



NVIDIA SLI Mosaic Mode

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User's Guide



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01 ABOUT NVIDIA SLI MOSAIC MODE

NVIDIA® SLI® Mosaic Mode takes the multiple GPUs in a Quadro Plex Visual Computing System (VCS) and presents them as a single logical Quadro GPU to the operating system.

In this way, using multiple-display hardware acceleration, SLI Mosaic mode lets you use multiple displays to create a larger, virtual canvas with zero or minimal performance impact on 2D or 3D applications.

Each display defines a unique uniform region within a larger virtual canvas.

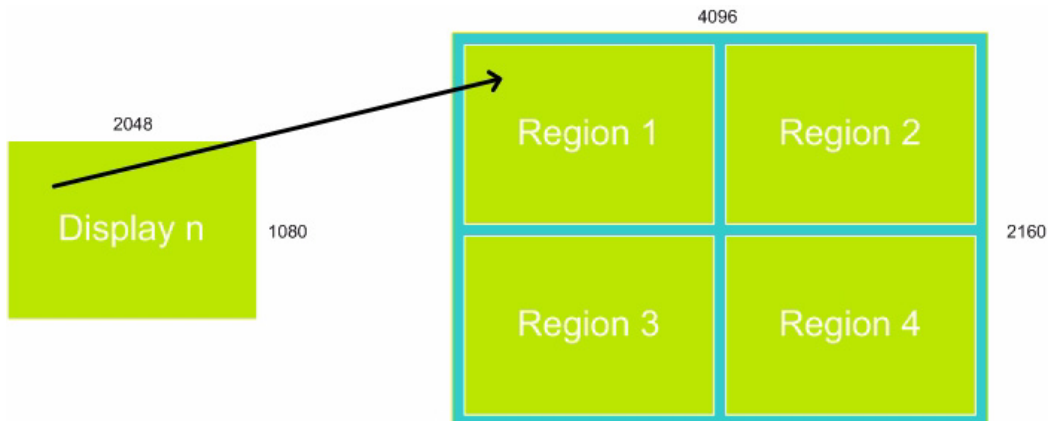


Figure 1.1 SLI Mosaic Mode Regions

In order to eliminate the hard edge between adjacent displays, SLI Mosaic mode can be configured to repeat the edges of adjacent displays so that the display edges can be overlapped to create a seamless composite projection.

About This Document

This document explains the SLI Mosaic Mode settings and how to connect your displays for optimum performance.

System Requirements

- ▶ NVIDIA Quadro Plex Model IV or D2 Series Visual Computing System (VCS)
- ▶ The following operating systems are supported:
 - Microsoft Windows XP[®] Professional with Service Pack 2 or later
 - Linux
- ▶ NVIDIA Quadro Professional Driver Release 185 or later.

NVIDIA recommends using the latest NVIDIA drivers explicitly targeted for NVIDIA Quadro Plex products.

Limitations

- ▶ Maximum Resolution

SLI Mosaic Mode is bounded by GPU rendering limitations (currently 8192 x 8192 pixels). For proper operation, do not configure display settings that will total greater than 8192 pixels in either the horizontal or vertical direction. For example, a 1 x 4 array consisting of panels of 2560 x 1600 pixel output each would have a total pixel output dimension of 10240 x 1600. This would exceed the 8192 limitation in the horizontal direction.

Total pixel output for a configuration is the total horizontal pixels by total vertical pixels. Total size on the Manage Quadro Plex Settings page calculates the total pixel dimension for you. The total pixels displayed is a combination of the Display configuration, resolution setting, and edge overlap settings.
- ▶ Minimum Resolution

SLI Mosaic Mode also requires that individual displays use a resolution greater than 800 x 600 pixel output. If a display in your configuration is set to one of the smaller pixel output resolutions (e.g., 640 x 480 or 800 x 600), the Quadro Plex system will revert to single display mode.
- ▶ Matching Displays

All displays must be the same type and use the same type of connection (for example, all DVI-to-DVI or all DVI-to-VGA). Mixed display use is not supported.
- ▶ Maximum Number of Displays
 - NVIDIA Quadro Plex Model IV: Supports up to four displays
 - NVIDIA Quadro Plex D2: Supports up to eight displays when using an NVIDIA Dual Output HIC (DoHIC) card.

02 USING NVIDIA SLI MOSAIC MODE

This chapter describes how to set up your displays and configure the NVIDIA software for SLI Mosaic Mode.

This chapter explains the three basic stages for setting up SLI Mosaic mode, and also includes a troubleshooting section:

- ▶ Connect Your Hardware
- ▶ Configure Your Driver Settings
- ▶ Set up SLI Mosaic Mode
- ▶ Troubleshooting

About the NVIDIA Control Panel

- See the *NVIDIA Control Panel Quick Start Guide* for an overview of the interface.
- SLI Mosaic Mode settings are found on the *Manage Quadro Plex Settings* page in your NVIDIA Control Panel. When SLI Mosaic mode is enabled, the Microsoft Windows Display Properties panel will show multiple displays but you will not be able to interact with them. Instead, use the settings on the *Manage Quadro Plex Settings* page to adjust the display resolution and refresh rate.

Connect Your Hardware

The hardware connections consists of connecting the Quadro Plex units to the host system, and the displays to the Quadro Plex units.

Connect your QuadroPlex Units

Connect your QuadroPlex unit to your host system.

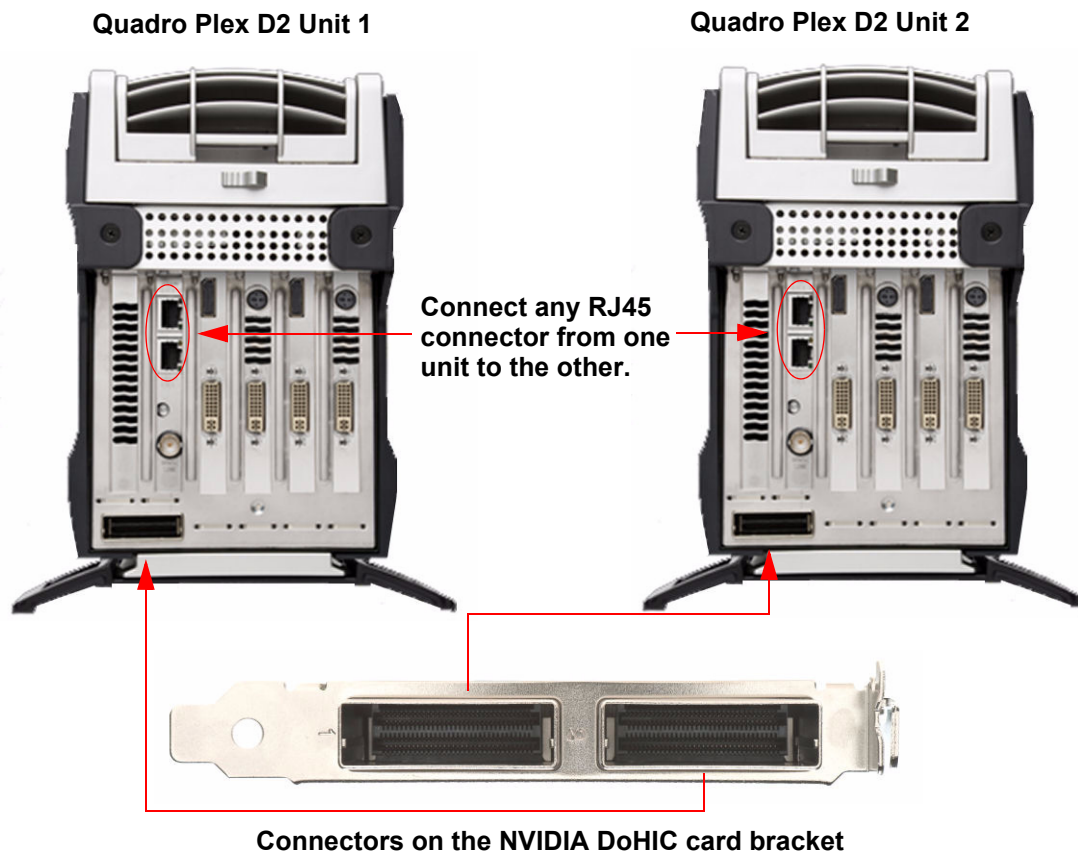
If your monitor layout consists of more than four displays,

- ▶ Connect two Quadro Plex D2 units to an NVIDIA Dual Output HIC (DoHIC) card installed in your host system.

Typically, the north connector on the NVIDIA DoHIC card is connected to the Quadro Plex D2 unit 1, but you may need to experiment to determine the connection in your system.

- ▶ You also need to synchronize the displays across the Quadro Plex units.

Connect the Quadro Plex units to each other using an RJ45 cable connected to the G-Sync connectors



Connect Your Displays

Connect all the displays that you intend to use in SLI Mosaic mode to the NVIDIA Quadro Plex unit. See [“Display Connections” on page 18](#) for the proper connectors to use, based on your Quadro Plex model and display configuration.

- ▶ All displays must be connected to the Quadro Plex and be part of the SLI Mosaic configuration. For example, the 2x2 configuration cannot be set with only 3 displays connected.
- ▶ Additional displays that are not part of the desired SLI Mosaic configuration should not be connected, as this may result in unpredictable behavior.
- ▶ SLI Mosaic mode cannot be enabled when only one display is connected to the Quadro Plex.
- ▶ All displays must be the same type and use the same type of connection (for example, all DVI-to-DVI or all DVI-to-VGA).
- ▶ The visual characteristics of displays vary by manufacturer and model from the same manufacturer. NVIDIA recommends using the same make and model for all displays.

Configure Your Driver Settings

There are several settings that you should configure before enabling Mosaic mode.

- ▶ Configure Display Settings
- ▶ Enable SLI Mode
- ▶ Enable V-Sync
- ▶ Set OpenGL Stereo Settings
- ▶ Synchronize Displays Across Two QuadroPlex D2 Units

Configure Display Settings

Before you enable SLI Mosaic mode, only one display is lit. The display settings that you set on this display will be applied to all the displays after enabling SLI Mosaic mode.

- 1 Open the NVIDIA Control Panel by right-clicking the desktop and then clicking **NVIDIA Control Panel** from the context menu.
- 2 Configure your display settings before enabling SLI Mosaic Mode.

Display settings may include but are not limited to:

- Desktop color settings
- Flat panel scaling
- Video and TV settings

Enable SLI Mode

- 1 From the **NVIDIA Control Panel** *Select a Task* pane, under *3D Settings*, select **Set SLI configuration** to open the associated page.
- 2 Under **Select the SLI configuration for your system**, click **Enable SLI technology**.
- 3 Click **Apply**.
- 4 Check the **Antialiasing – Setting** feature to make sure it is *not* set to any of the “SLI AA” values (e.g., 16x SLI AA, 32x SLI AA).

If it is, select a non-SLI AA setting, then click **Apply**.

Enable V-Sync

- 1 From the **Manage 3D Settings** Global presets pulldown menu, select **Base profile**.
- 2 From the Settings listbox, select **Vertical sync** and change its value to **Force on**, then click **Apply**.
- 3 From the Global presets pulldown menu, select **3D App - Default Global Settings** (the driver's default profile) or use the application profile that matches the application you are using, then click **Apply**.

Set OpenGL Stereo Settings

Set the OpenGL Stereo settings as needed.

On the Manage 3D Settings page:

- ▶ If you are not using OpenGL stereo, make sure that Stereo is disabled.
- ▶ If you are using active OpenGL stereo, then enable stereo and select the appropriate stereo display mode.
- ▶ If you are using passive OpenGL stereo, then enable stereo and select the Clone mode stereo display mode.

Synchronize Displays Across Two QuadroPlex D2 Units

If your configuration involves one QuadroPlex D2 unit (four or fewer displays), you can skip this section and proceed to [Set up SLI Mosaic Mode](#).

If your configuration involves two QuadroPlex D2 units (more than four displays), you must synchronize the displays as follows:

- 1 From the *Select a Task* navigation pane, under *Workstation*, click **Synchronize displays** to open the associated page.

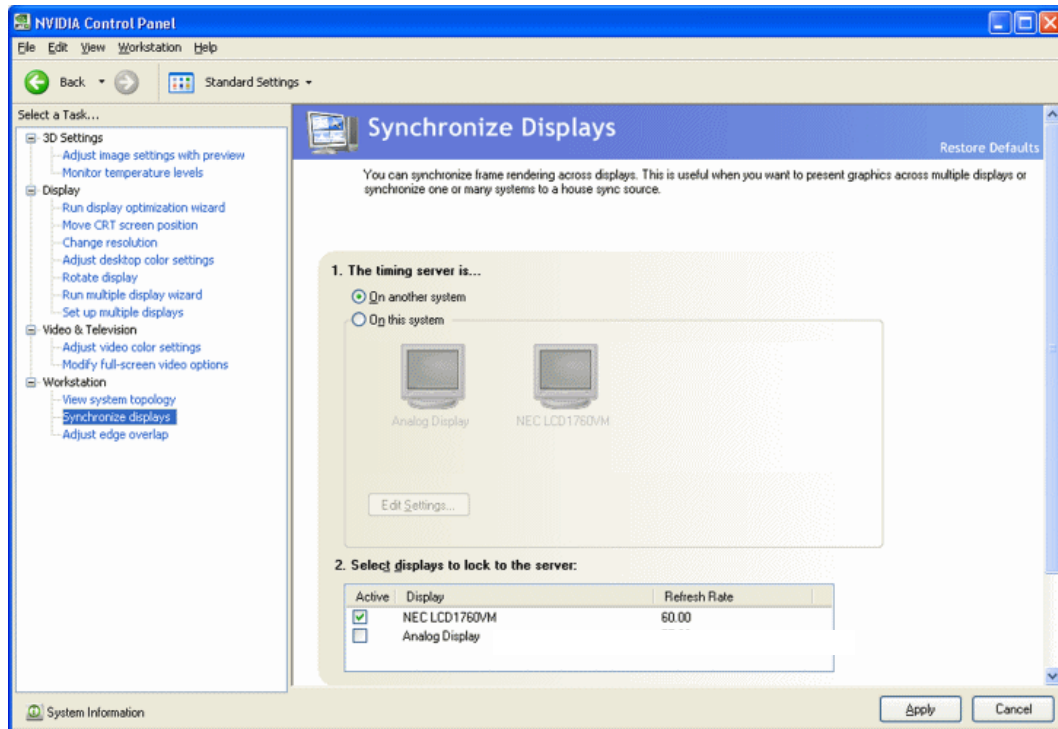


Figure 2.1 NVIDIA Control Panel Synchronize Displays Page

- 2 Under **The timing server is**, select the **On another system** radio button.
- 3 Under **Select displays to lock to the server**, select the check box for the display that appears.
- 4 Click **Apply**.

Set up SLI Mosaic Mode

- 1 From the *Select a Task* navigation pane, under *Workstation*, click **Manage Quadro Plex Settings** to open the associated page.

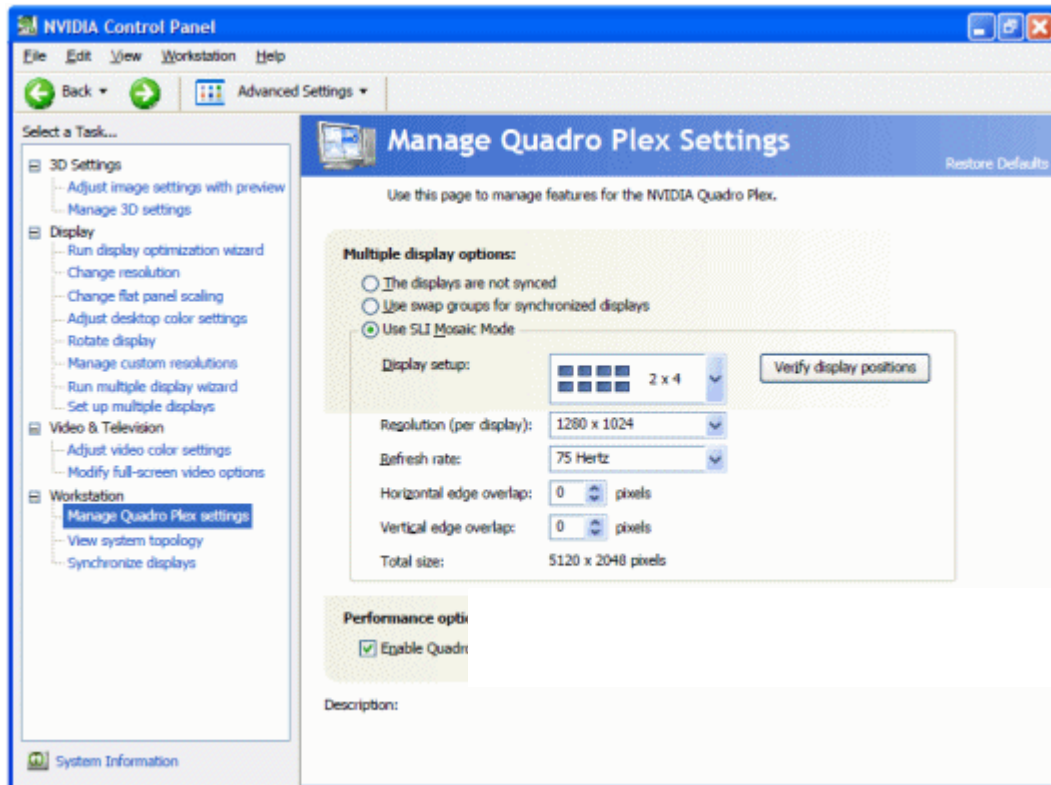


Figure 2.2 NVIDIA Control Panel Manage Quadro Plex Settings Page

- 2 Click the **Use SLI Mosaic Mode** check box to enable SLI Mosaic Mode settings.
- 3 Click the **Display setup** list arrow and then select the display configuration that matches your arrangement.

Available configurations list the number of display rows (vertical) by the number of display columns (horizontal). For example, a 1x4 configuration would be used for a single row of 4 displays lined up side-by-side; a 2x1 configuration would be used for a single column with 2 displays stacked one on top of the other.

- 4 Click **Verify display positions** to make sure your displays are attached to the correct Quadro Plex connectors.

A diagram appears on each display in the mosaic surface and indicates which Quadro Plex output is being driven.

Figure 2.3 shows an example of the diagrams that should appear in each display of a 2x2 SLI Mosaic arrangement .



Figure 2.3 2x2 Verify Display Example

If the diagrams match your display layout, you can close all the diagrams by clicking the “X” in the upper right corner of any of the diagrams.

If the diagrams do not match your display layout, then make the necessary corrections as follows:



Note: Do not disconnect the displays while the system is still powered on. Doing so can disable Mosaic mode.

- a Determine and make a note of the correct connections, using the diagrams as a guide.
 - b Close all applications and shut down your system.
 - c Rearrange the display connections.
 - d Turn your system back on and verify the configuration.
- 5** Set the resolution per display.

Click the **Resolution (per display)** list arrow and then select the resolution to which you want each display set. Make sure your settings fall within the following limits:

- Maximum total resolution: 8192, horizontal or vertical
- Minimum individual resolution: 800x600

6 Set the refresh rate.

Click the **Refresh rate** list arrow and then select the refresh rate you want applied to all displays.



Note: The refresh rate list box contains the refresh rates that are available for the resolution selected. The Manage QuadroPlex Settings page shows a limited number of refresh rates. For VGA displays, you may not see a refresh rate that you know is supported. If a refresh rate supported by your display is not listed, you can set it by locating and then setting it using the Windows Display Properties page. Alternatively, you can define a custom mode using the NVIDIA Control Panel->Change resolution page and then the refresh rate should appear on the Manage QuadroPlex Settings page.

7 Set the Horizontal and/or Vertical edge overlap as needed to accommodate a variety of configurations.

For example, you can introduce gaps (negative overlap) to accommodate bezeled displays.

8 Click **Apply** to save your changes.

Troubleshooting

- ▶ Display position does not match the diagrams in Appendix A
- ▶ Only 800x600 resolution is available
- ▶ SLI Mosaic options are missing from the Manage Quadro Plex Settings page

Display position does not match the diagrams in Appendix A

Due to differences in system BIOS configurations with respect to the GPU, the display positioning on your system may not match the arrangement given in Appendix A.

If this is the case,

- ▶ Use the “Verify Display” diagrams to determine the correct connections for your system, and then reconnect the displays accordingly.
- ▶ If you are using a configuration that does not use all of the display connections on the Quadro Plex unit and not all of your displays are lit, then connect displays to all of the connector outputs to determine which outputs are being used.

Only 800x600 resolution is available

The following information applies only to driver releases 190 and later .

Issue

On the Manage Quadro Plex Settings page, only 800x600 is listed under **Resolutions (per display)**.

Resolution

Verify the following and make the necessary corrections:

- ▶ All displays are the same type—all VGA or all DVI—and that they have the same EDID information and capabilities.
- ▶ All the displays are connected to the connector locations as indicated in Appendix A.

SLI Mosaic options are missing from the Manage Quadro Plex Settings page

The following information applies only to driver releases 190 and later .

Issue

Either the SLI Mosaic section is missing entirely from the Manage Quadro Plex Settings page, or an expected option from the **Display Setup** list is missing.

Resolution

- 1 With the system turned on and the NVIDIA Control Panel opened, disconnect (hot-unplug) all displays except for the primary boot display.
- 2 In the NVIDIA Control Panel, select **Manage Quadro Plex Settings** to open the associated page.
 - All appropriate display configurations should appear in the **Display setup** list.
 - Only 800x600 resolution is available.

- 3 Click the **Display setup** list arrow and then select the topology you wish to configure.

The topology should be activated but only the first display will be visible. If VNC is available, the full topology can be viewed from a remote machine.

- 4 Connect (hot plug) the remaining displays until all are visible.

The displays may not appear in the proper topology order. This can be corrected later.

- 5 When all displays are visible, click the **The displays are not synced** radio button to exit SLI Mosaic mode.
- 6 Enable SLI Mosaic mode, verify the display configuration, and make corrections as needed as described in [“Set up SLI Mosaic Mode” on page 9](#).

03 SETTING UP MOSAIC MODE UNDER LINUX

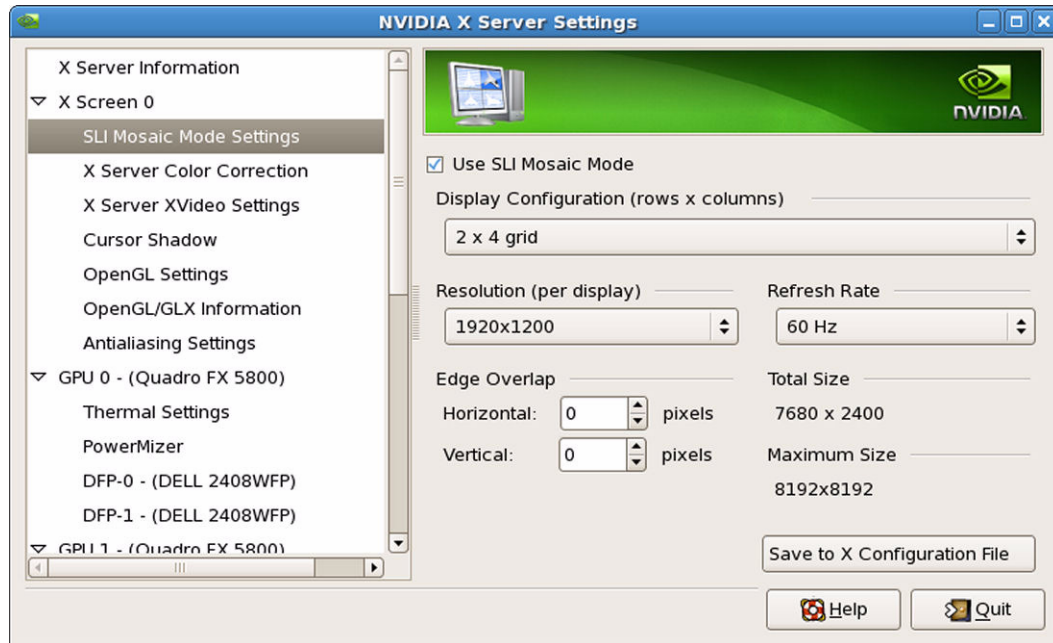
This chapter explains how to set up NVIDIA SLI Mosaic mode under Linux. It contains the following sections:

- ▶ “Using the SLI Mosaic Settings Page” on page 15
- ▶ “Adjusting Display Positioning Using MetaModes” on page 16

Using the SLI Mosaic Settings Page

See “[Connect Your Hardware](#)” on page 4 for information on connecting your QuadroPlex units and displays.

- 1 After starting X Windows, enter “**nvidia-settings**” from the command line.
The NVIDIA X Server Settings page appears.
- 2 Click **SLI Mosaic Mode Settings** from the side navigation tree.
The SLI Mosaic Mode page appears.



- 3 Click the **Use SLI Mosaic Mode** check box.
- 4 Use the corresponding up or down arrows to select the desired
 - Display Configuration (rows x columns)
 - Resolution (per display)
 - Refresh Rate
- 5 Under *Edge Overlap*, set the Horizontal and/or Vertical edge overlap as needed to accommodate a variety of configurations.
For example, you can introduce gaps (negative overlap) to accommodate bezeled displays.
- 6 Click **Save to X Configuration File**.
- 7 Restart the Linux X server.

Adjusting Display Positioning Using MetaModes

You can modify the configuration file in order to adjust the screen positions within the mosaic in the event that your connections do not match the layout as described in “Display Connections” on page 18.

About MetaModes and SLI Mosaic

Mosaic mode under Linux is an extension of Linux "TwinView", which uses MetaModes to control each display. MetaModes are "containers" that store information about what mode should be used on each display device at any given time. See <http://us.download.nvidia.com/XFree86/Linux-x86/185.18.14/README/chapter-13.html> for more information about NVIDIA TwinView and Linux MetaModes.

For SLI Mosaic mode, MetaModes let you specify the mode and offset (within the X screen) of each display.

Syntax

```
"<[GPU/Display identifier] [Resolution] [Offset], ... >"
```

Description

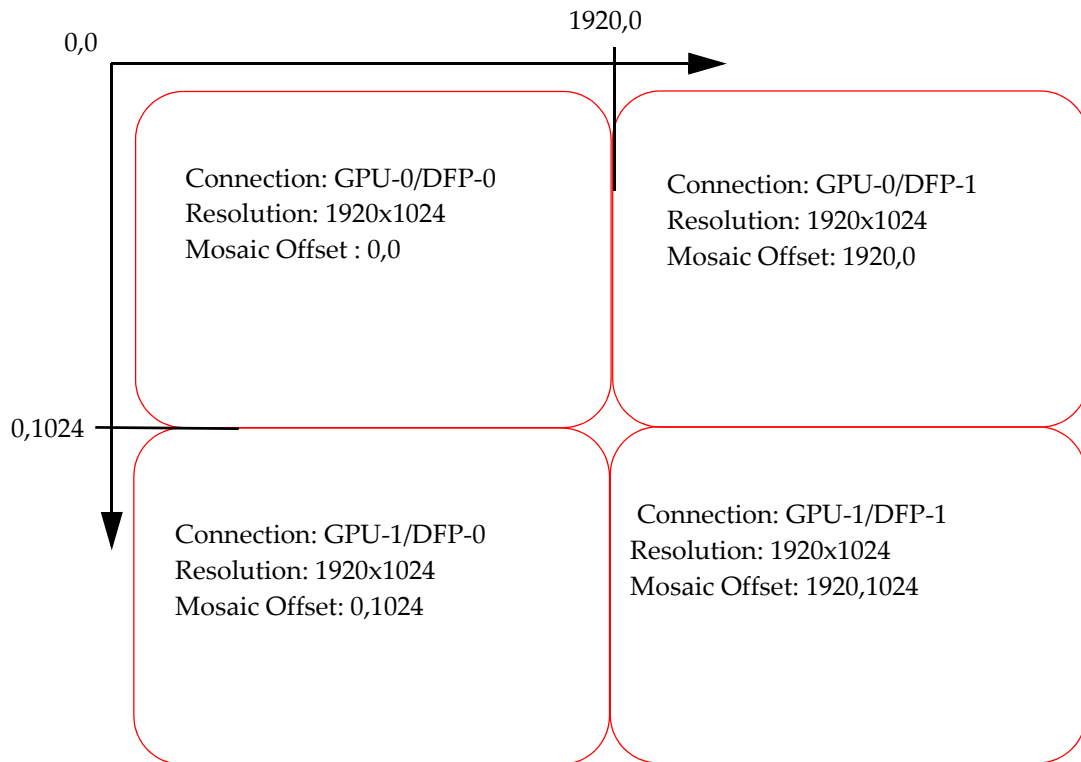
Following are descriptions of each element:

- ▶ **GPU/Display identifier format:** Each display can be identified by GPU and display. For CRTs, use "GPU-#.CRT-#" and for digital displays use "GPU-#.DFP-#".
- ▶ **Resolution format:** horizontal x vertical pixels
- ▶ **Offset format:** +[horizontal pixel offset]+[vertical pixel offset]

You can also specify offsets to produce arbitrary overlap.

Example: Using MetaModes to Set Up a 2x2 Mosaic

As an example, a particular 2x2 mosaic might be described by the information in the following figure:



Using the MetaModes option, specify this in the Device section of the X-Config file (xorg.conf) as follows:

```
Option "MetaModes" "GPU-0.DFP-0: 1920x1024 +0+0, GPU-0.DFP-1: 1920x1024
+1920+0, GPU-1.DFP-0: 1920x1024 +1024+0, GPU-1.DFP-1: 1920x1024
+1920+1024"
```

This results in the following display positions:

- GPU-0's DFP-0 at the top left (+0+0)
- GPU-0's DFP-1 at the top right (+1920+0)
- GPU-1's DFP-0 at bottom left (+1024+0)
- GPU-1's DFP-1 at bottom right (+1920+1024)

APPENDIX A DISPLAY CONNECTIONS

To achieve proper performance, the individual displays within a mosaic pattern must be connected to specific connectors on the Quadro Plex unit.

This appendix describes the display positions and corresponding connections to use when configuring SLI Mosaic mode.

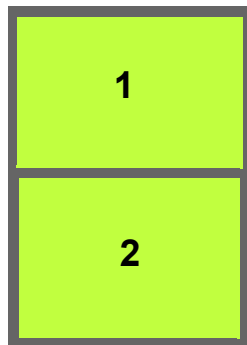
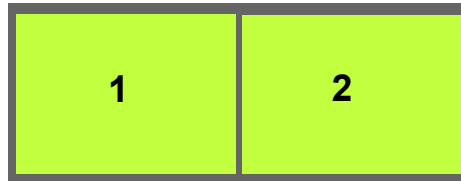
- ▶ “Quadro Plex D2 Display Connections” on page 19
- ▶ “Quadro Plex Model IV Display Connections” on page 31

Quadro Plex D2 Display Connections

- ▶ “Quadro Plex D2: 2-Display Mosaic Connections” on page 20
- ▶ “Quadro Plex D2: 3-Display Mosaic Connections” on page 21
- ▶ “Quadro Plex D2: 4-Display Mosaic Connections” on page 22
- ▶ “Dual Quadro Plex D2: 6-Display Mosaic Connections” on page 23
- ▶ “Dual Quadro Plex D2: 8-Display Mosaic Connections” on page 24
- ▶ “Quadro Plex D2: 4-Display Connections for 2-Display Passive Stereo Mosaic” on page 25
- ▶ “Dual Quadro Plex D2: 6-Display Connections for 3-Display Passive Stereo Mosaic” on page 26
- ▶ “Dual Quadro Plex D2: 8-Display Connections for 4-Display Passive Stereo Mosaic” on page 28

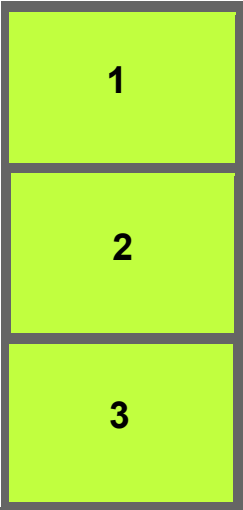
Quadro Plex D2: 2-Display Mosaic Connections

Connect the numbered connector to the display located at the corresponding mosaic position.



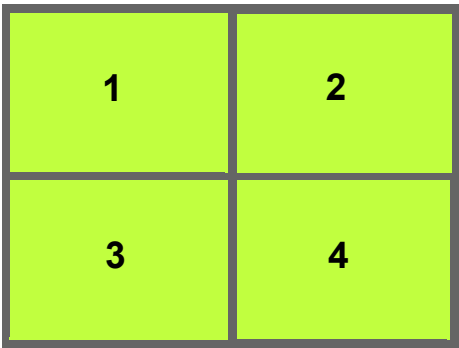
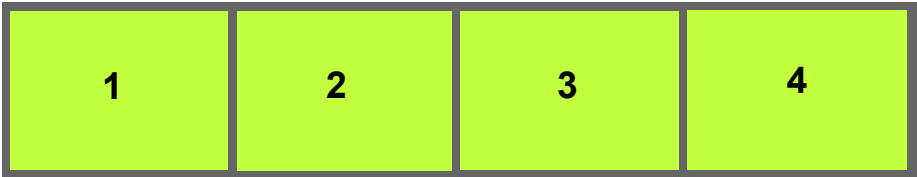
Quadro Plex D2: 3-Display Mosaic Connections

Connect the numbered connector to the display located at the corresponding mosaic position.



Quadro Plex D2: 4-Display Mosaic Connections

Connect the numbered connector to the display located at the corresponding mosaic position.



Dual Quadro Plex D2: 6-Display Mosaic Connections

This section describes the display connections to two Quadro Plex units (see “[Connect your QuadroPlex Units](#)” on page 4).

Connect the numbered connector to the display located at the corresponding mosaic position.

Quadro Plex Unit 1



Quadro Plex Unit 2



| | | |
|---|---|---|
| 1 | 2 | 5 |
| 3 | 4 | 6 |

Dual Quadro Plex D2: 8-Display Mosaic Connections

This section describes the display connections to two Quadro Plex D2 units (see “[Connect your QuadroPlex Units](#)” on page 4). Connect the numbered connector to the display located at the corresponding mosaic position.

Quadro Plex Unit 1

Quadro Plex Unit 2



(Windows)

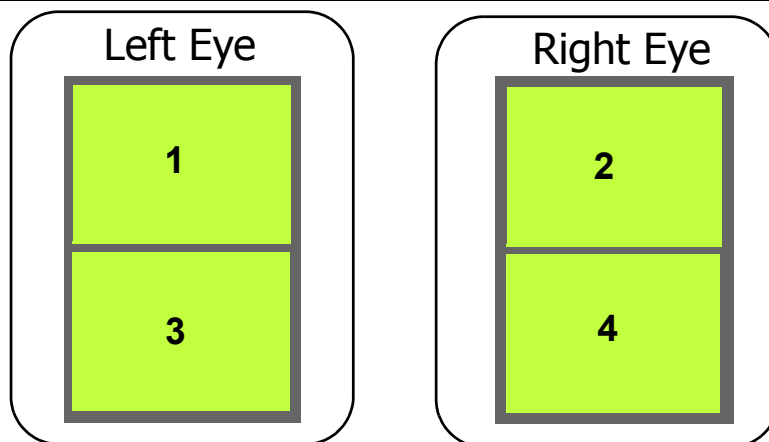
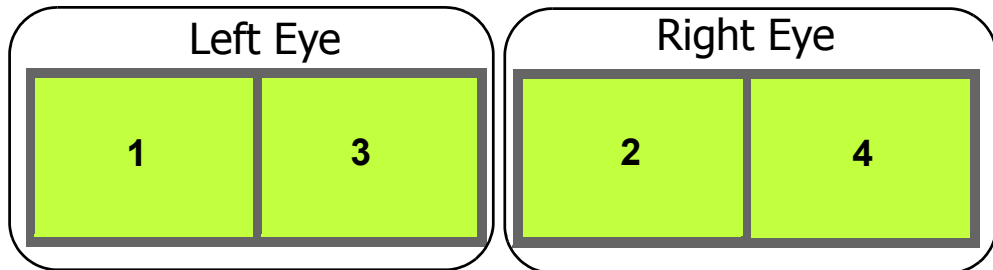
| | | | |
|---|---|---|---|
| 1 | 2 | 5 | 6 |
| 3 | 4 | 7 | 8 |

(Linux)

| | | | |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 |

Quadro Plex D2: 4-Display Connections for 2-Display Passive Stereo Mosaic

Connect the numbered connector to the display located at the corresponding mosaic position.



Dual Quadro Plex D2: 6-Display Connections for 3-Display Passive Stereo Mosaic

This section describes the display connections to two Quadro Plex units (see “[Connect your QuadroPlex Units](#)” on page 4).

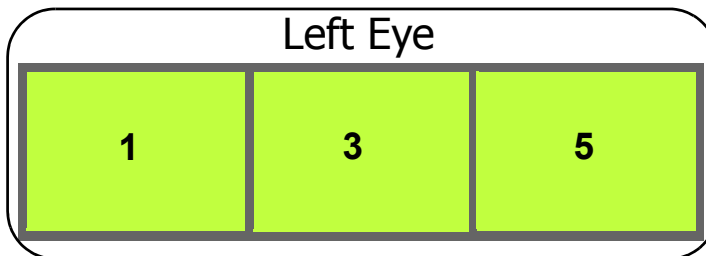
Connect the numbered connector to the display located at the corresponding mosaic position.

Quadro Plex Unit 1

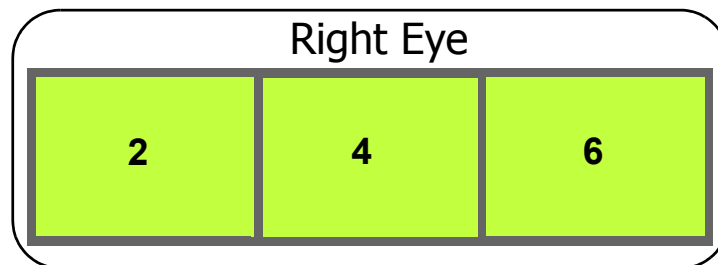
Quadro Plex Unit 2



Left Eye



Right Eye



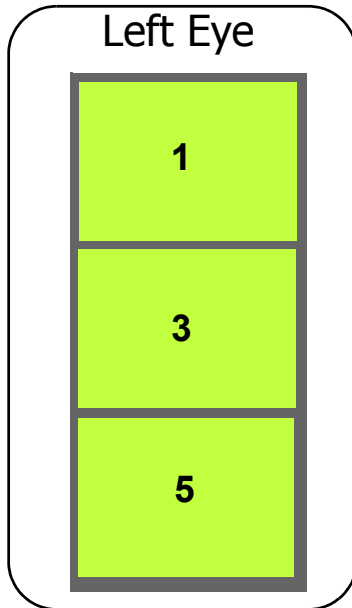
Quadro Plex Unit 1



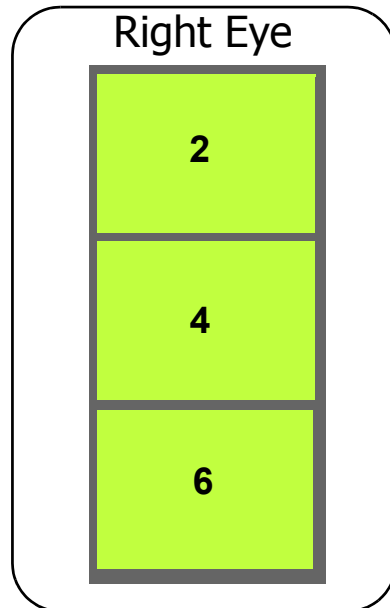
Quadro Plex Unit 2



Left Eye



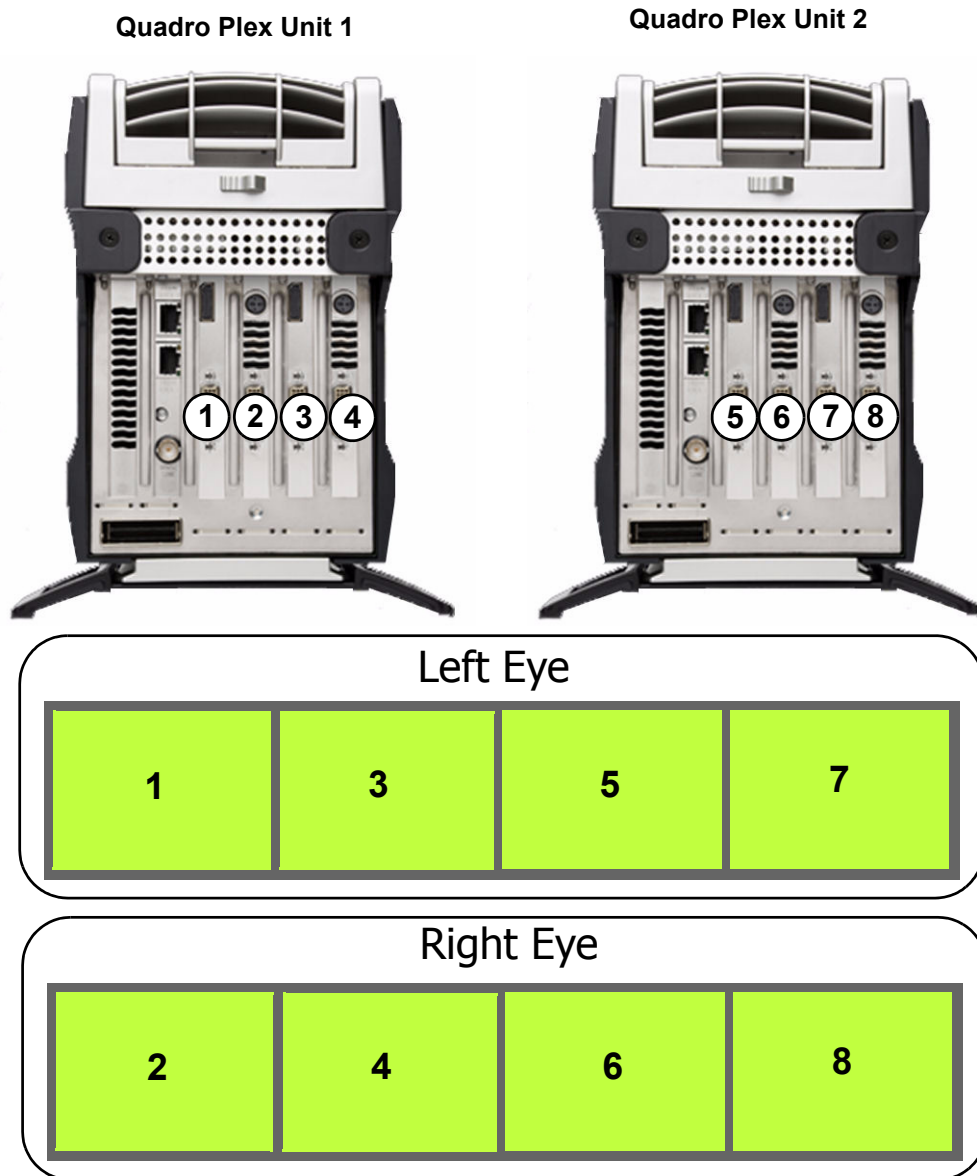
Right Eye



Dual Quadro Plex D2: 8-Display Connections for 4-Display Passive Stereo Mosaic

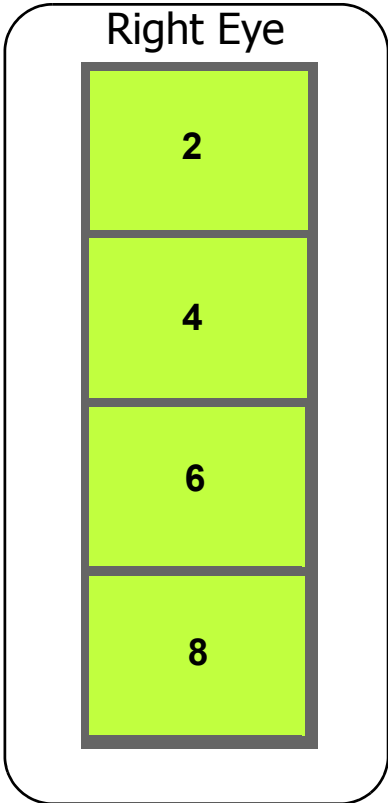
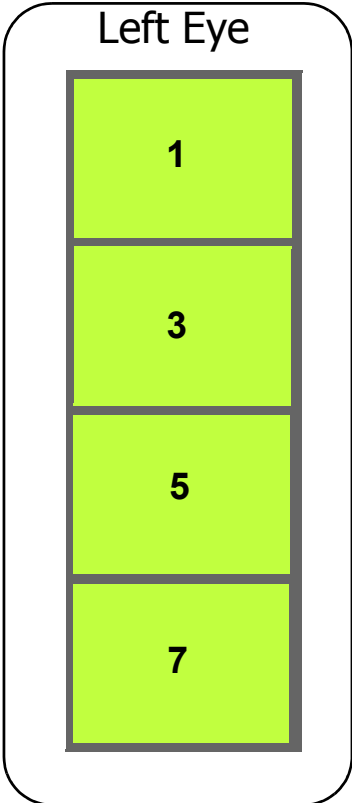
This section describes the display connections to two Quadro Plex units (see “[Connect your QuadroPlex Units](#)” on page 4).

Connect the numbered connector to the display located at the corresponding mosaic position.



Quadro Plex Unit 1

Quadro Plex Unit 2



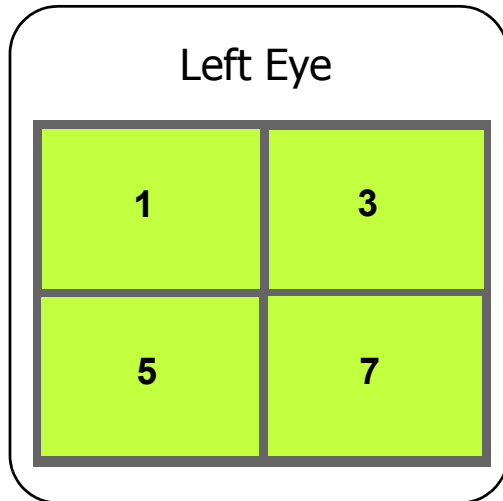
Quadro Plex Unit 1



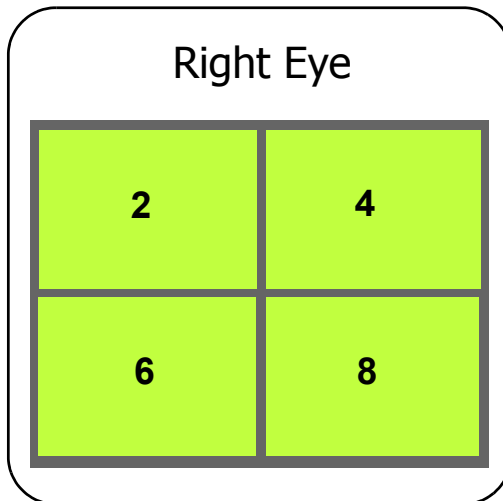
Quadro Plex Unit 2



Left Eye



Right Eye

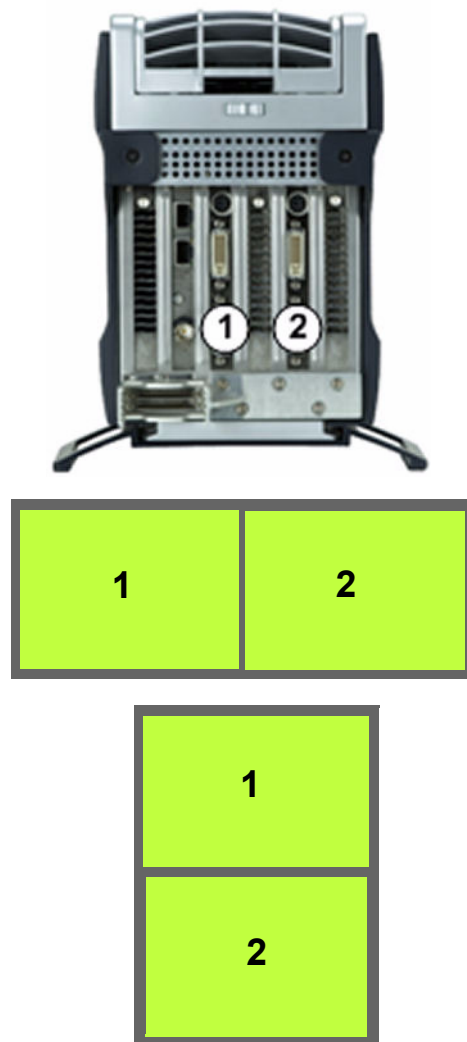


Quadro Plex Model IV Display Connections

- ▶ “Quadro Plex Model IV: 2-Display Mosaic Connections” on page 31
- ▶ “Quadro Plex Model IV: 3 or 4-Display Mosaic Connections” on page 32
- ▶ “Quadro Plex Model IV: 4-Display Connections for 2-Display Passive Stereo Mosaic” on page 33

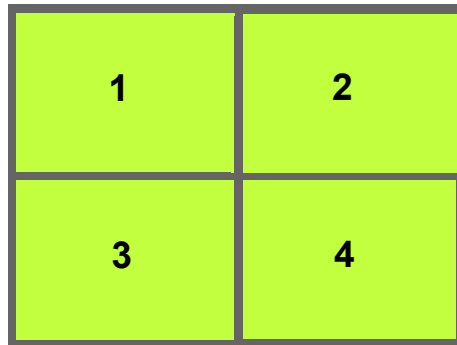
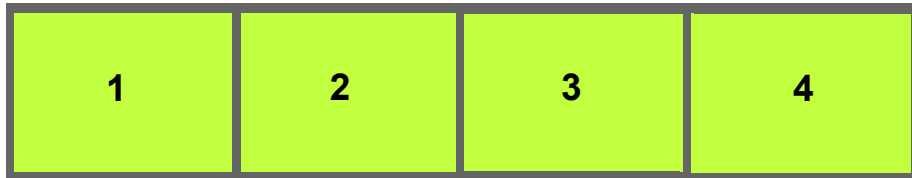
Quadro Plex Model IV: 2-Display Mosaic Connections

Connect the numbered connector to the display located at the corresponding mosaic position.



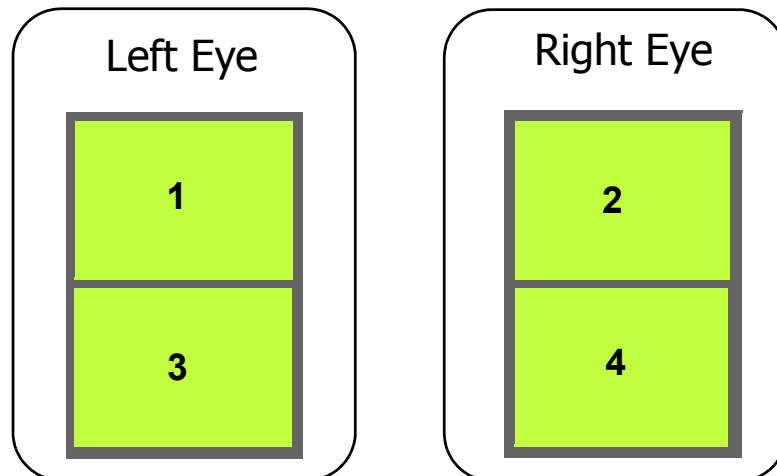
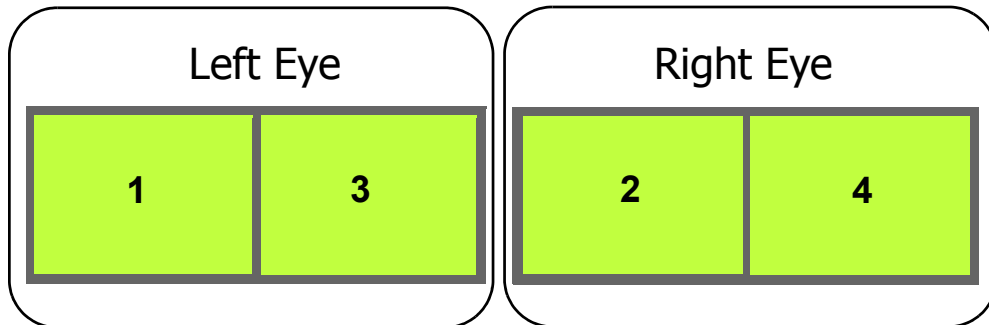
Quadro Plex Model IV: 3 or 4-Display Mosaic Connections

Connect the numbered connector to the display located at the corresponding mosaic position.



Quadro Plex Model IV: 4-Display Connections for 2-Display Passive Stereo Mosaic

Connect the numbered connector to the display located at the corresponding mosaic position.



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