML-file

Installing Leostream Connect on Thin Clients

Some thin clients include a native Leostream client. For thin clients that do not include a Leostream component, you can install the Leostream Connect software client.

- To access the Leostream Connection Broker from a thin client running Microsoft Windows embedded operating system, install the Windows version of the Leostream Connect client.

- To access the Leostream Connection Broker from a thin client running a version of a Linux operating system, install the Java version of the Leostream Connect client.

When you install the Java version of Leostream Connect, the client creates a client ID, which it sends to the Connection Broker when a user logs in from that thin client. The Connection Broker uses the client ID to uniquely identify different physical client devices.

If you clone your thin clients from a standard image that includes a Leostream Connect installation, you may create multiple unique physical devices with the same client UUID. The replicated client identifiers cause the Connection Broker to incorrectly inventory your client devices.

To avoid this problem, delete the `.clientuuid` file found inside the Leostream Connect installation directory on the image used to build your thin clients. Alternatively, you can select a different attribute to identify clients from the **Uniquely identify clients using** option on the Connection Broker **> System > Settings** page.

Appendix A: Command Line Options for the Windows version of Leostream Connect and Leostream Agent

Installing from the Command Line

If you install Leostream Connect or the Leostream Agent from the command line, you can specify the following options. You can list options in any order. Any option that requires an input, such as the `/CBADDRESS` parameter, must be followed by an equal sign.

- `/CBADDRESS` - The Connection Broker address, for example:

  `/CBADDRESS=leostreamcb.yourcompany.com`

- `/AGENTPORT` - *(Leostream Agent, only)* The Leostream Agent listening port. This port number appears in the **Port to listen on** field in the Leostream Agent Control Panel dialog.

- `/CONNECTLOGIN` - *(Leostream Connect, only)* Sets the default value for the **Connect to desktop after login** option on the **General** tab of the Leostream Connect **Options** dialog. If `/CONNECTLOGIN=0`, the option is not selected. Default is `1`. Each user can individually override the default value.

- `/LOG="path\filename"` - Causes the setup to create a log file in the fixed filename specified as `"path\filename"`.

- `/NOCANCEL` - Prevents the user from cancelling the installation by disabling the **Cancel** button and ignoring clicks on the **Close** button.

- `/NORUN` – Prevents the installation wizard from prompting the user to start Leostream Connect at the end of the installation process. When used together with the `/VERYSILENT` parameters, prevents the installer from running Leostream Connect immediately after the installation completes.

- `/NORESTART` - Instructs the installer not to reboot, even if a reboot is necessary, as is the case when installing the Leostream USB drivers.

- `/SILENT, /VERYSILENT` - Installs without displaying messages.

- `/SUPPRESSMSGBOXES`: Instructs setup to suppress message boxes. This option has an effect only when combined with `/SILENT` and `/VERYSILENT`.

- `/LANG=language` - Specifies the language to use. When a valid `/LANG` parameter is used, the **Select Language** dialog is suppressed. Valid `/LANG` parameter include:

    - `enUS`: English
    - `frFR`: French
    - `deDE`: German

    The `/LANG` option does not apply to Leostream Agent installations. The Leostream Agent supports only English.

- `/LOADINF="filename"` - Instructs the installer to load the settings from the specified file after having checked the command line. This file can be prepared using the `/SAVEINF=` command.

- `/SAVEINF="filename"` - Instructs the installer to save installation settings to the specified file. You must use quotes if the filename contains spaces.

- `/RESTARTEXITCODE=exit code` - Specifies the custom exit code to return when a restart is needed.

- `/DIR="x:\dirname"` - Overrides the default directory name displayed on the **Select Destination Location** wizard page. A fully qualified pathname must be specified.

- `/TASKS="comma separated list of tasks names"` - Specifies a list of installation tasks. When this option is used, the installer selects only the specified tasks; the remaining tasks are not selected.

    The Leostream Connect installer supports the following tasks.

    - `shell`: Installs Leostream Connect in the Windows shell
    - `singlesignon`: Installs the client-side single sign-on feature
    - `updateservice`: Installs the Leostream Connect update Windows service
    - `usb`: This option requires USB pass through support for Leostream Agent

    The Leostream Agent installer supports the following tasks.

    - `usb`: This option requires USB pass through support for Leostream Connect
    - `singlesignon`: Installs the Leostream Credential Provider for Windows SSO

    For example, use the following option to install Leostream Connect with the USB and Single Sign-On tasks:

    ```
    /TASKS="usb,singlesignon"
    ```

    Use the `/MERGETASKS` parameter to keep the default set of tasks selected, while selecting or deselecting other tasks

- `/MERGETASKS="comma separated list of tasks names"` - Changes the default set of installation tasks. When this option is used, specified tasks are selected or deselect from the default set of installation tasks. To deselect a task, prefix the task name with an exclamation point (!). For example, the following option turns off the default USB task for Leostream Connect, and turns on the desktop task.

    ```
    /MERGETASKS="!usb,desktop"
    ```

Uninstalling from the Command Line

You can find Leostream Connect and Leostream Agent uninstallers in the installation directory of the respective application. The uninstaller accepts optional command line parameters that can be useful for system administrators and other programs calling the uninstaller.

You can call the uninstaller with the following options, listed in any order.

`/SILENT`, `/VERYSILENT`: When specified, the uninstaller will not prompt for startup confirmation or display a message when the un-installation is complete.

The uninstaller automatically deletes shared files that are no longer in use, without prompting. However, the uninstaller continues to display any critical error messages. When `/VERYSILENT` is specified, the uninstaller does not display a progress window. If a restart is necessary and the `/VERYSILENT` option is used, the uninstaller reboots without promptly unless the `/NORESTART` option is also specified.

`/SUPPRESSMSGBOXES`: Instructs the uninstaller to suppress message boxes. This option applies only when combined with the `/SILENT` or `/VERYSILENT` options.

`/LOG="filename"`: When specified with an optional `filename`, allows you to specify a fixed path and filename to use for the log file. If a file with the specified name already exists, the uninstaller over-writes the file. If the file cannot be created, the uninstaller aborts with an error message. When used without a filename, Leostream Connect writes logs to the default directory.

`/NORESTART`: Instructs the uninstaller not to reboot, even if a reboot is necessary.

Encoding the Connection Broker Address

Leostream Connect and the Leostream Agent installers allow you to encode the Connection Broker address and port into the name of the executable file. The executable name can take one of the following four forms:

- Standard setup name: `LeostreamConnectSetup.exe` or `LeostreamAgentSetup.exe`

- Standard setup name with version number: `LeostreamConnectSetup2140.exe` or `LeostreamAgentSetup4120.exe`

- Standard setup name with Connection Broker IP address:

  `LeostreamConnectSetup_cb-address.exe` or
  `LeostreamConnectSetup_cb-address_cb-port.exe`

  or

  `LeostreamAgentSetup_cb-address.exe` or
  `LeostreamAgentSetup_cb-address_cb-port.exe`

  `where cb-address` is your Connection Broker IP address and `cb-port` is the Connection Broker port.

- `Setup` with Connection Broker DNS name, for example:

    o `Setup_cb.your-company.com.exe`
    o `Setup_cb.your-company.com_cb-port.exe`

       Where `cb.your-company.com` is the DNS name for your Connection Broker and `cb-port` is the Connection Broker port.