



Connection Broker

Where Virtual Desktops Meet Real Business

Screen Management for Multiple Displays

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Patents

Leostream products are patent pending.

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Screen Management for Multiple Display

Overview

Leostream's screen management for multiple displays provides end users with true multi-monitor behavior when they log into their remote sessions, including:

- Splitting or spanning remote desktop connections over multiple monitors.
- Restricting the taskbar to the primary monitor.
- Centering the Microsoft® Windows® login and logout dialogs, along with most message boxes, in the middle of the primary monitor.
- Maximizing application windows intuitively. For example, if the user places the majority of an application window within one monitor, maximizing the windows fills that monitor. If, on the other hand, the window is resized to cover a large percentage of two monitors, maximizing the windows fills both monitors.
- Returning to single monitor mode if the extra monitors are disconnected from the client.

Screen management is available when the remote session is invoked with any display protocol that supports multiple displays, including Microsoft RDP and HP® RGS. Different display protocols have different physical constraints when working with multiple displays.



Leostream does not currently provide screen management when connecting to desktops running a Linux® operating system.

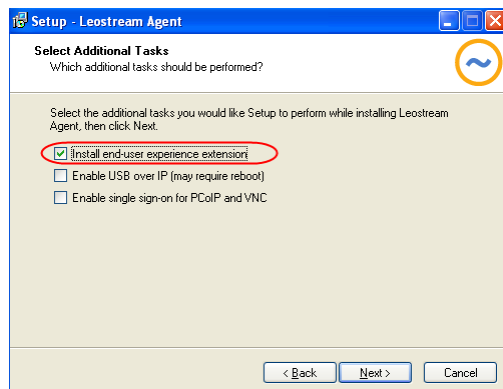
Leostream Agent Requirements

In order to use Leostream screen management, you must install the Leostream Agent on each Windows machine connected to by clients with multiple displays.

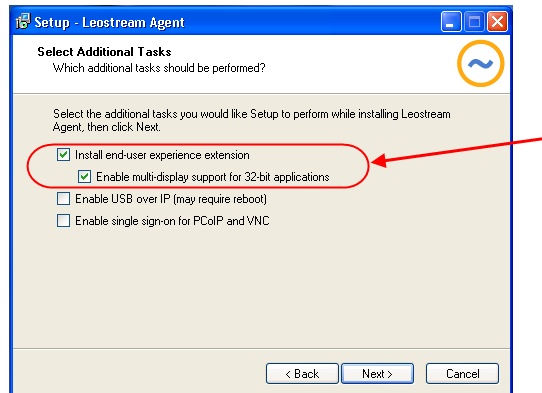


If your client devices run Microsoft RDP 7, and your end-users connect to Windows 7 or Windows Server 2008 desktops, you do not need the Leostream Agent for screen management. RDP 7 provides native screen management for multiple displays.

To enable screen management, install the Leostream Agent with the **Install end-user experience extension** task selected, as shown in the following figure.

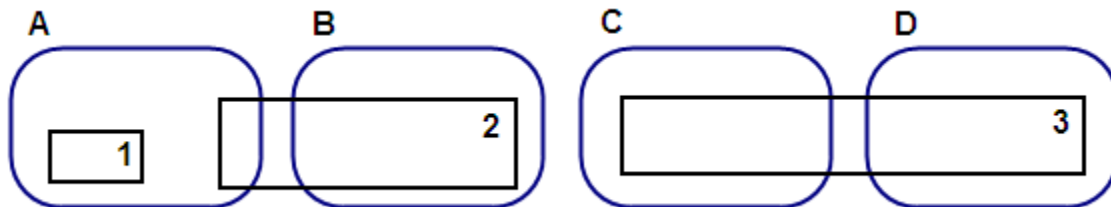


If you are installing the Leostream Agent on a desktop running a 64-bit operating system, and intend to run 32-bit applications on the desktop, also perform the **Enable multi-display support for 32-bit applications** task during installation, as shown in the following figure.



Maximizing Windows over Multiple Displays

The Leostream Agent intelligently maximizes application windows based on their location across all monitors. For example, consider the four monitors arranged side by side, depicted in the following figure.



The monitors are lettered A, B, C, and D. The numbered rectangles inside the monitors represent application windows. When an end user maximizes each of the application windows, the Leostream Agent sizes the windows to fill the monitors, as follows.

- Application 1:** Fills monitor A
- Application 2:** Fills monitor B
- Application 3:** Fills monitors C and D

When the Leostream Agent detects that an application covers the majority of multiple monitors, it will maximize the application to fill all of those monitors.

Configuring Your Connection Broker

To use Leostream screen management, you must do the following:

1. Install the Leostream Agent on each remote desktop that supports multiple displays.
2. Ensure that any Connection Broker policies used by clients with multiple monitors contain correctly configured display protocols. See [Display Protocol Configurations](#) for more information.
3. In the Connection Broker, define common display plans and assign them to clients.

A *display plan* describes a common monitor configuration; for example, two monitors that sit side-by-side. When you create the display plan, you assign it to clients based on the client's attributes, similar to creating Connection Broker Locations.

Creating Display Plans

When a user logs in through a client with attributes that match a particular display plan, the Connection Broker assigns that plan to the client, and communicates that plan to the Leostream Agent. The Leostream Agent on the remote desktop then handles positioning and resizing of application windows, including the Windows Taskbar, within the monitors in the layout.



The following documentation describes how to configure Leostream multiple display support when using Connection Broker versions 6.5 or 7.0. These versions of the Connection Broker use *display plans*, which describe common monitor configurations. In previous versions of the Connection Broker, display plans were called *monitor layouts* and were located on the > **Clients** page. If you are using an older version of the Connection Broker, use monitor layouts instead of display plans when following through this documentation.

Configuring Display Protocols for Multiple Displays

You can use the Leostream screen management with any display protocol and client that support multiple displays. You must ensure that the remote session spans all displays, typically by setting the appropriate parameters in the display protocols configuration file.

The following sections pertain to settings in the **Edit Protocol Plan** form.

Microsoft RDP 6

Microsoft RDP 6 can span across multiple monitors when the resolution and orientation of all monitors is identical. To span multiple monitors, ensure that the **Configuration file** associated with RDP in the **Leostream Connect and Thin Clients Writing to Leostream API** section or **Web Browser** section of the protocol plan contains the following line:

```
span monitors:i:{LEO_SPAN}
```

The Connection Broker replaces the `LEO_SPAN` dynamic tag with 1 if the client is assigned a display plan and with 0 if the client is not assigned a display plan or opts out of Leostream multiple-monitor support.

Alternatively, if all users of this policy have multiple-monitors, you can hard-code this line, as follows.

```
span monitors:i:1
```

Microsoft RDP 7

Microsoft RDP 7 can span across multiple monitors with different resolutions and orientations when the remote desktop is running a Windows 7 or Windows Server 2008 operating system. To span multiple monitors with different resolutions, ensure that the **Configuration file** associated with RDP in the **Leostream Connect and Thin Clients Writing to Leostream API** section or **Web Browser** section of the protocol plan contains the following line:

```
use multimon:i:{LEO_SPAN}
```

The Connection Broker replaces the `LEO_SPAN` dynamic tag with 1 if the client is assigned a display plan and with 0 if the client is not assigned a display plan or opts out of Leostream multiple-monitor support.

Alternatively, if all users of this policy have multiple-monitors, you can hard-code this line, as follows.

```
use multimon:i:1
```

If the client devices includes RDP 7, but the user connects to a desktop running RDP 6, use the `span monitors` configuration file parameter, instead of the `use multimon` parameter (see [RDP 6](#)).

Sun uttsc

To span across multiple monitors when connecting from a Sun Ray thin client, in the **Leostream Connect and Thin Clients Writing to Leostream API** section of a protocol plan, ensure that the command line parameters in the **Sun Ray** sub-section includes the `-m` parameter.

Wyse Thin Clients

For Wyse thin clients that support dual heads, for example, the V10L, ensure that the **Desktop configuration file** in the **Wyse Configuration** section of the protocol plan contains the following parameter:

```
Fullscreen={LEO_FULLSCREEN}
```

Wyse thin clients with dual-head support span the remote session across both monitors when the `Fullscreen` parameter is set to `yes`. Otherwise, when `Fullscreen` is set to `no`, the remote session runs in a windowed screen.

The Connection Broker replaces the `LEO_FULLSCREEN` dynamic tag with `yes` if the client is assigned a display plan, and with `no` if the client is not assigned a display plan or opts out of Leostream multiple-monitor support.

Alternatively, if all users of this protocol plan have multiple-monitors, you can hard-code this line as follows.

```
Fullscreen=yes
```

HP RGS

HP RGS can set the layout and resolution of the remote session to match the configuration of the client display. To match the client display for clients that are assigned an appropriate display plan, include the following lines in the **Configuration file** field for RGS in the **Leostream Connect and Thin Clients Writing to Leostream API** section of the protocol plan.

```
Rgreceiver.IsMatchReceiverResolutionEnabled.IsMutable=0
Rgreceiver.IsMatchReceiverResolutionEnabled={LEO_SPAN}
Rgreceiver.IsMatchReceiverPhysicalDisplaysEnabled.IsMutable=0
Rgreceiver.IsMatchReceiverPhysicalDisplaysEnabled={LEO_SPAN}
```

The Connection Broker replaces the `LEO_SPAN` dynamic tag with `1` if the client is assigned a display plan and with `0` if the client is not assigned a display plan or opts out of Leostream multiple-monitor support.

HP SAM Clients

HP SAM clients connecting to remote desktops using HP RGS provide native multi-monitor support. However, the default HP SAM configuration file does not provide multi-monitor support.

To provide multi-monitor support, in the **HP SAM Configuration** section of the protocol plan, modify the configuration file, as follows:

1. Modify the `Span` and `Display` settings in the `<Policy>` section, as follows:
2.

```
<Span "V=1" O="0" />
<Display FS="1" X="-1" Y="-1" Depth="-1" Stretch="0" O="0" />
```
3. Add the following lines to the `<DynamicPolicy>` section.

```
<DynamicPolicy>Rgreceiver.IsMatchReceiverResolutionEnabled.IsMutable=0</DynamicPolicy>
<DynamicPolicy>Rgreceiver.IsMatchReceiverResolutionEnabled=1</DynamicPolicy>
<DynamicPolicy>Rgreceiver.IsMatchReceiverPhysicalDisplaysEnabled.IsMutable=0</DynamicPolicy>
<DynamicPolicy>Rgreceiver.IsMatchReceiverPhysicalDisplaysEnabled=1</DynamicPolicy>
```

Creating Display Plans

4. If your RGS session opens with borders, ensure the `IsBordersEnabled` parameter is set to zero:

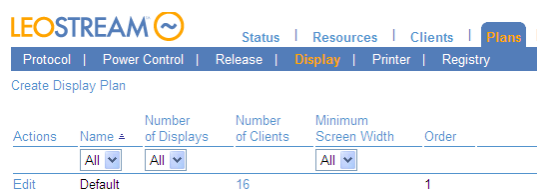
```
<DynamicPolicy>Rgreceiver.IsBordersEnabled=0</DynamicPolicy>
```

Creating Display Plans

Display plans define the number of monitors attached to a client device, and configure certain Leostream screen management parameters. Use display plans to define groups of clients with similar monitor configurations.

Defining Display Plans

To view the existing display plans, or define a new display plan, go to the **> Plans > Display** page, shown in the following figure.



The screenshot shows the Leostream web interface. At the top, there is a navigation bar with the Leostream logo and tabs for Status, Resources, Clients, and Plans. Below this is a sub-navigation bar with links for Protocol, Power Control, Release, Display (highlighted), Printer, and Registry. The main content area is titled 'Create Display Plan' and contains a table with the following data:

Actions	Name	Number of Displays	Number of Clients	Minimum Screen Width	Order
	All	All		All	
Edit	Default		16		1

The Connection Broker provides a single default display plan. You can create as many additional display plans as needed for your environment. Each display plan falls into one of the following three categories.

- **Match client displays:** This type of display plan automatically spans the remote session across all available monitors. The spanned session is split across the monitors, resulting in a true multi-monitor experience.
- **Specify number of displays:** This type of display plan spans the remote session across a specified number of display spaces.
- **Opt-out from multi-monitor support:** This type of display plan disables the Leostream multi-monitor support. The remote session is configured by the configuration file settings defined in the protocol plan.

The Default Display Plan

The Connection Broker provides a default display plan that applies to all clients that are not assigned to a specific display plan. The default display plan is configured to span the remote session across all displays attached to the client device, within the limitations of the display protocol used to connect to the desktop.

You can edit the default display plan, to change this default behavior. The **Edit Display Plan** form for the default display plan is shown in the following figure.

Edit Display Plan

Name
Default

.....

Display Options

Display Plan mode
Match client displays

Lock taskbar to a primary monitor
 Enable support for 32 bit applications running on 64 bit OS

Applications to exclude
.....
A comma-separated list of applications to exclude from multi-monitor support, i.e. sidebar.exe, GoogleDesktop.exe

.....

Attribute Selection

This display plan applies to all client devices that do not have an assigned display plan

.....

Notes

.....

Save Cancel

Use the **Display Plan mode** drop-down menu to change how the default display plan manages clients that are assigned to this plan.



To turn off screen management for all clients, select the Opt-out from multi-monitor support option from the **Display Plan mode** drop-down menu. In this case, the display properties of the remote session are controlled by the settings in the configuration file for the protocol used to connect to the desktop.

The following three sections describe the three categories of display plans, and how to configure each plan.

Display Plans to Match Client Displays



If creating a display plan for RDP connections established from the Leostream Web client, do not use a display plan that matches the client displays. You must explicitly set the number of displays attached to the client device (see [Plans for Specific Number of Monitors](#)).

To create a display plan that matches the remote session to the layout and resolution of the client displays:

1. Click the **Create Display Plan** link. The **Create Display Plan** form opens.
2. Enter a name for the layout in the **Name** edit field.
3. From the **Display Plan mode** drop-down menu, select the Match client displays option. The **Create Display Plan** form appears, as shown in the following figure.

Creating Display Plans

The screenshot shows the 'Create Display Plan' dialog box. It includes a 'Name' field, 'Display Options' (with 'Match client displays' selected, 'Lock taskbar to a primary monitor' checked, and 'Enable support for 32 bit applications running on 64 bit OS' unchecked), an 'Applications to exclude' field, an 'Attribute Selection' table with three rows of 'Client attribute', 'Conditional', and 'Value' dropdowns, and radio buttons for 'OR' (selected) and 'AND' logic. There is also an 'Other' section with 'Active display plan' checked and a 'Notes' text area. Buttons for 'Save', 'Delete', and 'Cancel' are at the bottom.

4. Select the **Lock taskbar to a primary monitor** option to restrict the Windows task bar to span across only the primary (or left-most) monitor. If this option is not selected, the task bar spans across all monitors.
5. Select the **Enable support for 32-bit applications running on 64-bit OS** option if the user's remote desktop runs a 64-bit operating system and the user runs 32-bit applications.

The remote desktop must have an installed Leostream Agent with the **Enable multi-display support for 32-bit applications** task selected, when using this option.

6. By default, Leostream controls the positioning of all application windows. If you do not want Leostream to control the windows for particular applications, enter the process name for these applications, separated by commas, into the **Applications to exclude** edit field. All windows associated with these processes will position, maximize, and resize as usual in a spanned remote session.
7. Use the **Attribute Selection** section to define the clients that are assigned to this display plan.
 - a. Select an attribute from the **Client attribute** drop-down menu.
 - b. Select a logic condition from the **Conditional** drop-down menu.
 - c. Enter or select the appropriate **Value** for this rule.
 - d. Indicate if the client can match any rule (OR) or must match all rules (AND), in order to be in this location.
8. Use the **Display Plan Order** drop-down menu to reorder the plans. If this is your first display plan, the form does not include the **Display Plan Order** drop-down menu. The Connection Broker assigns the client to the first display plan that matches the client's attributes. The default display plan is always applied last.
9. Uncheck the **Active display plan** option if you do not want to apply this display plan to any clients, but do not want to delete the plan.
10. Click **Save**.

Individual clients can opt out of Leostream screen management (see [out of Screen Management](#)).

Display Plans for Specific Number of Monitors

To create a display plan that spans across a number of monitors.

1. Click the **Create Display Plan** link. The **Create Display Plan** form, shown below, opens.

2. Enter a name for the layout in the **Name** edit field.
3. From the **Display Plan mode** drop-down menu, select the **Specify number of displays** option.
4. From the **Number of displays** drop-down menu, select the number of monitors attached to clients in this layout.
5. In the **Assume single monitor if screen width is less than** edit field, enter the width (in pixels) of the smallest resolution monitor in this layout. For example, if clients in this group are attached to monitors with a resolution of 1200x800, enter 1210. If the client is attached to two monitors, the total width is 2400 and the Connection Broker applies the display plan. If, however, one of the monitors is disconnected, the client has a total display width of 1200. The Connection Broker sees that this value is less than the threshold of 1210 and uses a single monitor.
6. Select the **Lock taskbar to a primary monitor** option to restrict the Windows task bar to span across only the primary (or left-most) monitor. If this option is not selected, the task bar spans across all monitors.
7. Select the **Enable support for 32-bit applications running on 64-bit OS** option if the user's remote desktop runs a 64-bit operating system and the user runs 32-bit applications.

The remote desktop must have an installed Leostream Agent with the **Enable multi-display support for 32-bit applications** task selected, when using this option.

8. By default, Leostream controls the positioning of all application windows. If you do not want Leostream to control the windows for particular applications, enter the process name for these applications, separated by commas, into the **Applications to exclude** edit field. All windows associated with these processes will position, maximize, and resize as usual in a spanned remote session.

Creating Display Plans

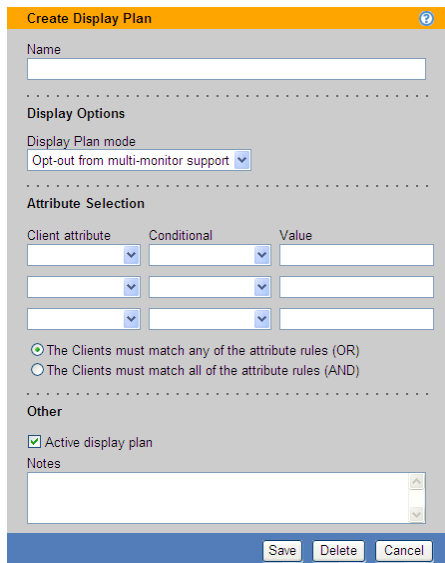
9. Use the **Attribute Selection** section to define the clients that are assigned to this display plan.
 - a. Select an attribute from the **Client attribute** drop-down menu.
 - b. Select a logic condition from the **Conditional** drop-down menu.
 - c. Enter or select the appropriate **Value** for this rule.
 - d. Indicate if the client can match any rule (OR) or must match all rules (AND), in order to be in this location.
10. Use the **Display Plan Order** drop-down menu to reorder the plans. If this is your first display plan, the form does not include the **Display Plan Order** drop-down menu. The Connection Broker assigns a client to the first display plan that matches the client's attributes. The default display plan is always applied last.
11. Uncheck the **Active display plan** option if you do not want to apply this display plan to any clients, but do not want to delete the plan.
12. Click **Save**.

Individual clients can opt out of Leostream screen management (see [out of Screen Management](#)).

Display Plans that Opt Out of Leostream Screen Management

To specify a display plan that opts out of Leostream screen management:

1. Click the **Create Display Plan** link. The **Create Display Plan** form opens.
2. Enter a name for the layout in the **Name** edit field.
3. From the **Display Plan mode** drop-down menu, select the Opt-out from multi-monitor support option. The **Create Display Plan** form changes, as shown in the following figure.



The screenshot shows the 'Create Display Plan' form. The 'Name' field is empty. Under 'Display Options', the 'Display Plan mode' dropdown is set to 'Opt-out from multi-monitor support'. The 'Attribute Selection' section has three rows, each with a 'Client attribute' dropdown, a 'Conditional' dropdown, and a 'Value' text field. Below this, there are two radio buttons: 'The Clients must match any of the attribute rules (OR)' (selected) and 'The Clients must match all of the attribute rules (AND)'. Under 'Other', the 'Active display plan' checkbox is checked. At the bottom, there are 'Save', 'Delete', and 'Cancel' buttons.

4. Use the **Attribute Selection** section to define the clients that fall into this display plan.
 - a. Select an attribute from the **Client attribute** drop-down menu.
 - b. Select a logic condition from the **Conditional** drop-down menu.
 - c. Enter or select the appropriate **Value** for this rule.
 - d. Indicate if the client can match any rule (OR) or must match all rules (AND), in order to be in this location.
5. Use the **Display Plan Order** drop-down menu to reorder the plans. If this is your first display plan, the

form does not include the **Display Plan Order** drop-down menu. The Connection Broker assigns the client to the first display plan that matches the client's attributes. The default display plan is always applied last.

6. Uncheck the **Active display plan** option if you do not want to apply this display plan to any clients, but do not want to delete the plan.
7. Click **Save**.

Individual clients can opt out of Leostream screen management (see [out of Screen Management](#)).

Assigning Display Plans to Clients

Use the **Attribute Selection** section of the **Create Display Plan** form to assign display plans to clients. Each row in the **Attribute Selection** section reads as a rule that defines clients assigned to this plan.

1. Select an attribute from the **Client attribute** drop-down menu, shown in the following figure.

The screenshot shows the 'Attribute Selection' form with a dropdown menu open for the 'Client attribute' field. The dropdown menu lists the following attributes: Certificate host, Certificate user, Device name, Device type, HTTP header, IP address, MAC address, Manufacturer, Serial number, and Version. The 'Conditional' and 'Value' fields are empty in this view.

2. Select a logic condition from the **Conditional** drop-down menu.
3. Enter or select the appropriate **Value** for this rule.
4. Create up to two additional rules in the remaining rows.
5. Indicate if the client can match any rule (OR) or must match all rules (AND), in order to be assigned to this display plan.
6. Click **Save**.

For example, the following figure shows how to apply a display plan to all Leostream Connect clients with an IP address that begins with 192.

The screenshot shows the 'Attribute Selection' form with the following configuration:

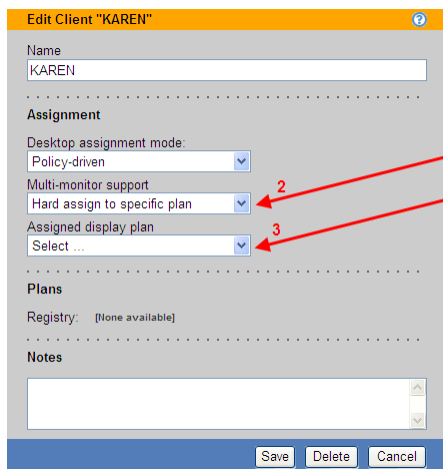
- Row 1: Client attribute: IP address, Conditional: begins with, Value: 192
- Row 2: Client attribute: Device type, Conditional: is equal to, Value: Leostream Connect
- Row 3: Client attribute, Conditional, and Value fields are empty.
- Logic selection: The radio button for 'The Clients must match all of the attribute rules (AND)' is selected.

After all of your display plans are defined and assigned to clients, and the Leostream Agents are installed, you are finished configuring your Connection Broker to provide multiple monitor support.

Hard-Assigning a Display Plan to a Client

Some cases may require you to hard-assign a particular display plan to a client, or specify that a client does not support multiple monitors. To hard assign a display plan to a client:

1. On the > **Clients** > **Clients** page, select the **Edit** action for appropriate client. The **Edit Client** form opens.
2. In the **Assignment** section, select Hard-assigned to a specific plan from the **Multi-monitor support** drop-down menu.
3. Select the appropriate display plan from the **Assigned display plan** drop-down menu, as shown in the following figure.



4. Click **Save** on the **Edit Client** page.

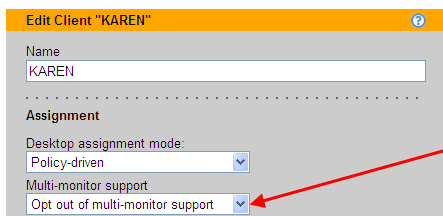


Ensure that the Leostream Agent is installed on all desktops that may be connected to by a client with a hard-assigned display plan.

Opting Out of Screen Management

To indicate that a particular client should opt out of Leostream screen management:

1. On the > **Clients** > **Clients** page, select the **Edit** action for appropriate client. The **Edit Client** form opens.
2. In the **Assignment** section, select Opt out of multi-monitor support from the **Multi-monitor support** drop-down menu, as shown in the following figure.



3. Click **Save** on the **Edit Client** page.