



Connection Broker

Where Virtual Desktops Meet Real Business

Multiple Display Support

Versions 6.x
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Patents

Leostream products are patent pending.

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Multiple Display Support

Overview

Leostream's support for multiple displays provides your 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.

Multiple monitor support 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.

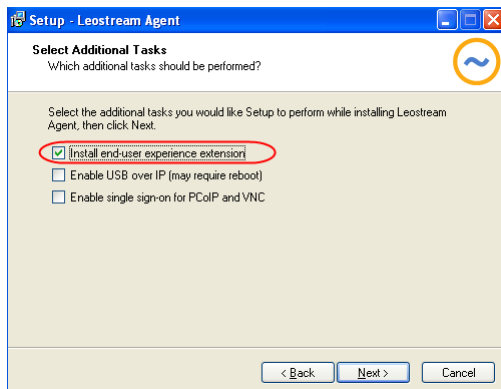


Leostream does not currently support multiple displays when connecting to Linux® desktops.

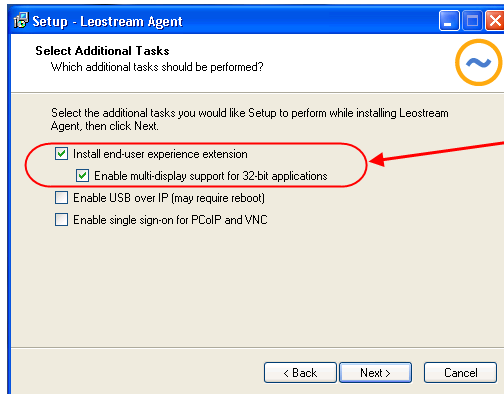
Leostream Agent Requirements

In order to use the Leostream multiple display feature, you must be using Connection Broker 6.x. In addition, you must install Leostream Agent 4.2 or higher on every remote machine connected to by clients with multiple monitors.

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

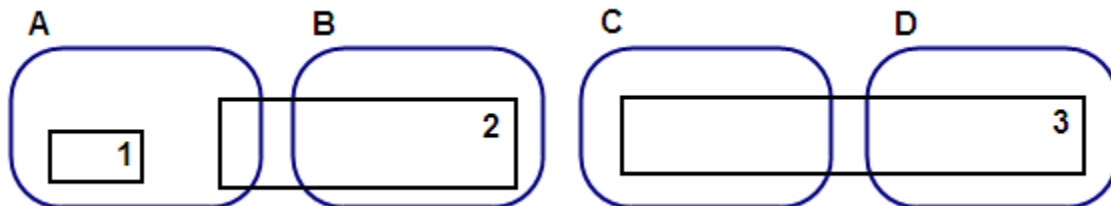


If you are installing the Leostream Agent 4.5 or higher on a desktop running a 64-bit operating system, and intend to run 32-bit applications on the desktop, also perform the **Enable multi-display support for 32-bit applications** task during installation, as shown in the following figure.



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 roll-out multiple display support to your end users, you must do the following:

1. Install the Leostream Agent on each remote desktop that supports multiple monitors.
2. Ensure that any Connection Broker policies used by clients with multiple monitors contain correctly configured display protocols. See [Setting 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.

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.

Multiple Display Support



The following documentation describes how to configure Leostream multiple display support when using Connection Broker 6.5. This version of the Connection Broker introduces *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.

Monitor layouts in previous Connection Broker versions do not support the option to match client displays.

Setting Display Protocol Configurations

You can use the Leostream extended monitor support 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

For the RDP display protocol, ensure that the **Configuration file** in the **Leostream Connect and Thin Clients Writing to Leostream API** section of the protocol plan contains the following line:

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

The Leostream multiple display feature requires a spanned RDP session. 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 could hard-code this line to:

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

Sun uttsc

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, so the session spans multiple monitors.

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 could hard-code this line to:

```
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>
```

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

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

Creating Display Plans

To begin using multi-monitor support, define display plans that mimic the typical monitor configurations used by your end users. You then use these display plans to define groups of clients with similar monitor configurations. If these clients connect to desktops with an installed Leostream Agent, the end user experiences the Leostream multiple display behavior.

Defining Display Plans

To define a display plan, go to the > **Plans > Display** page, shown in the following figure.

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

This page lists all display plans you previously define. 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. By default, the default display plan is configured to span the remote session to match the display layout and resolution of the monitors 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.

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 extended monitor support 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 [Display 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' section 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. There is an 'Applications to exclude' field with a note below it. The 'Attribute Selection' section has three rows of dropdowns for 'Client attribute', 'Conditional', and 'Value', with the 'OR' radio button selected. The 'Other' section has 'Active display plan' checked. At the bottom are 'Save', 'Delete', and 'Cancel' buttons.

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 extended monitor support. See [Opting out of Multi-Monitor Support](#) for more information. For more information on using multiple display support, see the Leostream [Extended Display Support](#) document.

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.

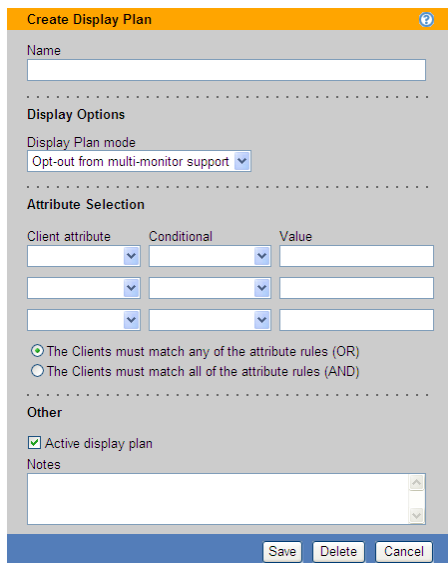
9. Use the **Attribute Selection** section to define the clients that are assigned to this display plan.
 - a. Select an attribute from the **Client attribute** drop-down menu.
 - b. Select a logic condition from the **Conditional** drop-down menu.
 - c. Enter or select the appropriate **Value** for 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 extended monitor support. See [Opting out of Multi-Monitor Support](#) for more information. For more information on using multiple display support, see the Leostream [Extended Display Support](#) document.

Display Plans that Opt Out of Leostream Multi-Monitor Support

To specify a display plan that opts out of Leostream extended display support:

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 'Display Options' section is expanded, showing 'Display Plan mode' set to 'Opt-out from multi-monitor support'. Below this, the 'Attribute Selection' section is visible, with three rows for defining rules. The 'Other' section has 'Active display plan' checked. The 'Notes' field is empty. At the bottom 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.

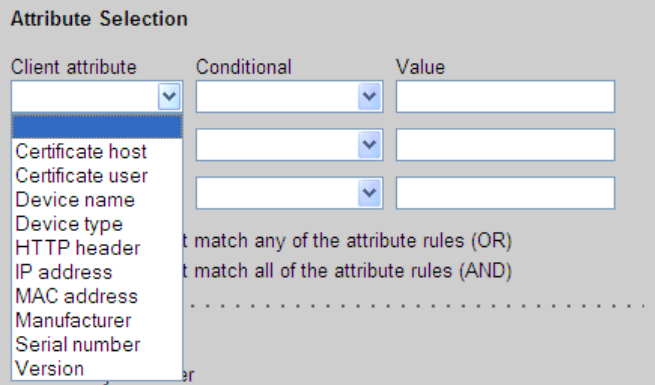
- 5. Use the **Display Plan Order** drop-down menu to reorder the plans. If this is your first display plan, the form does not include the **Display Plan Order** drop-down menu. The Connection Broker assigns the client to the first display plan that matches the client’s attributes. The default display 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 extended monitor support. See [Opting out of Multi-Monitor Support](#) for more information. For more information on using multiple display support, see the Leostream [Extended Display Support](#) document.

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.

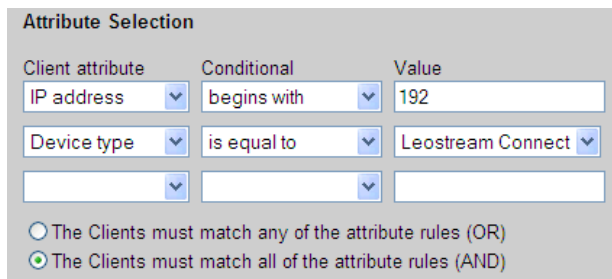
- 2. Select an attribute from the **Client attribute** drop-down menu, shown in the following figure.



- 3. Select a logic condition from the **Conditional** drop-down menu.
- 4. Enter or select the appropriate **Value** for this rule.
- 5. Create up to two additional rules in the remaining rows.
- 6. Indicate if the client can match any rule (OR) or must match all rules (AND), in order to be assigned to this display plan.
- 7. 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.

Creating Display Plans



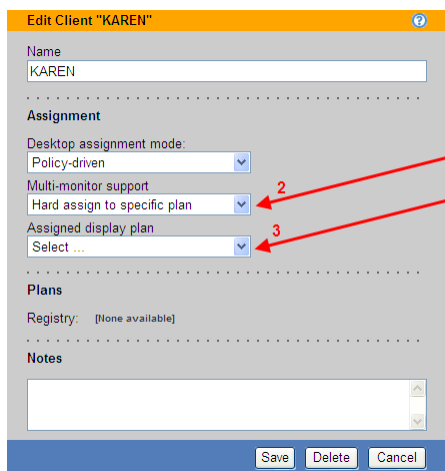
The 'Attribute Selection' dialog box contains three columns: 'Client attribute', 'Conditional', and 'Value'. The first row has 'IP address' in the first column, 'begins with' in the second, and '192' in the third. The second row has 'Device type' in the first column, 'is equal to' in the second, and 'Leostream Connect' in the third. Below these are two empty rows. At the bottom, there are two radio buttons: 'The Clients must match any of the attribute rules (OR)' and 'The Clients must match all of the attribute rules (AND)'. The second option 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

In some cases, you may need 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.



The 'Edit Client "KAREN"' form shows the 'Assignment' section. The 'Desktop assignment mode' is set to 'Policy-driven'. The 'Multi-monitor support' dropdown is set to 'Hard assign to specific plan', with a red arrow labeled '2' pointing to it. The 'Assigned display plan' dropdown is set to 'Select ...', with a red arrow labeled '3' pointing to it. The 'Plans' section shows 'Registry: [None available]'. At the bottom are 'Save', 'Delete', and 'Cancel' buttons.

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



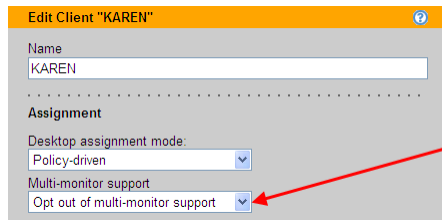
Ensure that the Leostream Agent is installed on all desktops that may be connected to by a client with a hard-assigned display plan.

Opting Out of Multi-Monitor Support

If you want to ensure that a particular client is never assigned a display plan, you can opt out of multi-monitor support as follows:

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.



The screenshot shows a web interface for editing a client named "KAREN". Under the "Assignment" section, there are two dropdown menus. The first is "Desktop assignment mode" with "Policy-driven" selected. The second is "Multi-monitor support" with "Opt out of multi-monitor support" selected. A red arrow points to the "Opt out of multi-monitor support" dropdown.

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

When a client with no multi-monitor support connects to a remote desktop, the display protocol configuration file determines the resolution and number of monitors supported in the remote viewing session. For example, you can manually include the following line in your RDP Configuration file to span multiple monitors.

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

However, in this case, the Leostream Agent will not handle positioning and resizing of application windows.