leostream

Remote Desktop Access Platform

Using Leostream with HPE Moonshot Systems

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Table of Contents

Introduction

What is HDI?

A Hosted Desktop Infrastructure (HDI) provides users with a Microsoft Windows or Linux desktop by using high-density, unshared desktop images running on enterprise hardware. Each user's desktop image runs on dedicated, unshared hardware and each end user remotely accesses their desktop image using a display protocol and client device.

Why HDI?

An HDI solution shares many of the benefits of a classic virtual desktop infrastructure (VDI) deployment, while solving the problems commonly associated with VDI. VDI and HDI both deliver data security, power savings, and centralized management. Traditional VDI environment, however, are often performance challenged, especially when compared to traditional desktop paradigms.

Common VDI deployments may host over 100 virtual desktops on a dual socket server where joint sharing of resources like compute, memory, storage, and networking causes bottlenecks and poor user experience. Addressing these deficiencies by deploying additional resources significantly increases the cost of VDI environments.

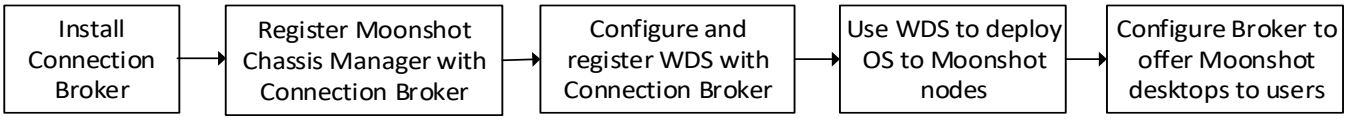
A key aspect of the end-user experience is video quality. In VDI, achieving exceptional video quality can be a challenge because GPU functionality is typically provided by software rendering on the system CPU instead of specialized hardware. Direct-mapped GPU technology in the virtual environment or virtualizing dedicated GPU hardware among many users exists today, but user density is very low and the cost is higher.

Enter HDI. The HPE Moonshot System HDI solution leverages the HPE ProLiant m700 Server Cartridge and latest SoC (System on a Chip) from AMD with built-in GPU/APU. This solution enables delivery of a natural desktop video experience, all in a low-power envelope with high density.

Solution Overview

The Leostream HDI solution is designed to work with HPE Moonshot System to help administrators manage and connect users to persistent desktops on HPE ProLiant m700 Server cartridges.

The solution consists of the following high-level configuration steps.



The following sections describe the components included in the solution.

HPE Moonshot System and HPE Moonshot 1500 Chassis

The HPE Moonshot System is a leap forward in infrastructure design that addresses speed, scale, and specialization needs. The HPE Moonshot 1500 chassis provides several shared functions that are leveraged by HDI solutions. The HPE Moonshot System provides a variety of servers, which HPE designates as cartridges, which are purpose-built for different workloads. For HDI workloads, the HPE Moonshot System utilizes the HPE ProLiant m700 server cartridge.

HPE ProLiant m700 Server Cartridge

The HPE ProLiant m700 Server Cartridge features four AMD Opteron X2150 APUs for hosted desktop infrastructure workloads. With integrated graphics acceleration, this cartridge is the foundation of the HPE Moonshot System, delivering 44% lower TCO than traditional desktops while improving security and compliance for mobile workers.

Because each user has an independent CPU, NIC, RAM, SSD storage, and GPU, the high-density HPE Moonshot System delivers a fully functional PC desktop experience to each user. Users enjoy consistent, reliable performance and high-quality service running varied individual workloads.

HP ZCentral Remote Boost Software

HP ZCentral Remote Boost Software (RGS) provides flawless, secure, and instant access to desktops hosted in an HPE Moonshot system from any location. Remote Boost provides 3D graphics support for the latest versions of Open GL and Direct X.

All applications run natively on the remote desktop, taking full advantage of its graphics resources. The remote desktop is transmitted over a standard network to a window on a local computer using advanced image compression technology specifically designed for digital imagery, text, and high frame rate video applications.

A local keyboard and mouse are supported, as well as redirection of most USB devices to provide an interactive, high-performance workstation experience.

Leostream

Leostream lies at the heart of any HDI deployment, and is the key component for deploying operating systems to HPE Moonshot nodes, assigning desktops to users, connecting users to their desktops, and controlling the end-user experience. When used with an HPE Moonshot System, the Leostream Connection Broker deploys operating system to the individual nodes using Microsoft Windows Deployment Services.

The Leostream Platform consists of the following four components.

- **Connection Broker**: The main application that manages the hosted desktop environment. The Connection Broker is the central management layer for configuring your deployment, including inventorying and provisioning desktops, assigning and connecting users to these desktops, and defining the end-user experience. The Connection Broker also includes a web portal for users to access their hosted resources.

- **Leostream Gateway:** An optional application that provides HTML5-based clientless remote access for users connecting to their remote desktop. The Leostream Gateway also provides gateway functionality for protocols such as RDP, HP ZCentral Remote Boost, NICE DCV, and Mechdyne TGX, to connect users to desktops that are hosted in a network that is isolated from the user's client device.

- **Leostream Agent**: When installed on the remote desktop, the Leostream Agent provides the Connection Broker with insight into the connection status of remote users, including when they log out, disconnect, or are idle on their desktop. The Agent also manages enhancements such as USB device passthrough and network printer redirection. The Leostream Agent is available for Microsoft Windows, Linux and macOS operating systems. For more details, see the **Leostream Agent Administrator's Guide**.

- **Leostream Connect:** A software client provided by Leostream that allows users to log into your Leostream environment and access their hosted resources from fat or thin clients. Using Leostream Connect, you can repurpose existing desktops and laptops as client devices, lowering the cost of VDI deployments. Some thin clients provide built-in Leostream Connect clients. For more details, see the **Leostream Connect Administrator's Guide**.

Related Documentation

- Leostream Installation Guide: How to install the Connection Broker, Leostream Connect, and Leostream Agent

- Working with Display Protocols: Information on managing HP ZCentral Remote Boost connections using Leostream

- Leostream Gateway Guide: Information on using the Leostream Gateway for remote access

Leostream Connection Broker Installation

Enterprise Linux® 8.x operating system and its derivatives such as Rocky Linux and AlmaLinux OS.

 The Connection Broker does not install on CentOS 8, on any operating system based on Fedora, or any other Linux distribution.

When creating a virtual machine for the Connection Broker installation, ensure that the VM has, at least, the following resources.

- 2 vCPU
- 8.0 Gbytes of RAM
- At least 20 Gbytes of hard drive space
- One NIC, ideally with Internet connectivity

Prior to installing your Connection Broker, install the latest updates to the operating system. See the Leostream Installation Guide for full Connection Broker installation instructions and the procedure for applying your Leostream license.

Configuring Windows Deployment Services

Creating an Initial Install Image

Leostream deploys operating systems to the cartridge nodes using Windows Deployment Services. Before adding a standard Windows operating system image to your WDS server, you may want to customize it by adding applications, data, etc. Most importantly, to provide Remote Boost connections to your users, you must install the Remote Boost Sender, as well as the AMD graphics drivers, available through www.hp.com.

In order to deploy a Windows image onto a Moonshot cartridge, the Windows image must be modified using a software bundle provided by HPE. The HPE software bundle contains the minimum set of drivers necessary to deploy a functional Windows image on the cartridge, as well as scripts and unattend files to use in Windows Deployment Services. Using the scripts, drivers and unattend files in the software bundle, the deployed instance of Windows has SAC and RDP enabled.

For a full description on creating a custom Windows image and modifying the boot and install images using the HPE software bundles, see the Operating System Deployment on HPE ProLiant Moonshot Server Cartridges Users Guide.

Installing the Leostream Agent

In order to use your Windows Deployment Services with Leostream, you must install the Leostream Agent on the Windows server hosting WDS. See the Leostream Installation Guide for complete instructions. When installing the Leostream Agent, do not select any additional tasks to install.

By default, the Leostream Agent looks for a DNS SRV record associated with your Connection Broker. If you do not have a Connection Broker DNS SRV record, you can enter your Connection Broker address during installation.

Setting Windows Deployment Server Options

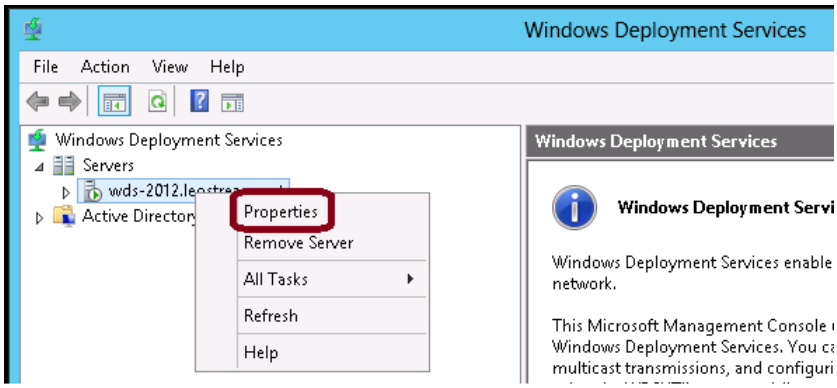
Before configuring WDS for use with Leostream, create your custom Moonshot boot and install images and add them to the Windows Deployment Services management interface. Information on configuring your Windows images for use with HPE Moonshot Systems can be found in the Operating System Deployment on HPE ProLiant Moonshot Server Cartridges Users Guide. After your Moonshot boot and install images are listed in your WDS server, configure your WDS server as described in the following sections.

General Windows Deployment Services Properties

Leostream requires you to specify default images and PXE boot responses in the WDS server. The following sections describe how to configure the WDS server properties to satisfy the Leostream requirements. To access your WDS server's **Properties** dialog:

1. Expand the **Servers** node in the **Windows Deployment Services** tree.

2. Right-click on the WDS server and select **Properties**, as shown in the following figure.



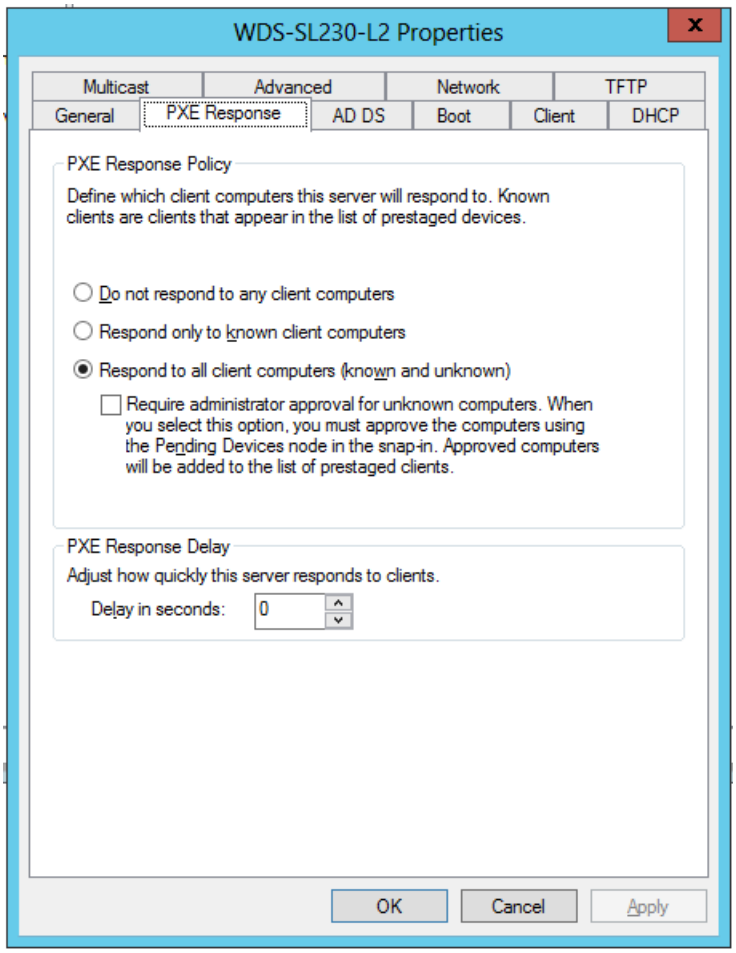
3. In the **Properties** dialog go to the tab indicated in the following sections.

PXE Response Policy

Leostream supports deploying Windows images to all known clients and to pre-staged clients. To specify which clients the WDS server manages, open the **Properties** dialog for your WDS server and click on the **PXE Response** tab. Select one of the following two options, shown in the following figure.

- **Respond only to known client computers**: In this case, you must configure Prestaged Devices to indicate which client computers Leostream manages (see **Prestaged Devices**).

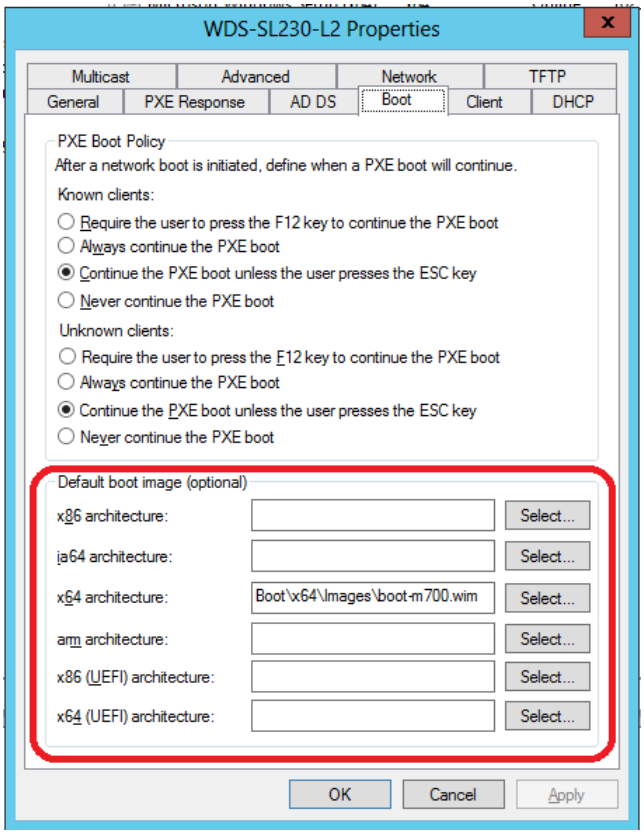
- **Respond to all client computers (known and unknown)**: In this case, Leostream manages the Windows deployment for all client computers PXE booting on this network (see PXE Boot Policy), for example:



Regardless of which option you select, ensure that you configure the PXE boot to proceed without requiring user intervention, described in later sections.

Default Boot Images

Leostream supports deploying images to Moonshot cartridges based on the default images. To set the default images, go to the **Boot** tab of the Windows Deployment Services **Properties** dialog. Regardless of whether you plan to respond to all client devices or only to prestaged devices, you must specify a default image for the Moonshot architecture, as shown in the **Default boot image** section of the following figure.



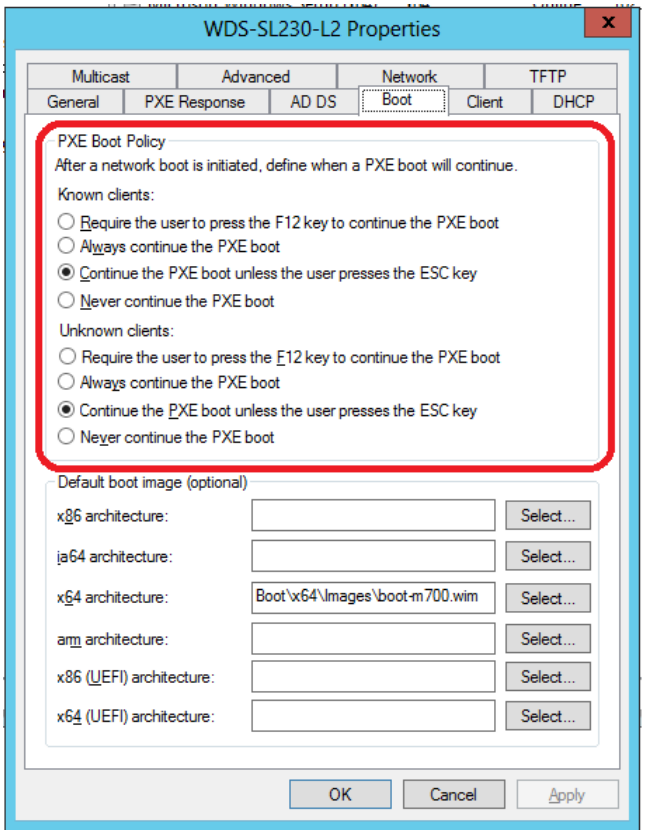
When you create a Windows Deployment Services center in your Connection Broker, Leostream modifies the default image to include necessary Leostream components. Leostream modifies only the default image for each architecture. If you need to use different images for different nodes, contact ***support@leostream.com*** *for instructions on how to modify multiple images.*

PXE Boot Policy

If you configure the **PXE Response** tab in your WDS server to respond to all client computers, use the **PXE Boot Policy** section in the **Boot** tab of the Windows Deployment Services **Properties** dialog to ensure that you are not required to confirm the PXE boot. Select one of the following options.

- **Always continue the PXE boot**
- **Continue the PXE boot unless the user presses the ESC key**

For example:



Client Properties

In order to automate the operating system installation, specify a client unattend file for the default boot images. Go to the **Client** tab on the Windows Deployment Services **Properties** dialog and configure the following settings.

- Select the **Enable unattended installation** option.
- For the Moonshot architecture, specify the client unattend file.

For example:

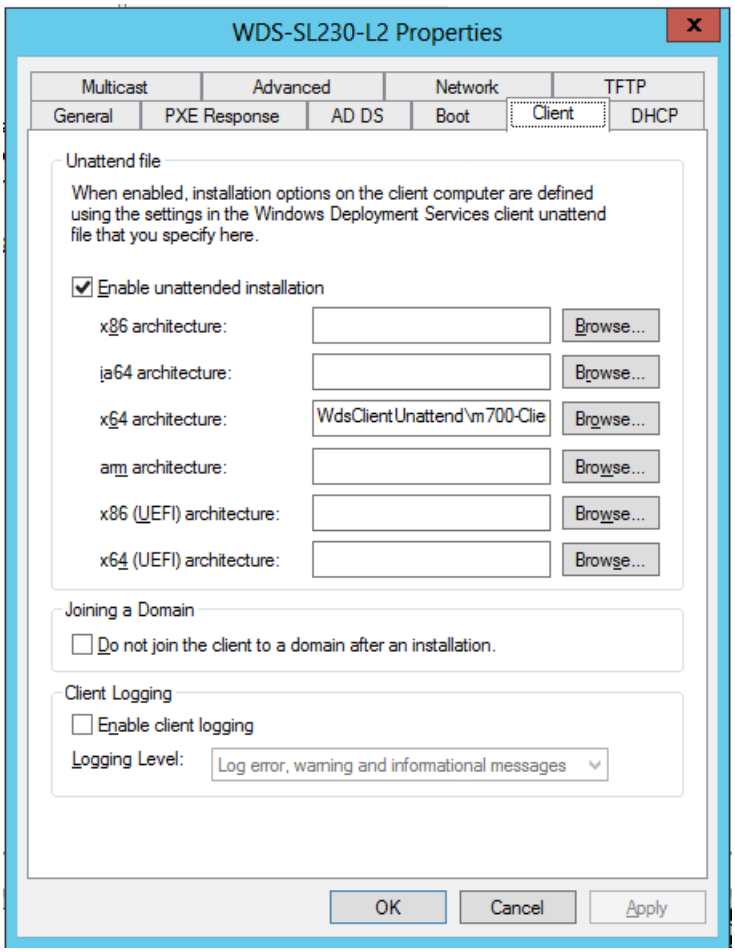


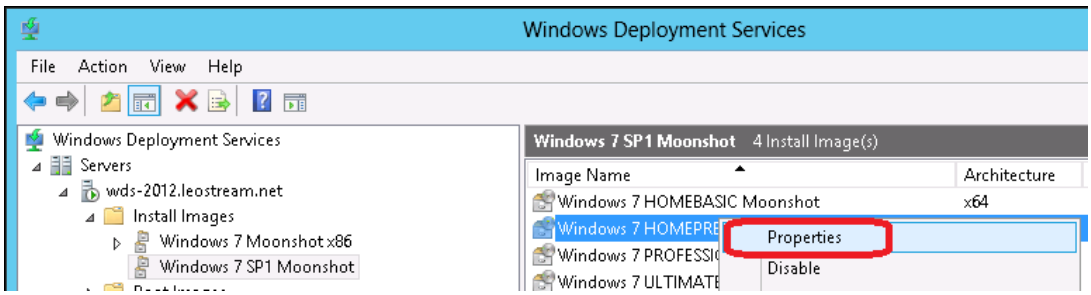
Image Properties

You must select an image unattend file in order to automate the Windows Operating System installation. To set the image unattend file:

1. Click on the **Install Images** folder in the **Windows Deployment Services** tree.

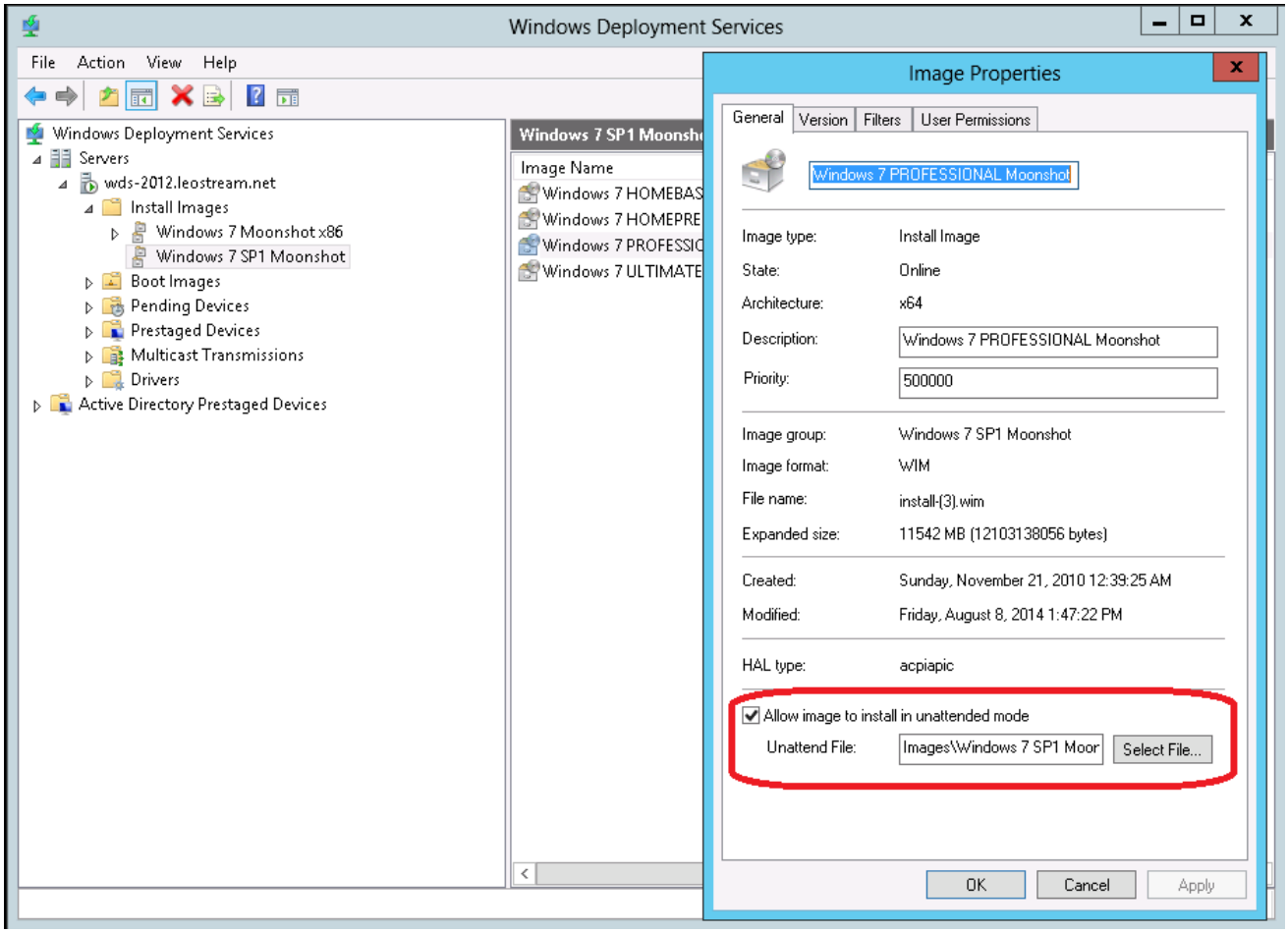
2. Select the image group that contains the image you plan to deploy to the Moonshot cartridges.

3. Right-click on the Image name in the list, and select **Properties**, for example:



4. Select **Allow image to install in unattended mode**

5. Specify the **Unattend File**, for example:



Prestaged Devices

*You do not need to configure prestaged devices if you selected **Respond to all client computers (known and unknown)** for the PXE Response Policy (see PXE Response Policy).*

The **Prestaged Devices** folder contains a list of known client devices that the WDS server will respond to when they perform a PXE boot. Prestaging clients allows you to restrict the WDS server to respond only to a set of client devices, for example, just your Moonshot nodes.

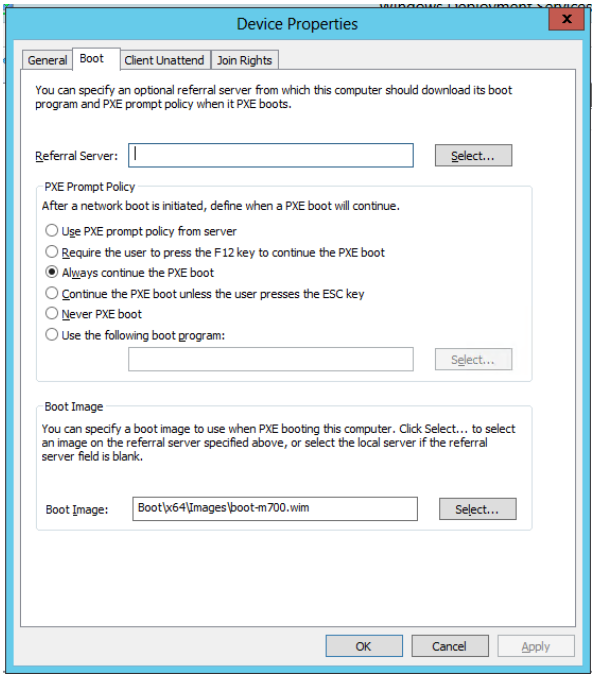
If you configure your WDS server to respond only to known client computers, you must configure the PXE Prompt Policy and Boot images on the **Device Properties** dialog. After you add your prestaged devices, right-click on each device and select the **Properties** option.

In the **Device Properties** dialog that opens, click on the **Boot** tab and configure the following two settings.

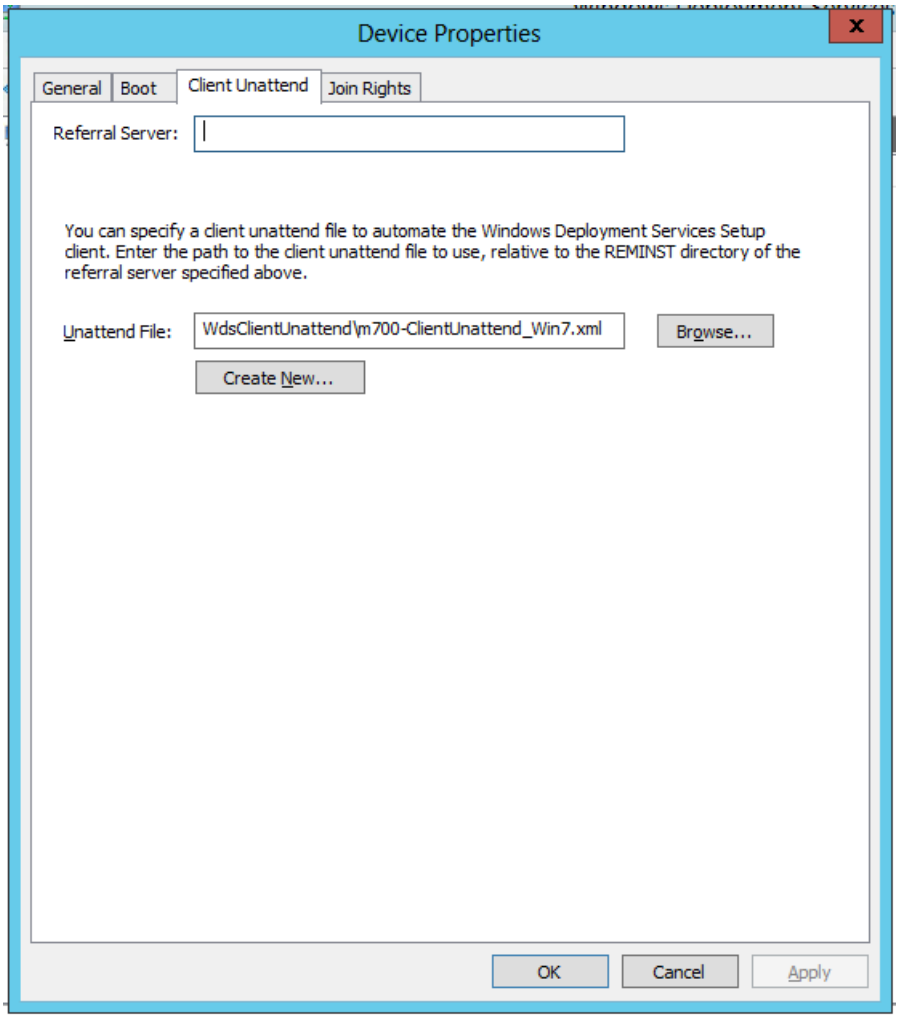
- Set the **PXE Prompt Policy** to either **Always continue the PXE boot** or **Continue the PXE boot unless the user presses the ESC key**: This setting ensures that you do not have to interact with the nodes console in order to perform the PXE boot.

1. Set the **Boot Image** to the default boot image specified for the Windows Deployment Services (see **Boot Settings**)

For example:



Next, on the **Client Unattend** tab of the **Device Properties** dialog, select the unattend file for this prestaged device, for example:



Click **OK** to save all changes to the device properties. You must individually configure each prestaged device.

Creating a Windows Deployment Server Center

After you configure your Windows Deployment Services, to use it with Leostream and deploy Windows images to your Moonshot nodes, create a Windows Deployment Services center in your Connection Broker.

*Leostream defines **centers** as the external systems that the Connection Broker communicates with to inventory desktops and other resources (such as OS images, printers, and Teradici PCoIP devices).*

To create a Windows Deployment Services center:

1. Go to the **> Setup > Centers** page in your Connection Broker.

2. Click the **Add Center** link.

3. In the **Add Center** form, select **Windows Deployment Services** from the **Type** drop-down menu.

4. In the **Name** edit field, enter a user-friendly display name for this center.

5. In the **Hostname or IP address of the Windows deployment services server** edit field, enter the WDS server address.

6. To limit the number of concurrent deployment commands sent to the WDS server, enter that limit into the **Maximum concurrent deployments** edit field. Enter zero or leave the field blank to allow an unlimited number of simultaneous deployments.

   For information on configuring your WDS server to support a large number of concurrent connections, consult the Windows Server documentation on optimizing performance and scalability for Windows Deployment Services.

7. Enter any arbitrary notes into the **Notes** edit field.

8. Click **Save**.

When you save the form, the Connection Broker instructs the Leostream Agent installed on the WDS server to perform two tasks.

1. The Leostream Agent returns a list of all available Windows images and unattend files to the Connection Broker.

2. The Leostream Agent prepares all default images for deployment. During this step, the Leostream Agent is injected into the default image, allowing new desktops deployed from this image to register with the Connection Broker, automatically.

Contact **support@leostream.com** for information on how the Leostream Agent prepares the images for deployment by the Connection Broker.

Managing HPE Moonshot Systems

Creating an HPE Moonshot System Center

The Connection Broker manages HPE Moonshot Systems using the HPE Chassis Manager RESTful API. To create a center that communicates with the chassis manager:

1. Go to the **> Setup > Centers** page.
2. Click on **Add Center**. The **Add Center** form opens.
3. Select **HPE Moonshot System** from the **Type** drop-down menu.
4. Enter a name for the center in the **Name** edit field.
5. Enter the appropriate information in the **Hostname or IP address of Chassis Management Module** edit field.
6. In the **Username** and **Password** edit fields, enter the credentials for a user with administrator privileges to the Chassis Manager.
7. The **Inventory refresh interval** instructs the Connection Broker on how often to refresh the desktops imported from this center. The refresh interval is the length of time between when one refresh action completes and the next refresh action begins.

   For Moonshot, the refresh interval is responsible for checking the node's power state.
8. Leave the remaining settings at their default values and click **Save**. For a description of the additional center options, see "HPE Moonshot System Centers" in the Connection Broker Administrator's Guide.

After you save the center, the Connection Broker contacts the Chassis Manager and retrieves information about the cartridges and nodes installed in the chassis and displays the nodes on the **> Resources > Desktops** page. If the nodes do not have an installed operating system, or a running Leostream Agent, the Connection Broker retrieves only the nodes' MAC addresses from the chassis manager.

If the nodes have an installed operating system with a running Leostream Agent, the Connection Broker contacts the Leostream Agent to obtain information about the desktop's hostname, IP address, operating system version, alternate MAC address, etc.

You can click the **Status** link next to the HPE Moonshot System center to display the general information about the chassis, as well as temperatures, power supply status, and more (see **Viewing Chassis and Node Status**).

Deploying Operating Systems

You can deploy an operating system on to one or more nodes using the **Deploy** bulk action available for desktops, as follows.

1. Go to the **> Resources > Desktops** page in your Connection Broker.
2. In the **Bulk Action** column, select the checkbox associated with each desktop. To select all the listed desktops, click the check box at the top of the **Bulk action** column.

*If the check boxes are not visible, click the **customize** link at the bottom of the **> Resources > Desktops** page and add the **Bulk actions** column to the **Selected items** list.*

3. Select the **Deploy** action from the drop-down menu at the top of the column of checkboxes.
4. In the **Deploy desktop** form that opens, select the image to deploy from the **Operating system** drop-down menu. All nodes are deployed from the same image.

Ensure that you select an image that has been prepared to use on m700 Server cartridges.

5. Click **OK**.

The Connection Broker switches the boot mode of each selected node to PXE, and powers on (or restarts) the node. If the number of selected nodes exceeds the maximum number of concurrent deployments specified in the WDS center, the Connection Broker powers on the maximum number of allowed nodes and marks the remaining nodes as scheduled.

After the initial PXE boot succeeds and begins deploying the operating system to the node, the Connection Broker automatically switches the boot mode for that node to HDD.

The deployment completes when the Leostream Agent injected into the image installs and registers with the Connection Broker, providing the hostname and IP addresses of the newly deployed operating system. The node's **Power Status** switches to running and the remaining node information is populated.

Viewing Chassis and Node Status

The **Status** link for the HPE Moonshot System center you created on the **> Setup > Centers** page uses the Chassis Manager CLI to return basic status information for the Moonshot Chassis. You can use this information to track the internal temperature of the chassis, as well as the status of fans, etc.

The output displayed by clicking the **Status** link is a combination of the information provided by the following three chassis manager commands.

- `show chassis info`
- `show chassis status`
- `show chassis temperature`

The **Status** link on the **> Resources > Desktops** page provides information about any active connections to the desktop, if the Leostream Agent installed on the node is responding, as well as status information returned by the chassis manager.

*You can use the **Status** link for a desktop to retrieve status information from the chassis manager even if an operating system is not yet installed on the node.*

The output displayed by clicking the **Status** link for a desktop is a combination of the information provided by the following two chassis manager commands.

- `show node status`
- `show node detail`

Basic Connection Broker Configuration

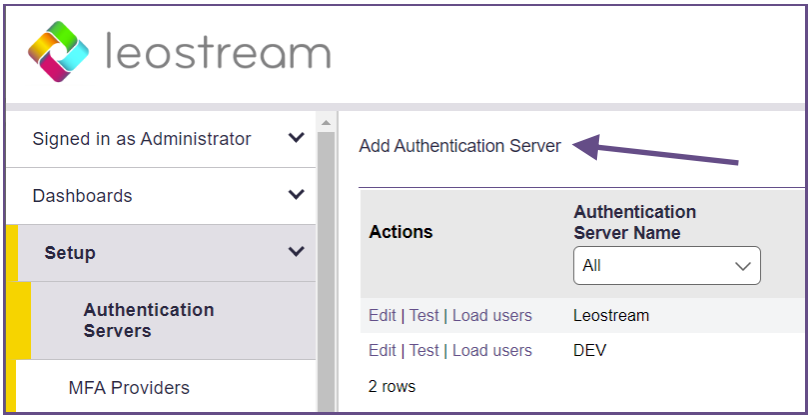
Adding Authentication Servers

The Connection Broker authenticates users and, in part, determines which policy to offer to a user based on the user's attributes in your authentication servers. The Connection Broker can authenticate users in standard LDAP systems, such as Active Directory and OpenLDAP™.

To add an Active Directory authentication server:

1. Go to the **> Setup > Authentication Servers** page.

2. Click **Add Authentication Server**, as shown in the following figure.

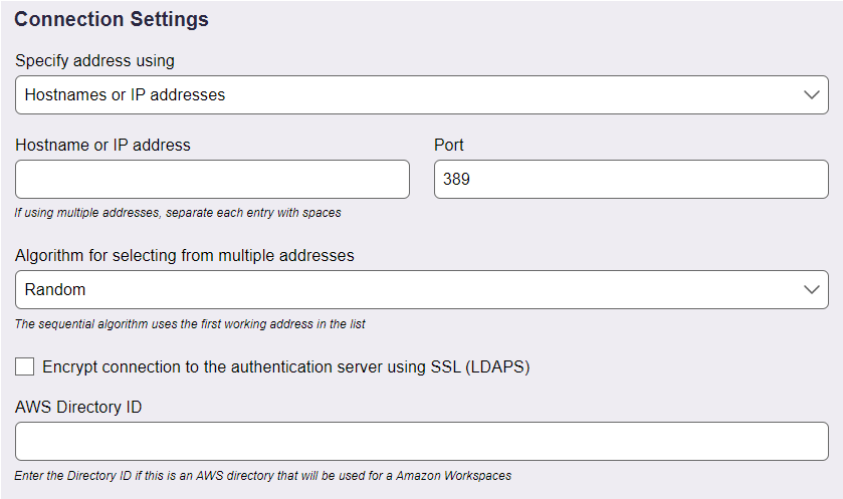


3. In the **Authentication Server name** edit field, enter a name for this record in the Connection Broker.

4. In the **Domain Name** edit field, enter the domain name associated with these Active Directory servers.

5. If you configure the **Authentication Server Features** on the **> System > Settings** page to include a domain field on the login page, use the **Include domain in drop-down** menu to indicate if this domain should be shown in that field. If you set the **Domain** field to be displayed as an edit field, select **Yes, as default** to populate the edit field with this domain.

6. In the **Connection Settings** section, shown in the following figure, point your Connection Broker to your Active Directory Server, as follows.



a. Select **Active Directory** from the Type drop-down list.

b. Enter the IP address or hostname of your Active Directory server in the **Hostname or IP address** edit field. To associate multiple Active Directory servers with this authentication server record, enter multiple authentication server addresses separated by blank spaces.

7. In the **Search Settings** section, enter the username and password for an account that has read rights to the user records. The Connection Broker does not write any information to your Active Directory server and does not need full administrator privileges to your AD server.

8. The **User Login Search** section, define where and how the Connection Broker looks for a user in the Active Directory tree.

   a. In the **Sub-tree: Starting point for user search** field, enter the fully qualified path in LDAP format to the top point on the authentication server tree you want the Connection Broker to search for users.

   b. In the **Match Login name against this field** edit field, enter the attribute that the Connection Broker should match the user's entered login name against. Typically, for Active Directory, this is `sAMAccountName`.

9. Click **Save**.

For information on additional fields in the **Add Authentication Server** form, see "Authenticating Users" in the Connection Broker Administrator's Guide.

Building Pools

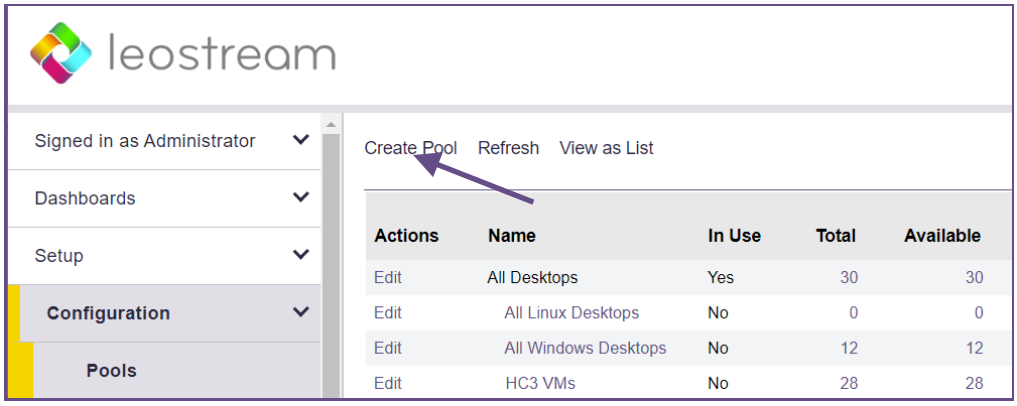
The Leostream Connection Broker defines a ***pool*** as a group of desktops. When offering desktops to a user, Leostream relies on the desktop's pool membership to determine how to connect the user to the desktop and how to manage the user's session. Unlike other brokering solutions, the Leostream Connection Broker allows a desktop to be a member of multiple pools, allowing you to change how you manage that desktop for different users.

When working with HPE Moonshot Systems, a pool may be a grouping off all nodes hosted in a particular chassis, may include nodes in multiple chassis or, conversely, may be restricted to a subset of nodes from one chassis. The key to pooling in Leostream is that you have the flexibility to structure your pools in the manner that best fits your users' needs.

For example, you can create a pool that contains all the nodes in one or more Moonshot chassis, as follows.

1. Navigate to **> Configuration > Pools** menu.

2. Click the **Create Pool** link, shown in the following figure.



3. In the **Create Pool** form that open, enter a unique name for this pool in the **Name** edit field.

4. Select **Centers** from the **Define pool using** drop-down menu.

5. From the **Available centers** list, select your Moonshot center.

6. Click the **Add items** link to the right of the **Available centers** list. The center should now be listed in the **Selected centers** list.

7. Click **Save**.

The **> Configuration > Pools** page displays a hierarchy of all available pools. For a complete description of pools, see the "Creating Desktop Pools" chapter in the Connection Broker Administrator's Guide.

Defining Protocol, Power Control, and Release Plans

After you separate your desktops into pools, define the behaviors you want to assign to the desktops in those pools. To perform this step, ask yourself the following questions.

- What display protocols do I want the user to be able to use to connect to their desktops?
- How do I want to manage the power state of each desktop, for example, should it be turned off when the user logs out?
- How long do I want my users to be able to claim a particular desktop? For example, if the user logs out, should they remain assigned to that desktop, or should another user be able to log into that desktop?

*The Leostream Connection Broker defines a **plan** as a set of behaviors that can be applied to any number of pools. This step describes three types of pool-based plans: 1) Protocol, 2) Power Control, and 3) Release.*

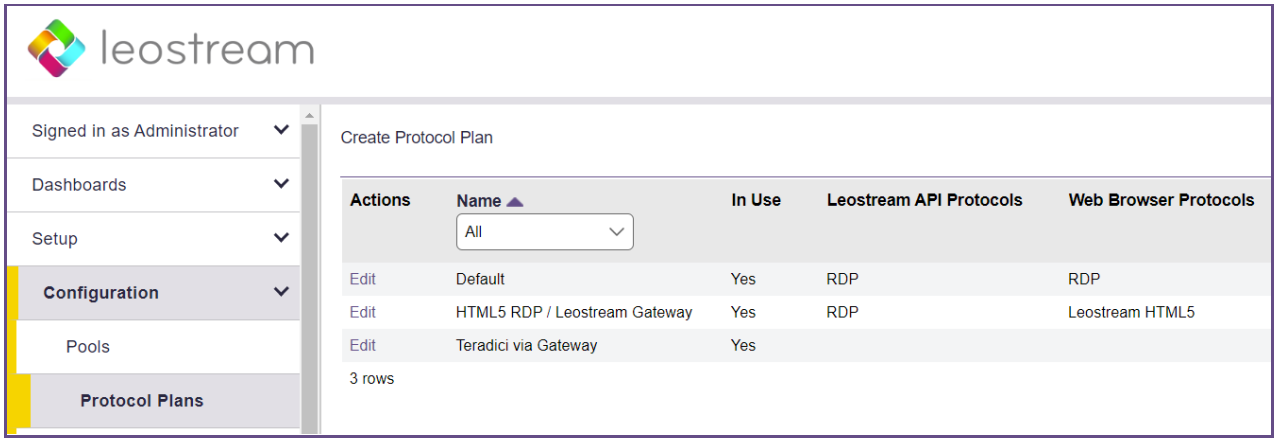
Power control and release plans control three particular points in the user's experience:

- When the user disconnects from their desktop
- When the user logs out of their desktop
- When the desktop is released to its pool
- When the user's session has been idle for a specified length of time

The remote desktop must have an installed and running Leostream Agent to allow the Connection Broker to distinguish between user logout and disconnect and to perform actions based on idle time. Not all display protocols allow the Connection Broker to perform actions at these times.

Protocol Plans

Protocol plans determine the display protocol the Connection Broker uses to connect a user to their desktop. The Connection Broker provides one default protocol plan, which is shown on the **> Configuration > Protocol Plans** page, shown in the following figure.



When connecting users to Moonshot nodes with an installed Remote Boost Sender, create a new Protocol Plan that defines how the Remote Boost connection is established, as follows.

1. Go to the **> Configuration > Protocol Plans** page.
2. Click the **Create Protocol Plan** at the top of the page. The **Create Protocol Plan** form opens.
3. In the **Plan name** edit field, enter the name to use when referring to this protocol plan.
4. In the **Leostream Connect and Thin Clients Writing to Leostream API** section:
    a. Select **Do not use** from the **Priority** menu associated with **RDP**.
    b. Select **1** from the **Priority** menu associated with **HP ZCentral Remote Boost (RGS).**
    c. In the **Configuration file** edit field, specify values for any `RGreceiver` parameters that should be used to launch the connection.
5. Click **Save**.

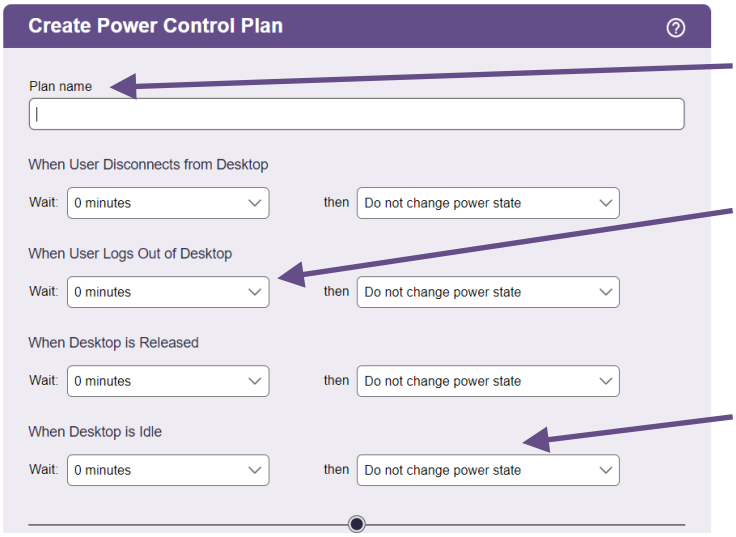
Power Control Plans

Power control plans define what power control action is taken on a desktop when the user disconnects or logs out of the desktop or when the desktop is released to its pool. Available power control plans are shown on the **> Configuration > Power Control Plans** page.

New Connection Broker installations contain one default power control plan, called **Default**. You can edit the default, or create as many additional power control plans as needed for your deployment. For example, you may want to shutdown nodes when the user logs out. You can build a power control plan that performs this action, as follows.

1. Go to the **> Configuration > Power Control Plans** page.

2. Select **Create Power Control Plan**. The **Create Power Control Plan** form, shown in the following figure, opens



Enter a descriptive name. You'll refer to this name when assigning the plan to a pool.

Select the amount of time to wait before changing the desktop's power state. A wait time of zero tells the Connection Broker to immediately execute the selected power control action.

Select the power control action to take after the wait time elapses. For the Connection Broker to take actions based on disconnect or idle-time events, you must install the Leostream Agent on that desktop.

3. Enter a unique name for the plan in the **Plan name** edit field.

4. In the **When User Logs Out of Desktop** section, select **Shutdown** from the second drop-down menu.

5. Click **Save**.

Shutting down the node after use is optional. Configure your Power Control Plan based on your particular needs.

Release Plans

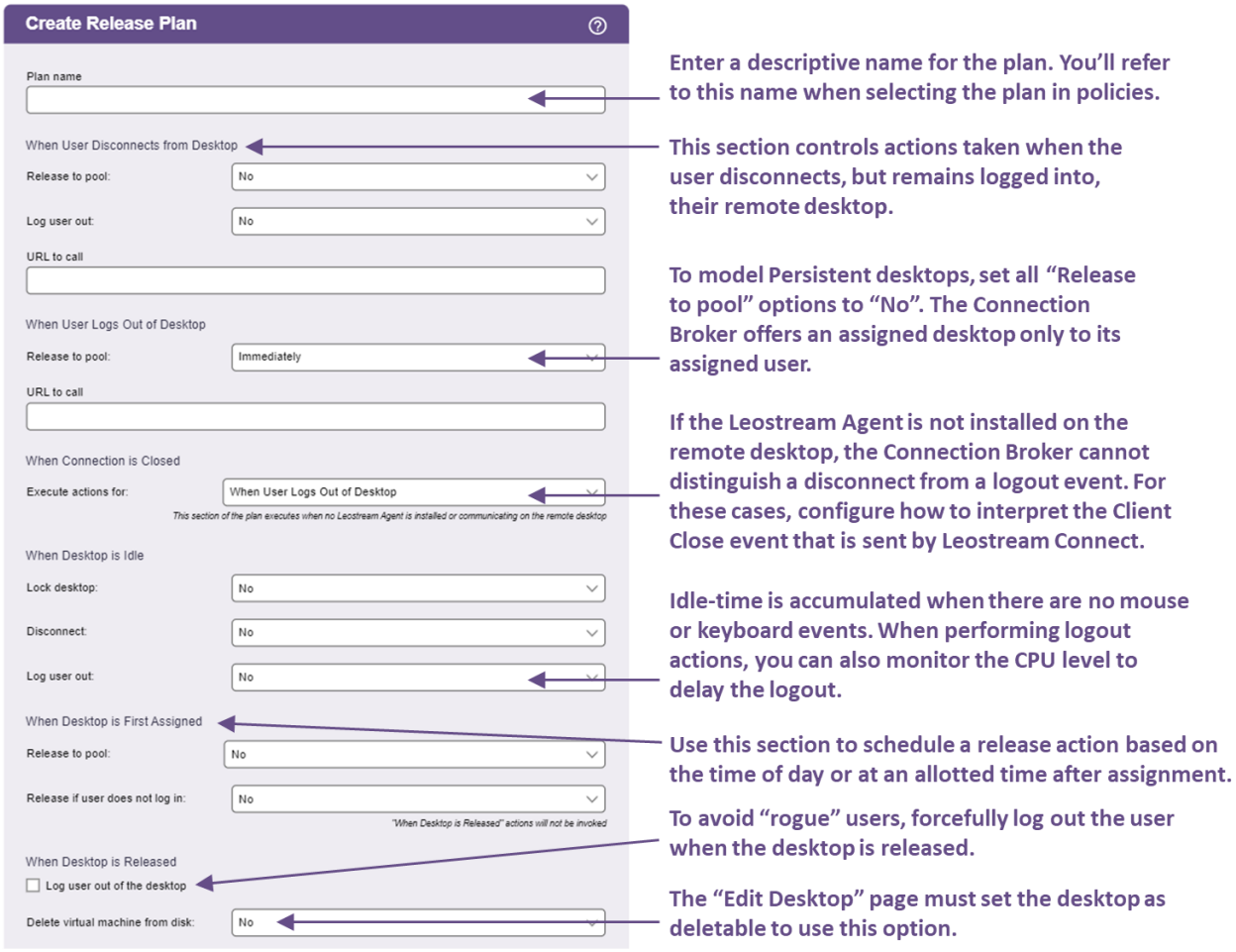
Release plans define how long a desktop remains assigned to a user and when it is released to its pool, as well as if a user should be forcefully logged out of their desktop. Available release plans are shown on the **> Configuration > Release Plans** page.

In Leostream, as long as a desktop is assigned to a particular user, the Connection Broker offers that desktop only to that user. If a desktop is for shared use, you must release the desktop back to its pool. The Connection Broker removes any user assignment when the desktop is released to its pool.

New Connection Broker installations contain one default release plan, called **Default**. The default release plan assigns a desktop to a particular user when the user first requests a connection to that desktop, and leaves the desktop assigned to that user until they log out. After the user logs out, the default Release plan releases the desktop back to its pool.

To model persistent desktops, allow the Connection Broker to policy assign a new user to an unassigned node, but configure the Release Plan to maintain the assignment permanently. You can create a persistent Release Plan, as follows.

1. Go to the **> Configuration > Release Plans** page.
2. Select **Create Release Plan**. The **Create Release Plan** form, shown in the following figure, opens.



3. Enter a unique name for the plan in the **Plan name** edit field.

4. In the **When User Logs Out from Desktop** section, select **No** from the **Release to pool** drop-down menu.

5. Click **Save**.

The **When Desktop is Idle** section can be used with persistent desktops to add security by locking, disconnecting, or logging out the user's Remote Boost session when the user is idle.

Creating Policies

After you define your pools and plans, build policies.

*The Leostream Connection Broker defines a **policy** as a set of rules that determine which desktops are offered to users, how users connect to those desktops, and how the Connection Broker manages the users' sessions.*

The Connection Broker provides one default policy assigns one desktop from the **All Desktops** pool. You can modify the default policy or create a new policy to assign Moonshot nodes to users. For example, you can create a new policy, as follows.

1. Go to the **> Configuration > Policies** page.
2. Click the **Create Policy** link. The **Create Policy** page opens.
3. In the **Create Policy** form, enter a name for the policy in the **Policy name** edit field. For a discussion on the remaining general policy properties, see the Connection Broker Administrator's Guide.
4. Click **Save** to initialize the policy.
5. Go to the **Pool Assignments** tab.
6. Click the **Add Pool Assignments** link. The **Edit Pool Assignment** form opens.
7. In the **When User Logs into Connection Broker** section use the **Number of desktops to offer** drop-down menu to indicate the number of desktops to offer to a user of this policy.
8. Also, in this section, use the **Pool** menu to select the pool to offer desktops from. When a user is offered this policy, the Connection Broker sorts the desktops in the selected pool based on the other Pool Assignment settings, then offers the user the top *n* desktops from the pool, where *n* is the number selected in the **Number of desktops to offer** drop-down menu.
9. Scroll down to the **Plans** section to select the protocol, power control, and release plans to apply to desktops offered from this pool.

   In a simple proof-of-concept environment, many of the remaining Pool Assignment settings can be left at their default values. Note that, by default, the Connection Broker does not offer a desktop to the user if the desktop does not have an installed Leostream Agent. If you want to offer desktops that do not have a Leostream Agent, select the **Yes, regardless of Leostream Agent status** option from the **Offer running desktops** drop-down menu.
10. Click **Save**.

*A policy can offer desktops from multiple pools. Click the **Add Pool Assignment** link to add a new pool, or use the kebab menu to clone an existing Pool Assignment to simplify initializing the options for an additional pool.*

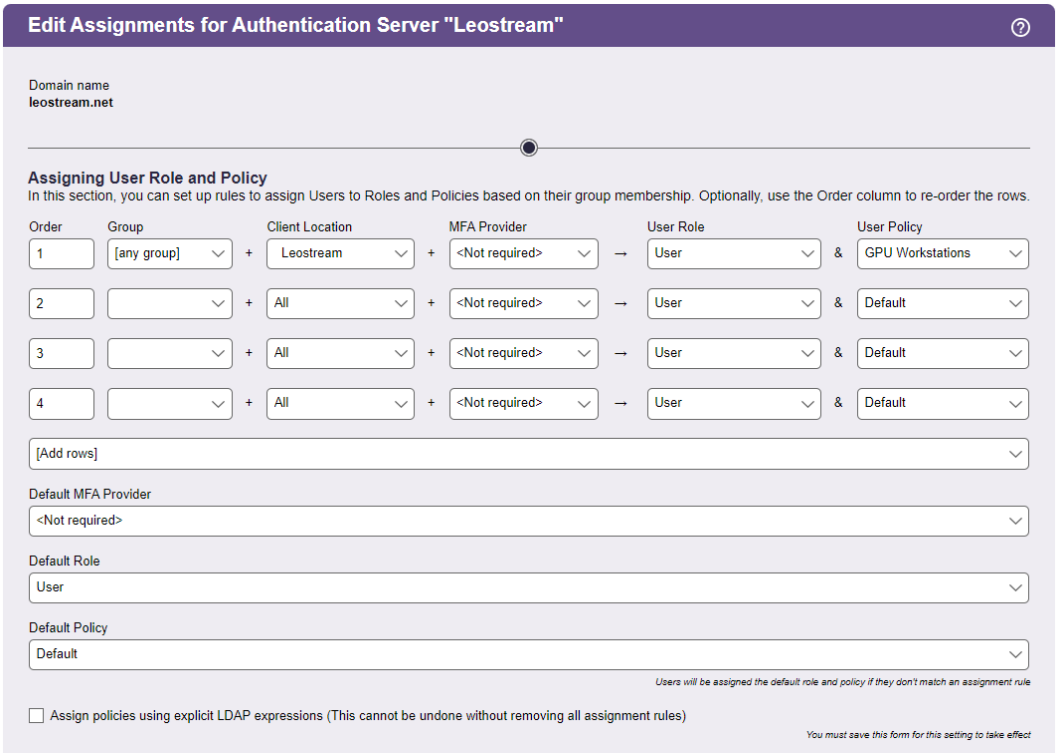
See the "Configuring User Experience by Policy" chapter of the Connection Broker Administrator's Guide for information on using the additional options in the **Create Policy** form.

Assigning Policies to Users

When a user logs in to the Connection Broker, the Connection Broker searches the authentication servers defined on the **> Setup > Authentication Servers** page, in order of the **Position** property, until it locates the user. After locating the user, the Connection Broker steps through the assignment rules defined for that authentication server on the **> Configuration > Assignments** page to determine the user's role and policy.

The **> Configuration > Assignments** page automatically contains one row for every authentication server you defined on the **> Configuration > Authentication Servers** page. Click the **Edit** link next to an authentication server to view the assignment rules associated with that server.

By default, the **Query for group information** option is checked when you create your authentication server and the **Edit Assignment** form appears as in the following figure.



The table contains a list of assignment rules that determine what Role and Policy the user is assigned based on who the user is (their **Group)** and what client they log in from (the **Client Location**). When using an Active Directory authentication server, the group is defined as the `memberOf` attribute.

If your Active Directory server defines a large number of groups, the **Edit Assignments** form may take a long time to load. If this is the case, or if you need to assign roles and policies using a different authentication server attribute, uncheck the **Query for Active Directory Group information** option at the bottom of the **Edit Assignments** form. After you save the form, the format of the **Assigning User Role and Policy** section changes. For more information, see "Assigning Roles and Policies Based on any Attribute" in the Connection Broker Administrator's Guide.

To assign policies based on the user's `memberOf` attribute:

1. Select the group from the **Group** drop-down menu.

2. If you are using locations, select a location from the **Client Location** drop-down menu (see **Using Client Locations to Define End-User Experience**).

3. Assign end-user and administrator permissions by selecting an item from the **User Role** drop-down menu (see **Role-Based Administration**).

4. Assign a policy by selecting an item from the **User Policy** drop-down menu.

The Connection Broker steps through the rules in order and assigns the role and policy from the first rule that the user matches. Edit the value in the **Order** column to reprioritize the assignment rules.

Logging into the Connection Broker

The Leostream Test Login functionality allows you to simulate a user login to ensure that your policies, plans, and assignment rules are configured correctly. To test a user login:

1. Go to the **> Resources > Users** page.

2. Click the **Test Login** link. The **Test Login** form opens.

3. In the **User Name** edit field, enter the name of the user you want to simulate logging in.

4. Choose the user's domain from the **Domain** drop-down meu. Select **<Any>** to instruct the Connection Broker to search all domains.

5. Click **Run Test**.

The Connection Broker searches through the authentication servers and assignment rules to determine which policy and desktops to offer to the user. The logic and results are displayed below the **Test Login** form.

Advanced Leostream Configurations

Building a Mixed HDI and VDI Environment

Leostream Centers and Protocol Plans support a wide range of back-end hosting systems and display protocols, allowing you to develop a single environment to provide access to all hosted resources. After you configure your Connection Broker to manage your HDI, you can create additional Centers to inventory and manage other virtual machines and physical machines hosted in your data center.

The Connection Broker provides centers for:

- Virtual desktops from VMware® and Red Hat virtualization hosts
- Amazon Web Services, Microsoft Azure, Google Cloud Platform, and OpenStack clouds
- Microsoft Windows® Remote Desktop Services or multi-user Linux servers
- Physical or virtual machines registered in a Microsoft Active Directory® service
- Nutanix AHV and Scale Computing HC3 clusters

For information on creating different types of Centers, see “Connecting to your Hosting Platforms” in the Connection Broker Administrator’s Guide.

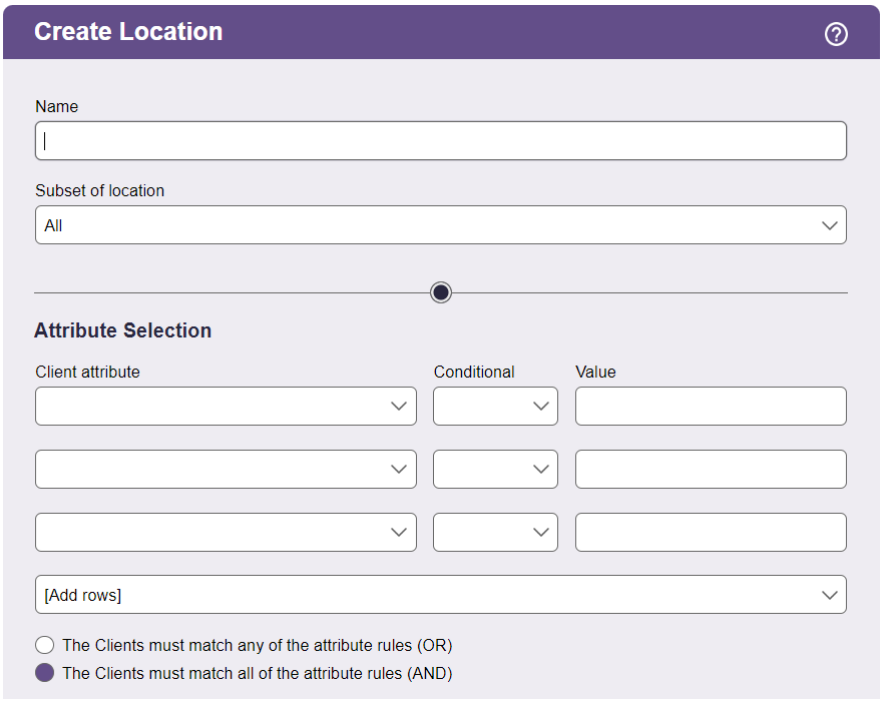
To connect users to desktops in different centers using different display protocols, create a Protocol Plan for each desired protocol. Then, build policies for the different types of resources, or use a single policy to offer resources from multiple pools. See “Configuring Desktop Policy Options” in the Connection Broker Administrator’s Guide for a complete description.

Using Client Locations to Define End-User Experience

When a user logs into the Connection Broker from a client device, the Connection Broker registers that client device on the **> Resources > Clients** page. The Connection Broker also assigns that client to one or more locations.

A *client location* is similar to a desktop pool. Location represents a group of clients with similar attributes. You can use locations to assign printer mappings to the user’s desktop, change the user’s protocol plan, or even change the user’s policy.

Locations are listed on the **> Configuration > Locations** page. You define locations using a series of rules based on client attributes. For example, the following figure shows a location that contains all client devices running a Linux operating system.



The **Plans** section in the form allows you to assign a Printer plan to the location, as well as override the Protocol Plan assigned to that client via the user's policy. You can also use the location on the **> Configuration > Assignments** pages to assign the user to a policy based on the client they use to log in (see **Assigning Policies to Users**).

For more information on building locations and location-based plans, such as Printer plans, see "Configuring User Experience by Client Location" in the Connection Broker Administrator's Guide.

Role-Based Administration

The Connection Broker assigns a role to all users, including the default Connection Broker Administrator. Connection Broker *roles* determine what Connection Broker Administration functionality a user can view and use. Using roles, you can restrict or provide different levels of access to the Connection Broker configuration, enabling role-based administration.

The Connection Broker provides two roles, a default Administrator role and a default User role. The default Administrator role has permission to edit all Connection Broker settings in the Administrator Web interface, while the default User role cannot access the Connection Broker Administrator Web interface.

To create a role with restricted access to the Administrator Web interface

1. Go to the **> Configuration > Roles** page.
2. Click on the **Create Role** link to open the **Create Role** dialog.
3. Enter a name for the new role in the **Name** edit field.

4. Select one of the following options from the **User has access to Administrator Web interface** drop-down menu.

    a. **Yes: Administrator Web interface, only** if the user is not assigned desktops via a policy, or does not need to access their desktops from a Web browser

    b. **Yes: Both Web Client and Administrator interface** if the user needs to access their assigned desktops using a Web browser, as well as the Connection Broker Administrator Web interface

5. Use the remainder of the form to specify the Administrator Web interface permissions.

6. Click **Save**.

For a complete description on setting up roles, see "Configuring User Roles and Permissions" in the Connection Broker Administrator's Guide.

Scaling Up Leostream Environments

The Leostream Connection Broker is designed to handle large-scale deployments simply and effectively. Because Leostream is not in the data path of the user's desktop connection, Leostream measures scale by the number of users logging in at any point in time, not at the number of users actively logged in.

To scale a Leostream environment, create a cluster of Leostream Connection Brokers connected to a single Microsoft SQL Server or PostgreSQL database. The database holds all the Connection Broker configuration information, as well as the Leostream Job Queue. The brokers in the cluster work off the common job queue to handle user logins, center scans, and any other scheduled Connection Broker job.

Creating a cluster addresses three scalability goals:

- **Availability:** Using clusters enhances availability by allowing any Connection Broker instance in the cluster to handle the necessary system functions without operator intervention. If one Connection Broker in the cluster fails, user logins are processed by the other Connection Brokers, resulting in no break in the end-user experience. Connection Broker instances that are not handling logins automatically process other system tasks.
- **Disaster Recovery:** Using clusters also allows you to mitigate system or site failures. Run each Connection Broker in the cluster on a different virtualization host, to ensure resiliency to a host failure. Place Connection Brokers or entire clusters in different data centers or regions, to support disaster recovery scenarios.
- **Capacity:** The number of logins per second that can be handled depends on the overall structure of your Connection Brokers, database, and authentication server. Typically, each Connection Broker can handle 5 logins per second. To increase this throughput, add additional Connection Brokers on different hosts and spread the traffic between the Connection Brokers using a load balancer. The throughput scales linearly when using up to ten Connection Brokers.

For information on creating a Leostream cluster, see the Leostream Scalability Guide.