



## Orchestration Workflow Tasks for PXE Boot

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## About the Orchestration Workflow Tasks for PXE Boot

The orchestration workflow tasks for PXE boot enable you to create workflows within Cisco UCS Director that use the functionality of Cisco UCS Director Baremetal Agent (Baremetal Agent).

The following orchestration workflow tasks are available:

- Setup PXE Boot task
- Setup PXE Boot with BMA Selection task
- Setup Windows PXE Boot task
- Monitor PXE Boot task
- Remove PXE Boot Setup task



### Note

To set up a PXE boot for a Windows Server operating system, you must use the PXE boot setup task that is defined specifically for Windows. To set up a PXE boot for all other supported operating systems, use the Setup PXE Boot task or the Setup PXE Boot with BMA Selection task.

You can access these workflow tasks in the **Network Services** area of the Cisco UCS Director Workflow Designer Task Library.

## Prerequisites for Workflows with PXE Boot Tasks

If you plan to create orchestration workflows that include one or more of the PXE boot tasks, your Cisco UCS Director and Cisco UCS Director Baremetal Agent environment must meet the following prerequisites:

- Cisco UCS Director has been installed and the network interface configured as described in the appropriate [Cisco UCS Director installation guide](#).
- Cisco UCS Director is reachable through a web browser and you can log in.
- Cisco UCS Director Baremetal Agent has been installed as described in [Installing Cisco UCS Director Baremetal Agent](#) and the network configuration completed as described in [Configuring Cisco UCS Director Baremetal Agent](#).
- The required network/VLAN has been configured as the native, or default, VLAN on the server. For example, for a Cisco UCS server, edit the vNIC template associated with the server and choose the PXE network/VLAN as the native VLAN. You can perform this configuration through an orchestration workflow.
- Each Baremetal Agent account that you want to use in a workflow has been set up, is active, has a tested connection, and has services that have been enabled and started.

## Setup PXE Boot, Setup PXE Boot with BMA Selection, and Setup Windows PXE Boot Tasks

When you include any of the PXE boot tasks in an orchestration workflow, the task prepares the Baremetal Agent environment to receive a PXE install request for a physical or virtual machine.

The values for each input required within the task can be supplied in one of the following ways:

- As user inputs by the user who executes the workflow
- Through outputs from a previous task in the workflow
- Through admin inputs that are assigned by the Cisco UCS Director user who creates the workflow

Most inputs and outputs are the same for the Setup PXE Boot task, the Setup PXE Boot with BMA Selection task, and the Setup Windows PXE Boot task, with the following notable exceptions:

- The Setup PXE Boot with BMA Selection task has an input field for selecting the target Baremetal Agent.
- The Setup PXE Boot task does not have an option to select the target Baremetal Agent. This legacy workflow task uses the default Baremetal Agent as the target Baremetal Agent.
- The Setup Windows PXE boot task has an input field for selecting the target Baremetal Agent.

**Tip**

For the legacy Setup PXE Boot task, the default Baremetal Agent is the first Baremetal Agent added. However, you can change the default Baremetal Agent. See [Changing the Default Baremetal Agent Account](#).

## Execution of the Setup PXE Boot Tasks

The following Setup PXE Boot tasks are available for use in workflows:

- Setup PXE Boot task
- Setup PXE Boot with BMA Selection task
- Setup Windows PXE Boot task

Each time that one of these tasks is executed within a workflow, Cisco UCS Director uses the following values for the inputs to complete a set of configuration files for that particular PXE request:

- Dynamic values received from previous tasks in the workflow or from the user at run-time.
- Static values that you enter when you create the workflow.
- Template configuration files—the `ks.cfg` Kickstart files—that were created when the chosen operating system was added to Baremetal Agent. For more information about these files, see [Sample Operating System Configuration Template Files](#).

When the workflow is executed, Baremetal Agent and Cisco UCS Director use the values gathered through the task and perform the following steps to prepare for a PXE installation request on the specified server:

Step	Action	Notes
1	Creates a new directory in the Cisco UCS Director Baremetal Agent VM that corresponds to the PXE ID request in the <code>/opt/cnsaroot/web/ks-repository/</code> directory.	You can view these PXE requests and PXE IDs on the <b>PXE Boot Requests</b> tab for a pod in Cisco UCS Director.
2	Adds the required unique configuration files to the <code>/opt/cnsaroot/web/ks-repository/PXE_ID</code> directory for the PXE installation specific to this request, including the <code>ks.cfg</code> , or Kickstart Configuration, file. Depending upon the operating system, other configuration files might be added to this directory, such as the <code>boot.cfg</code> file required for an ESXi installation.	For example, to create the customized <code>ks.cfg</code> file for the PXE installation, Cisco UCS Director takes the template <code>ks.cfg</code> file from the <code>/opt/cnsaroot/templates/Operating_System/</code> directory and fills in the variables provided in the Setup PXE Boot task. This customized <code>ks.cfg</code> file is saved in a directory that corresponds to the PXE ID, such as <code>/opt/cnsaroot/web/ks-repository/PXE_ID</code> .
3	Creates a file corresponding to the MAC address of the server in the <code>/opt/cnsaroot/pxelinux.cfg/</code> directory in the Baremetal Agent VM.	The workflow appends "01-" to the MAC address of the server to create the filename. This file includes information about where the image files are located and is generated through the <code>pxe.cfg</code> file in the <code>/opt/cnsaroot/templates/Operating_System/</code> directory.

**Note**

Baremetal Agent automatically creates Windows answer files for the supported operating systems. The same answer file is used for local boot and SAN boot. The Windows installation does not support multi-path SAN boot, but you can use a single path workflow to achieve SAN boot.

## Inputs for the Setup PXE Boot Task

The following table describes the inputs for the Setup PXE Boot task. Because the information for one or more of these inputs can be obtained from a previous task or from a user at run-time, the values for these inputs can be dynamic and change with each execution of the workflow.

**Note**

For legacy Setup PXE Boot tasks, the default Baremetal Agent is the first Baremetal Agent added. However, you can change the default Baremetal Agent. See [Changing the Default Baremetal Agent Account](#).

**Table 1: Setup PXE Boot Task Inputs**

Input	Description
OS Type drop-down list	The OS image that you want this PXE boot request to install on the server. The drop-down list includes all OS images that have been created and are available for PXE installation.
Server MAC Address	The MAC address of the server that requires the PXE installation. This input is typically mapped to the MAC address output from the Create UCS Service Profile task.
Server IP Address field	The IP Address that you want to assign to the server. This IP address is given to the server after the PXE installation process is complete, and is the final IP address for the server.  This IP address can be on a different network or subnet than the PXE network or Management network that you configured for Baremetal Agent.
Server Net Mask field	The subnet mask that you want to assign to the server after the PXE installation process is complete.
Server Host Name field	The hostname that you want to assign to the server after the PXE installation process is complete.
Server Gateway field	The default gateway IP address that you want to assign to the server after the PXE installation process is complete.
Server Name Server field	(Optional) The DNS server that you want the server to use.  If no DNS server is required, leave this input blank.

Input	Description
<b>Management VLAN</b> field	(Optional) The VLAN ID that you want to assign to the management interface on the server after the PXE installation process is complete.  This setting is typically used in ESX/ESXi deployments where VLAN tagging is prevalent on the virtual switch. It sets the VLAN ID for tagging on the management vmkernel port.
<b>Root Password</b> field	The password that you want to assign to the root user on the server.
<b>Timezone</b> field	The time zone in which you want to configure the server.
<b>Additional Parameters</b> interface	<p>Interface to add, edit, or delete single-line parameters that are used additionally for the PXE boot request. You can add multiple parameters using this interface.</p> <p>To add an additional parameter, click (+). In the <b>Add Additional Parameter</b> box that appears, enter the parameter name and the value for the parameter. Use the <b>Edit</b> button to modify the parameter name or its value. Use the <b>Delete</b> button to delete a parameter.</p> <p>For example, you can use an additional parameter to customize the ks.cfg file template and provide a value for the parameter here. The parameter is then updated with the appropriate value in the ks.cfg file template.</p> <p>Suppose the existing firewall configuration in ks.cfg is as follows:</p> <pre># Firewall configuration firewall --disabled</pre> <p>You can customize the configuration as following:</p> <pre># Firewall configuration firewall --\$FIREWALL_CONFIG</pre> <p>In the Additional Parameter interface here, you can include <code>FIREWALL_CONFIG</code> as the parameter name and provide the value as <code>disabled</code>. The value of the parameter can also be mapped to a user input <code>\${variable}</code>. This parameter is updated with the appropriate value in the ks.cfg file template.</p> <p>The ks.cfg file templates used by Baremetal Agent are available in <code>/opt/cnsaroot/templates/IMAGE_CATALOG_NAME/ks.cfg</code>. For example, the ks.cfg file for CentOS 6.0 is available in <code>/opt/cnsaroot/templates/CentOS60/ks.cfg</code></p>

## Inputs for the Setup PXE Boot with BMA Selection Task

The following table describes the inputs for the Setup PXE Boot with BMA Selection task. Because the information for one or more of these inputs can be obtained from a previous task or from a user at run-time, the values for these inputs can be dynamic and change with each execution of the workflow.

**Note**

The Setup PXE Boot with BMA Selection task does not support the Windows OS and does not accept inputs for that OS.

**Table 2: Setup PXE Boot with BMA Selection Task Inputs**

<b>Input</b>	<b>Description</b>
<b>Target BMA field</b>	The Baremetal Agent accounts that have been added to Cisco UCS Director and are available for use.
<b>OS Type drop-down list</b>	The OS image that you want this PXE boot request to install on the server. The drop-down list includes all OS images that have been created and are available for PXE installation.
<b>Server MAC Address</b>	The MAC address of the server that requires the PXE installation. This input is typically mapped to the MAC address output from the Create UCS Service Profile task.
<b>Server Address field</b>	The IP Address that you want to assign to the server. This IP address is given to the server after the PXE installation process is complete and is the final IP address for the server.  This IP address can be on a different network or subnet than the PXE network or Management network that you configured for Baremetal Agent.
<b>Server Net Mask field</b>	The subnet mask that you want to assign to the server after the PXE installation process is complete.
<b>Server Host Name field</b>	The hostname that you want to assign to the server after the PXE installation process is complete.
<b>Server Gateway field</b>	The default gateway IP address that you want to assign to the server after the PXE installation process is complete.
<b>Server Name Server field</b>	(Optional) The DNS server that you want the server to use. If no DNS server is required, leave this input blank.
<b>Management VLAN field</b>	(Optional) The VLAN ID that you want to assign to the management interface on the server after the PXE installation process is complete.  This setting is typically used in ESX/ESXi deployments where VLAN tagging is prevalent on the virtual switch. It sets the VLAN ID for tagging on the management vmkernel port.
<b>Root Password field</b>	The password that you want to assign to the root user on the server.
<b>Timezone field</b>	The time zone in which you want to configure the server.

Input	Description
<b>Additional Parameters</b> interface	<p>Interface to add, edit, or delete single-line parameters that are used additionally for the PXE boot request. You can add multiple parameters using this interface.</p> <p>To add an additional parameter, click (+). In the <b>Add Additional Parameter</b> box that appears, enter the parameter name and the value for the parameter. Use the <b>Edit</b> button to modify the parameter name or its value. Use the <b>Delete</b> button to delete a parameter.</p> <p>For example, you can use an additional parameter to customize the ks.cfg file template and provide a value for the parameter here. The parameter is then updated with the appropriate value in the ks.cfg file template.</p> <p>Suppose the existing firewall configuration in ks.cfg is as follows:</p> <pre># Firewall configuration firewall --disabled</pre> <p>You can customize the configuration as following:</p> <pre># Firewall configuration firewall --\$FIREWALL_CONFIG</pre> <p>In the <b>Additional Parameter</b> interface here, you can include <code>FIREWALL_CONFIG</code> as the parameter name and provide the value as <code>disabled</code>. The value of the parameter can also be mapped to a user input <code>\${variable}</code>. This parameter is updated with the appropriate value in the ks.cfg file template.</p> <p>The ks.cfg file templates used by Baremetal Agent are available in <code>/opt/cnsaroot/templates/IMAGE_CATALOG_NAME/ks.cfg</code>. For example, the ks.cfg file for CentOS 6.0 is available in <code>/opt/cnsaroot/templates/CentOS60/ks.cfg</code></p>

## Inputs for the Setup Windows PXE Boot Task

The following table describes the inputs for the Setup Windows PXE Boot task. Because the information for one or more of these inputs can be obtained from a previous task or from a user at run-time, the values for these inputs can be dynamic and change with each execution of the workflow.



### Note

Baremetal Agent automatically creates Windows answer files for supported Windows operating systems. You can use the same answer file for local boot and SAN boot. The Windows installation does not support multi-path SAN boot, but you can use a single path workflow to achieve SAN boot.

**Table 3: Setup Windows PXE Boot Task Inputs**

<b>Input</b>	<b>Description</b>
<b>Target BMA field</b>	The Baremetal Agent accounts that have been added to Cisco UCS Director and are available for use.
<b>OS Type drop-down list</b>	The OS image that you want this PXE boot request to install on the server. The drop-down list includes all OS images that have been created in Baremetal Agent and are available for PXE installation.
<b>Server MAC Address</b>	The MAC address of the server that requires the PXE installation. This input is typically mapped to the MAC address output from the Create UCS Service Profile task.
<b>OS Flavor Name field</b>	<p>The flavor name is required for successful PXE boot of a Windows Server image. You must enter the exact character string used by Windows PE (WinPE). This string is case sensitive. For example, enter SERVERSTANDARD or SERVERENTERPRISE. For more information, see <a href="#">Determining the Windows OS Flavor Name</a>.</p> <p>This value is used in the Windows answer file, which requires the correct name of the edition for the image installation process. The OS flavor name might be different for each type of Windows OS image.</p>
<b>Organization Name field</b>	<p>The name of the organization that is associated with the OS product key.</p> <p>This value is used by the Windows answer file. It could be a division within your company or the company name.</p>
<b>Product Key field</b>	The product key (sometimes called the license key or software key) for the OS.
<b>Host Name field</b>	The hostname that you want to assign to the server after the PXE installation process is complete. Make sure the name complies with NetBIOS name restrictions.
<b>Administrator Password field</b>	The password that you want to assign to the administrative user on the server.
<b>Timezone field</b>	The time zone in which you want to configure the server.
<b>Server Address field</b>	<p>The IP Address that you want to assign to the server. This IP address is given to the server after the PXE installation process is complete, and is the final IP address for the server.</p> <p>This IP address can be on a different network or subnet than the PXE network or Management network that you configured for Baremetal Agent.</p>
<b>Disk Partition Size (GB) field</b>	The size, in GB, of the partition designated for the OS.

Input	Description
Additional Parameters field	<p>Interface to add, edit, or delete single-line parameters that are used additionally for the PXE boot request. You can add multiple parameters using this interface.</p> <p>To add a parameter, click (+). In the <b>Add Additional Parameter</b> box that appears, enter the parameter name and the value for the parameter. Use the <b>Edit</b> button to modify the parameter name or its value. Use the <b>Delete</b> button to delete a parameter.</p> <p>For example, you can use parameters to provide the minimum requirements for the Windows answer file. You can define parameters and their values to enhance the answer file to meet the requirements of your environment. These parameters are updated with the appropriate values in the Answer file template.</p> <p>The answer file templates used by Baremetal Agent are available in the following locations:</p> <ul style="list-style-type: none"> <li>• Windows 2012 R2 x64—/opt/cnsaroot/templates/Win2k12R2x64/autounattend.xml</li> <li>• Windows 2012 x64—/opt/cnsaroot/templates/Win2k12x64/autounattend.xml</li> <li>• Windows 2008 R2 x64—/opt/cnsaroot/templates/Win2k8R2x64/autounattend.xml</li> </ul>

## Outputs from the Setup PXE Boot Task and Setup Windows PXE Boot Task

The following table describes the outputs from both the Setup PXE Boot task and the Setup Windows PXE Boot task.

**Table 4: Setup PXE Boot and Windows PXE Boot Task Outputs**

Input	Description
OUTPUT_PXE_BOOT_ID	The ID of the PXE boot request that was set up through the workflow task.

## Monitor PXE Boot Setup Task

When included in an orchestration workflow, the Monitor PXE Boot task monitors a particular PXE ID request until

- The PXE boot is ready.
- The maximum number of hours specified is reached before the PXE boot is ready.

## Inputs for the Monitor PXE Boot Task

The following table describes the inputs for the Monitor PXE Boot Task:

**Table 5: Monitor PXE Boot Task Inputs**

Input	Description
PXE Boot Id	The ID of the PXE boot request that you want to monitor through the workflow.
Max Wait time (Hours)	The maximum length of time, in hours, that you want the task to wait for the PXE boot request to be ready.

## Outputs from the Monitor PXE Boot Task

The Monitor PXE Boot task has no outputs.

## Remove PXE Boot Setup Task

When included in an orchestration workflow, the Remove PXE Boot Setup task removes the directory and files that are created by the Setup PXE Boot task for a particular PXE ID request.

## Inputs for the Remove PXE Boot Setup Task

The following table describes the inputs for the Remove PXE Boot Setup Task.

**Table 6: Remove PXE Boot Setup Task Inputs**

Input	Description
PXE Boot Id	The ID of the PXE boot request for which you want to remove the setup directory and files.

## Outputs from the Remove PXE Boot Setup Task

The Remove PXE Boot Setup task has no outputs.