



NVIDIA RTX PRO Sync

User Guide

Document Change History

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08	April 16, 2025	VO, DV	> Rebranding Quadro Sync II to RTX PRO Sync. > New features highlighted, including Variable Refresh Rate. > Updated content about Frame Lock detection.
09	March 10, 2026	GG, RK	Updated references to Sync Utility.

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Chapter 1. Introduction

The NVIDIA RTX PRO™ Sync card is designed as an add-on card for NVIDIA RTX PRO/NVIDIA RTX™/Quadro® series graphics processing units (GPUs). The NVIDIA RTX PRO Sync card fits into a free PCI Express slot within the system. The card does not use any electrical or data connection through the PCIe bus.

The RTX PRO Sync card provides the following functionalities for the Quadro Pascal™ series graphics boards and later:

- > Synchronizes up to eight GPUs in a system with two NVIDIA RTX PRO Sync cards.
- > Allows displays driven by one or more GPUs to be synchronized to an external synchronization source.
- > Supports external synchronization up to 1000 Hz.
- > Can generate a synchronization output signal for other systems with NVIDIA RTX PRO Sync cards.
- > Creates a group of synchronized displays driven by one or more systems.
- > Enables Synchronized Mosaic.
- > Sync multiply and divide: sync displays to a multiple or divisor of an external sync signal.
- > Sync different resolutions with the same refresh rate between NVIDIA RTX PRO Sync boards on the same or different system.

Chapter 2. Terminology

> External Sync

External Sync refers to a sync signal generated external to the system and used as a reference to synchronize the frame update of displays attached to the system.

> Frame Lock

Frame Lock occurs when multiple displays are synchronized so that the start and end of the frame align for all displays.

> Mosaic

Mosaic creates one large desktop of monitors and appears as a single desktop to the operating system. Taskbars span across the monitors and applications maximize across the Mosaic configuration.

> SLI

SLI is an acronym referring to an NVIDIA technology, called Scalable Link Interface, that allows multiple GPUs to be linked together to improve rendering performance. SLI implements multiple algorithms to improve performance, such as Alternate Frame Rendering (AFR) or Split Frame Rendering (SFR).

- Explicit SLI

Graphics APIs have evolved to give applications significantly more control over GPU resources. Vulkan and DirectX 12 are often referred to as explicit APIs, which means that an application explicitly controls the GPU instead of the driver. This explicit application control also applies to SLI, where with Vulkan and DirectX 12, applications can implement whatever scaling algorithm is best for their needs.

- Implicit SLI

The SLI SFR and AFR algorithms were a GPU driver feature and transparent to applications, which means that applications will benefit from improved rendering performance without modification.

> Swap Barrier

A swapbarrier refers to a mechanism where multiple displays or swapgroups on multiple systems are synchronized so that all displays across all systems update the displayed frame simultaneously. The term swapbarrier is also used to define an API interface within a graphics API, such as OpenGL.

> **Swap Group**

A swapgroup refers to a group of displays in one system where all displays in the group will update the displayed frame simultaneously. swapgroup is also used to define an API interface within a graphics API, such as OpenGL.

> **SwapReady**

Swapready is a hardware signal created by the GPU used to synchronize a group of GPUs so that all the GPUs in the group update the display image simultaneously, regardless of how long each GPU took to render.

> **Synchronized Mosaic**

Creates one large desktop of monitors and appears as a single desktop to the operating system with all the monitors synchronized at the same time. This will ensure no tearing across monitors on the setup.

For configurations with two or more GPUs, an NVIDIA RTX PRO Sync card is needed to synchronize Mosaic across all the GPUs.

> **Bi-level and Tri-level Frame Sync**

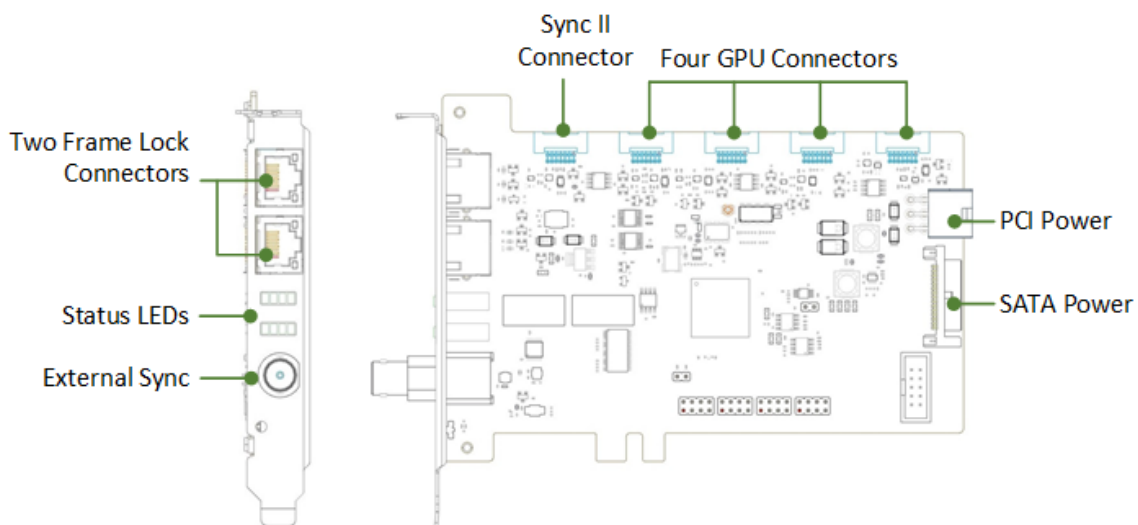
Bi-level and Tri-level syncs refers to industry-standard sync types for Standard Definition (SD) and High Definition (HD) digital video, respectively, and represents the start of a digital video frame. Bi-level and tri-level syncs are often referred to as composite sync, which means that the sync and video data are transmitted on the same video signal.

Chapter 3. Getting Started

3.1 NVIDIA RTX PRO Sync Card Overview

The NVIDIA RTX PRO Sync card is an accessory to NVIDIA RTX PRO GPUs. On the top edge of the card are five connectors that can connect to four GPUs and a second NVIDIA RTX PRO Sync card (refer to Figure 1). The flexible cables to make these connections, four 12-inch cables and two 24-inch cables are included in the box.

Figure 1. NVIDIA RTX PRO Sync Overview



For high-vibration environments, self-latching/locking cable connectors are used, which hold all cables securely in place on the NVIDIA RTX PRO Sync card and NVIDIA GPU. Since the SATA power connector has no physical retention, the board has a hole that can be used to secure the cable with a cable tie.

3.2 In the Box

Figure 2 shows the following components in the box:

- > RTX PRO Sync Card
- > 12-Inch Short Sync Cables (four)
- > 24-Inch-Long Sync Cables (two)
- > Quick Start Guide

Figure 2. Components in the Box



Chapter 4. Installation System Requirements

- > NVIDIA RTX PRO/NVIDIA RTX/Quadro Pascal-series graphics boards and later, 4000-class and above.
 - The NVIDIA RTX PRO Sync card supports up to four matching NVIDIA RTX PRO/NVIDIA RTX/Quadro GPUs.
Each GPU is connected to the card through an internal flexible cable.
 - Two NVIDIA RTX PRO Sync cards are supported in a workstation, synchronizing up to eight NVIDIA RTX PRO/NVIDIA RTX/Quadro GPUs.
 - Multiple workstations can be connected to enable additional NVIDIA GPUs and NVIDIA RTX PRO Sync cards for complex deployments with many displays
 - Two NVIDIA RTX PRO Sync cards require an internal flexible cable connection between the boards.
 - For a current list of the NVIDIA RTX PRO/NVIDIA RTX/Quadro GPU boards that are compatible with NVIDIA RTX PRO Sync, go to <https://www.nvidia.com/en-us/design-visualization/solutions/quadro-sync/>.
- > Operating Systems
 - Windows 10/11 64-bit
 - Linux 64-bit
- > Driver
 - R440 branch and newer display drivers support NVIDIA RTX PRO Sync with Mosaic topologies.
- > Chassis Requirements
 - Single free PCIe slot
 - Six-pin PCIe or SATA power connector

4.1 NVIDIA RTX PRO Sync Card Install

Before you install the NVIDIA RTX PRO Sync card, power down the machine and unplug the power cord.

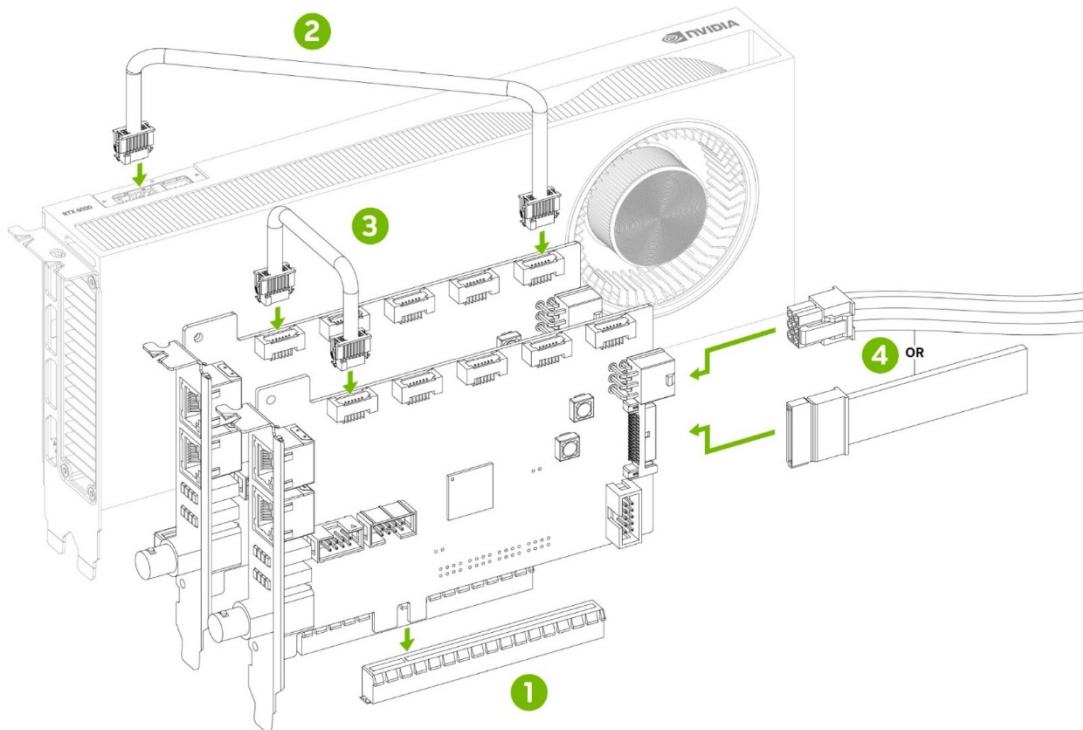
To install the NVIDIA RTX PRO Sync Card:

1. Place the NVIDIA RTX PRO Sync card in a free PCI Express slot on the motherboard ( in Figure 3).



Note: The PCIe edge fingers might not bottom out in the PCIe slot.

Figure 3. Installing and Connecting the NVIDIA RTX PRO Sync Card



2. Connect up to four NVIDIA RTX cards to the NVIDIA RTX PRO Sync card GPU connectors ( in Figure 3) using the provided cables.



Note: There is no order requirement when connecting the NVIDIA RTX/Quadro cards to the NVIDIA RTX PRO Sync card GPU connectors.

3. Connect power to the RTX PRO Sync card using a 6-pin PCIe or SATA power cable ( in Figure 3).

To add a second NVIDIA RTX PRO Sync card for a dual NVIDIA RTX PRO Sync configuration:

1. Install a second NVIDIA RTX PRO Sync card in a nearby PCIe slot.
2. Connect up to four supported NVIDIA GPUs to the NVIDIA RTX PRO Sync card GPU connectors (2 in Figure 3) using the included cables.
3. Connect power to the second NVIDIA RTX PRO Sync card using either a 6-pin PCIe or SATA power cable (4 in Figure 3.)
4. Connect one RTX PRO Sync card to the other NVIDIA RTX PRO Sync card (3 in Figure 3) using the included cables between the Sync connectors.

This dual configuration enables synchronization of up to eight GPUs in a system.



Note: There is an order requirement when connecting the second NVIDIA RTX PRO Sync card (CON0, which is closest to the PCIe bracket) should be used to connect both cards (Figure 2).

If you are considering these types of configurations, contact

QuadroSVS@nvidia.com.

4.2 NVIDIA RTX Enterprise Driver

The NVIDIA RTX PRO Sync card does not require a dedicated driver, so the files needed to operate the card are included in the latest NVIDIA RTX Driver. To download the latest driver, go to <http://www.nvidia.com/drivers>. When selecting the drivers that will be used with NVIDIA RTX PRO Sync, select the options from the drop-down lists that match your operating system and the NVIDIA GPU configuration (refer to Figure 5).

Figure 4. NVIDIA RTX Driver Download

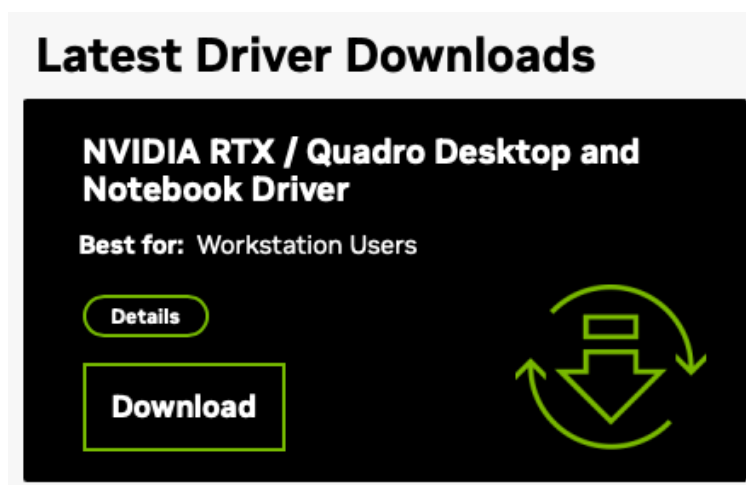


Figure 5. Searching for a Driver

Manual Driver Search

NVIDIA RTX PRO / RTX / Quadro

NVIDIA RTX PRO Series

NVIDIA RTX PRO 6000 Blackwell Workstation

Windows 11

English (US)

Find

Chapter 5. Working with NVIDIA RTX PRO Sync

The NVIDIA RTX PRO Sync card is used in many applications, including digital signage displays, location-based entertainment exhibits, flight simulators, Power Walls, visualization CAVes, Info Walls, and so on. These installations are typically complex, and architecture decisions can impact performance and reliability. Contact QuadroSVS@nvidia.com for questions about architecting systems with an NVIDIA RTX PRO Sync card and/or Mosaic.

Chapter 6. Configuring Synchronization

Frame Lock refers to a situation where multiple displays are synchronized, and the start and end of the frame align for all displays.

6.1 Connecting Nodes in a Visualization Cluster

If you are using the multi-node synchronization features of the NVIDIA RTX PRO Sync cards, the NVIDIA RTX PRO Sync cards in each node in the cluster need to be connected. To enable all the synchronization features, such as Frame Lock, stereo sync, and swap/present barrier, that NVIDIA RTX PRO Sync provides, NVIDIA recommends that you connect the nodes using CAT-5 Ethernet cables (not included). NVIDIA also recommends that you use high-quality cables with the shortest length possible for your installation.

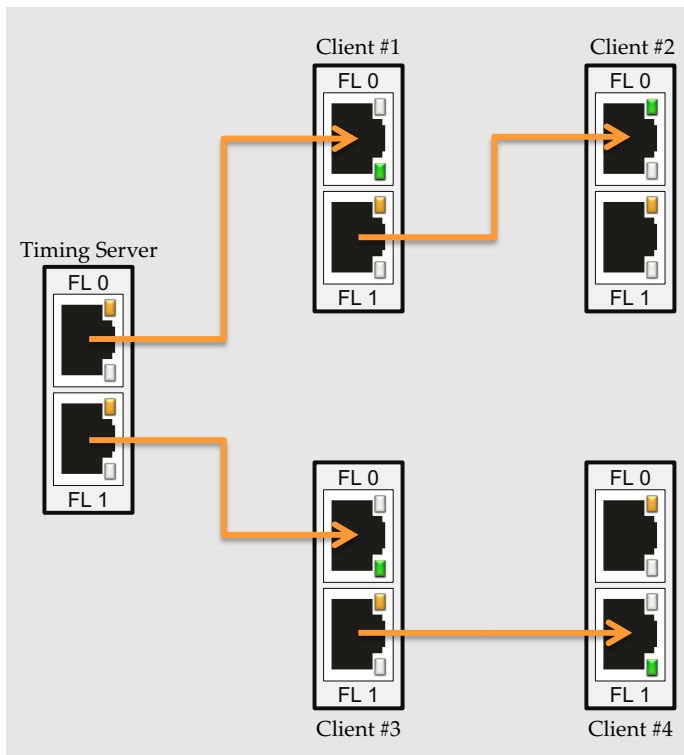


Caution: Here is some important information:

- > **Do not** connect the RTX PRO Sync card to TCP/IP networking equipment.
- > **Do not** use Ethernet hubs or switches to branch or extend the signal.
- > NVIDIA RTX PRO Sync cards are not compatible with TCP/IP protocols, and the card will not operate if it is connected to networking equipment.

Select one node as the timing server to control the timing on all the other nodes. From the timing server, connect a CAT-5 cable between the Frame Lock connectors on the timing server and a client machine, and it does not matter which RJ45 connector you use. For large clusters, NVIDIA recommends that you create two signal chains off the timing server (refer to Figure 6).

Figure 6. Frame Lock Connections on Timing Server



6.1.1 Setting Up the Visualization Cluster

When you configure a visualization cluster, the order of operations for configuration is important. NVIDIA recommends that you enable Frame Lock after you complete the other driver configurations.

Here is a sample workflow:

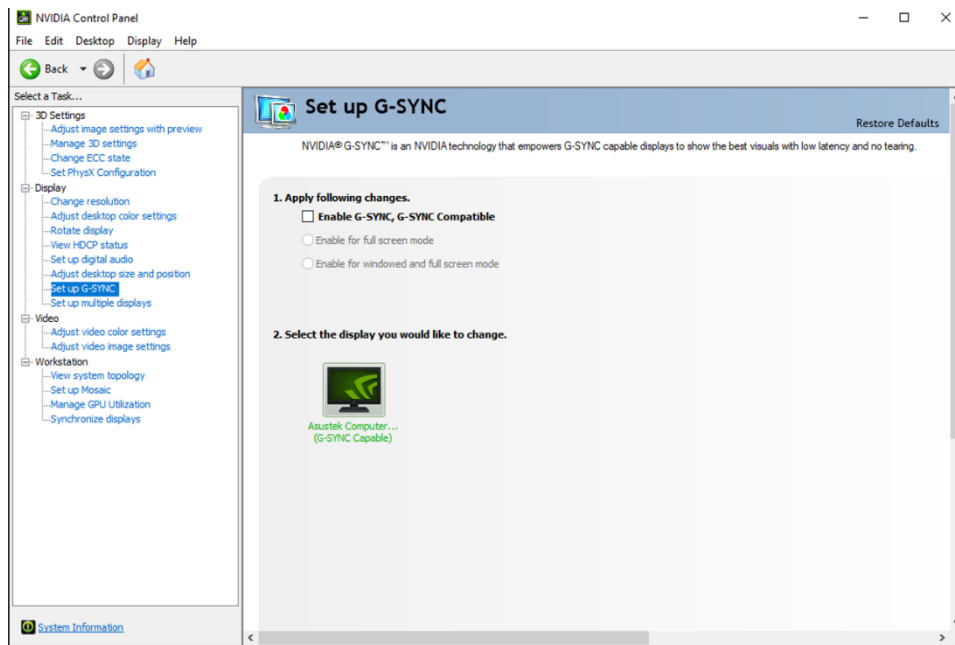
1. Complete the following tasks on the timing server.
 - a. If you are using a G-SYNC display, disable G-SYNC.
 - b. If you are using stereo, enable it with the correct mode.
 - c. If you are using Mosaic, configure Mosaic **before** you enable Frame Lock.
 - d. Enable Frame Lock as the timing server.
2. Configure each client machine.
 - a. If using a G-SYNC display, disable G-SYNC.
 - b. If you are using stereo, enable stereo with the correct mode.
 - c. If using Mosaic, configure Mosaic **before** you enable Frame Lock.
 - d. Enable Frame Lock on each machine as timing clients.

6.1.2 Configuring the Windows Driver

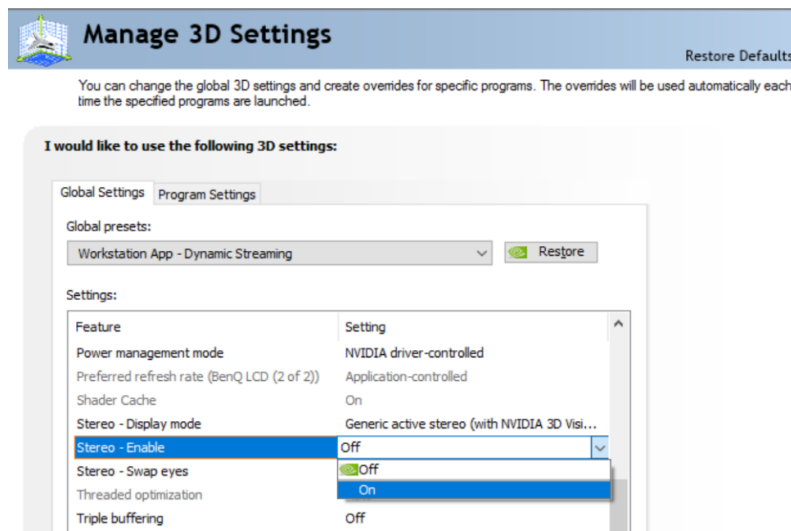
Before you configure the synchronization modes, change the G-SYNC, Stereo, and Mosaic settings in the NVIDIA Control Panel.

1. Open the NVIDIA Control Panel and select **Manage 3D Settings**.
2. If you are using G-SYNC display, disable G-SYNC.

The following page only appears when a G-SYNC monitor is connected.



3. In the **Stereo - Enable** drop-down list, select **On**.



4. If you are using Mosaic, configure Mosaic **before** you enable synchronization.

6.1.3 Enabling Frame Lock

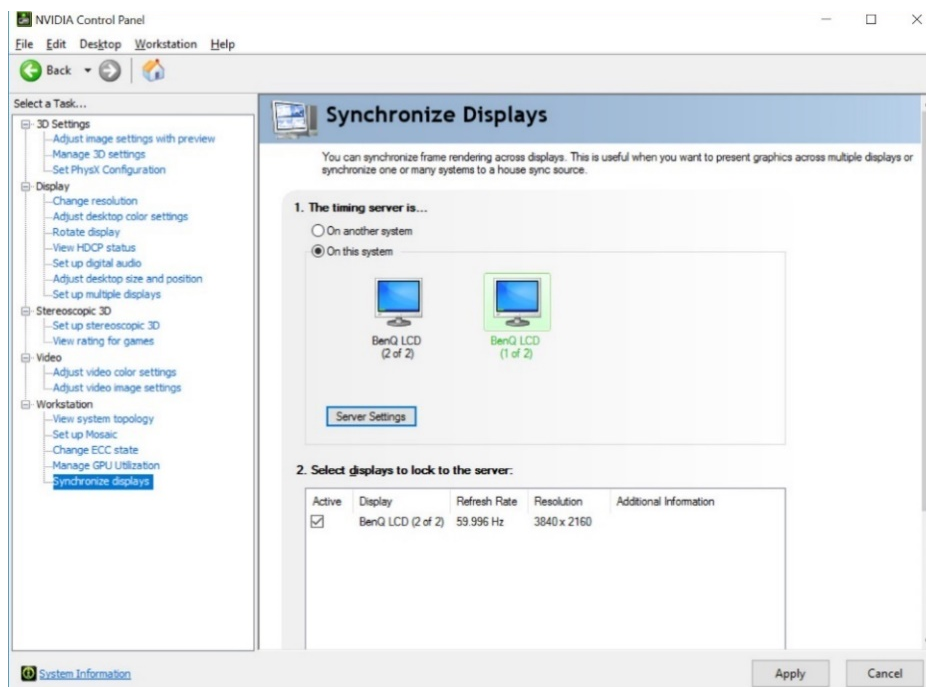
When enabling Frame Lock across a cluster, you must define a display as the timing server to which the clients connect (refer to “Connecting Nodes in a Visualization Cluster”). NVIDIA recommends that this node be in the middle of the timing chain for large clusters (refer to Figure 6).

For best results when synchronizing the cluster, and so you can verify that each client synchronizes correctly as you add the client, configure the Timing Server first and then the client machines. Each client should detect the incoming sync signal from the timing server when you add it to the cluster.

- **Configuring the Frame Lock Server**

To enable Frame Lock on the timing server:

1. Open the NVIDIA Control Panel.
2. In the left pane, select **Synchronize Displays**.
3. Under **The timing server is**, select **On this system**.



When the system has multiple displays, the driver automatically selects the primary display as the timing server, and all other displays become the clients. To change the configuration, select the display that you want to be the timing server.



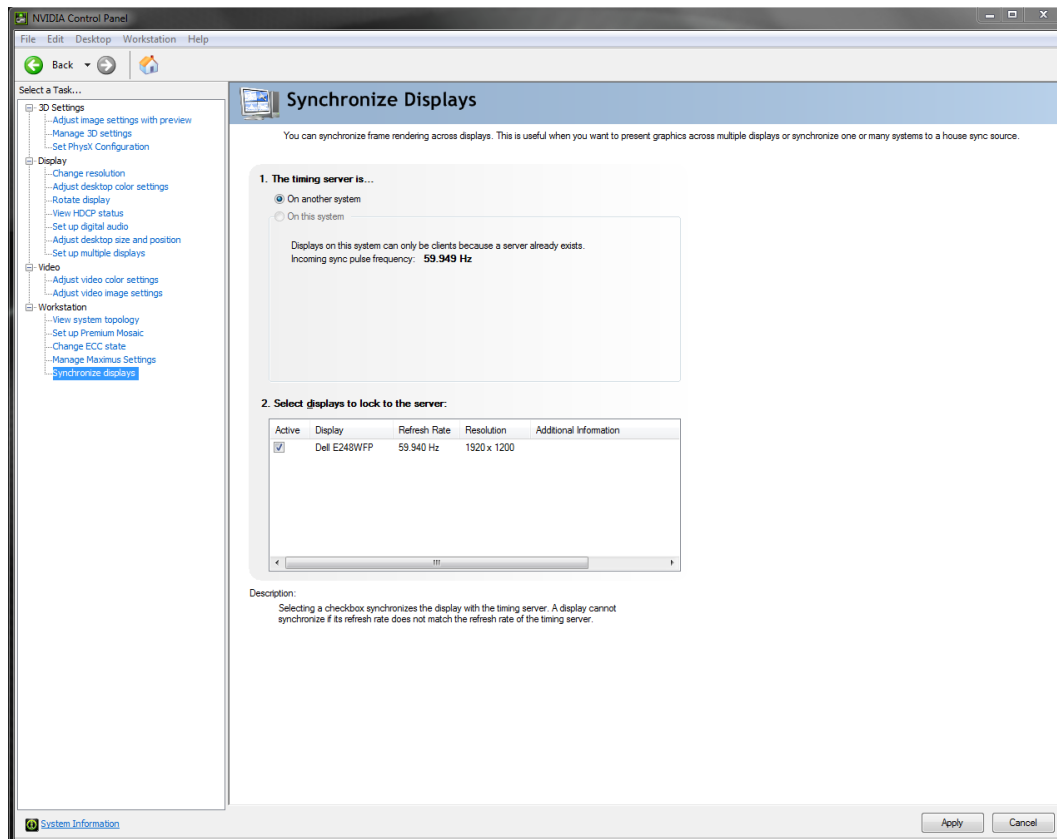
Note: The Server node refers to the node that is used as the Timing Server, and there can only be one Timing Server in a cluster. All other nodes are typically referred to as clients.

4. Click **Apply**.

6.1.4 Configuring the Frame Lock Clients

The client machines are also configured through the **Synchronize Displays** menu on the NVIDIA Control Panel. There is already a timing server in the cluster, so when you open the control panel, it should detect the incoming signal from the timing server and only offer the option to synchronize as timing clients.

1. Open the NVIDIA Control Panel and, in the left pane, select **Synchronize Displays**.
2. Select the displays to synchronize from the displays listed in **Select displays to lock to the server**.



Note: The NVIDIA RTX PRO Sync card requires the timings of all displays to be within ± 50 ppm to properly synchronize.

3. Click **Apply**.

4. During the synchronization process, the displays might blink as they adjust their timing.
5. To accept the new synchronization settings, acknowledge the confirmation dialog. If you do not acknowledge, the settings will be reverted.
6. The Status LEDs on the NVIDIA RTX PRO Sync card, and in the System Topology Viewer in the Control Panel, report the state of the synchronization (refer to “Monitoring Display Synchronization”).
7. To disable Frame Lock, reverse the process.

6.1.5 Restarting a Visualization Cluster

To restart a cluster and minimize the synchronization time:

1. Restart the Timing Server.
2. After the Timing Server is back up, verify that it is outputting the signal as indicated by the LEDs or the NVIDIA Control Panel (refer to Table 2).
3. Restart all the client machines.

Depending on the configuration, it can take many minutes for a cluster to fully synchronize.

6.1.6 NVIDIA RTX PRO Sync TTL Sync Generator Output

The NVIDIA RTX PRO Sync card supports the generation of TTL Sync output using the onboard BNC connector. The output is locked to the Frame Lock signal that is generated by the NVIDIA RTX PRO Sync card.

The rate of the output signal will be the same as the display that was selected as the timing server. The output can be used to synchronize compatible third-party equipment using a TTL sync signal, but the output signal is a short duty-cycle signal (for example, only ~200 ns duration for a 60 Hz signal).

6.1.7 Configuring BNC Output

To configure BNC output:

1. Open the NVIDIA Control Panel and complete the steps in “Configuring the Windows Driver.”
2. After the Synchronize Displays step, click **Server Settings**.

- Click **The server refresh rate with BNC output enabled**.

- Click OK.



Caution: If the BNC port is configured as a Sync output, do not connect it to a Sync Generator. Doing so might damage the NVIDIA RTX PRO Sync card and the Sync Generator.

6.2 Configuring the Linux Driver

The NVIDIA Control Panel on Linux allows one node to manage all nodes in the cluster. If the security settings are not correctly set for the cluster to work properly, the client nodes might not get added.

6.2.1 Setting Driver Security for Remote Management

Any X Server can be added to the Frame Lock group if the system supports it, it is configured to support Frame Lock, and it is connected through an RJ45 cable to the

other systems in the Frame Lock group. The system running `nvidia-settings` can communicate with the X server that is to be included for Frame Lock.

This means one of the following:

- > The server must be listening over TCP, and the system's firewall is permissive enough to allow remote X11 display connections.
- > An alternative mechanism, such as `ssh(1)`, is configured to forward between the machines.

For listening over TCP, verify that the `-nolisten tcp` command-line option was not used when starting the X server. You can find the X server command line by running a command like the following:

```
% ps ax | grep X
```

If `-nolisten tcp` is on the X server command line, consult your Linux distribution documentation for more information about removing this option.

For example, distributions configured to use the GDM login manager might need to set `DisallowTCP=false` in the GDM configuration file (for example, `/etc/gdm/custom.conf`, `/etc/X11/gdm/gdm.conf` or `/etc/gdb/gdb.conf`), the exact configuration file name and path varies by the distribution), or distributions that were configured to use the KDM login manager might have the following line in their `kdm` file (for example, `/etc/kde3/kdm/kdmrc`):

```
ServerArgsLocal=-nolisten tcp
```

This line can be commented out by prepending it with `#`.

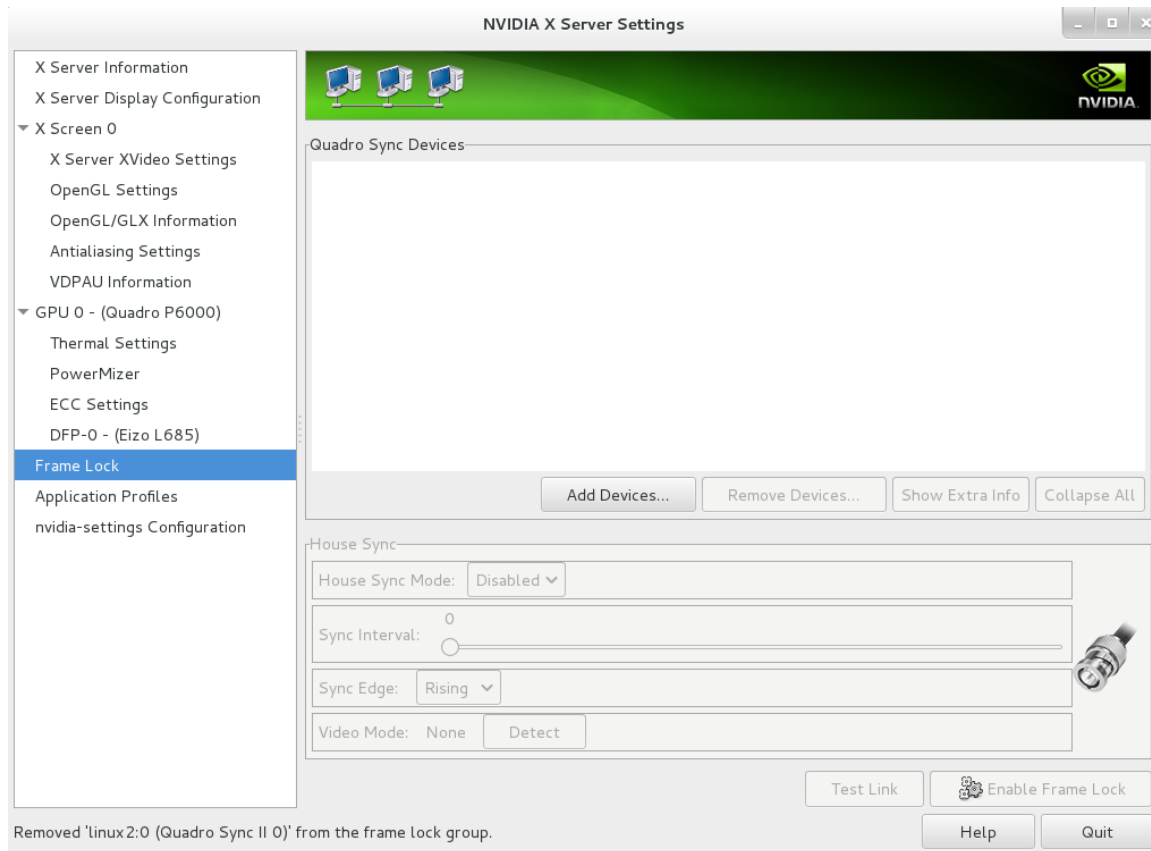
The system running `nvidia-settings` has display privileges on the X server that must be included in the cluster.

A system can gain display privileges on a remote system by running the following command on the remote system (refer to the `xhost(1)` man page for more information).

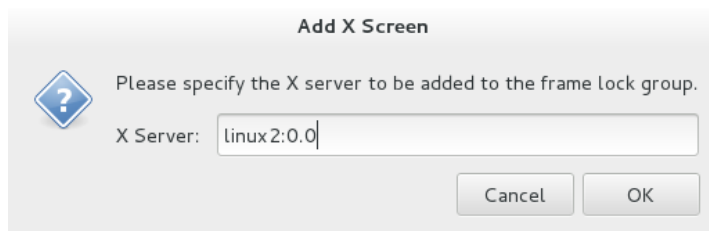
```
% xhost +
```

6.2.2 Configuring Frame Lock

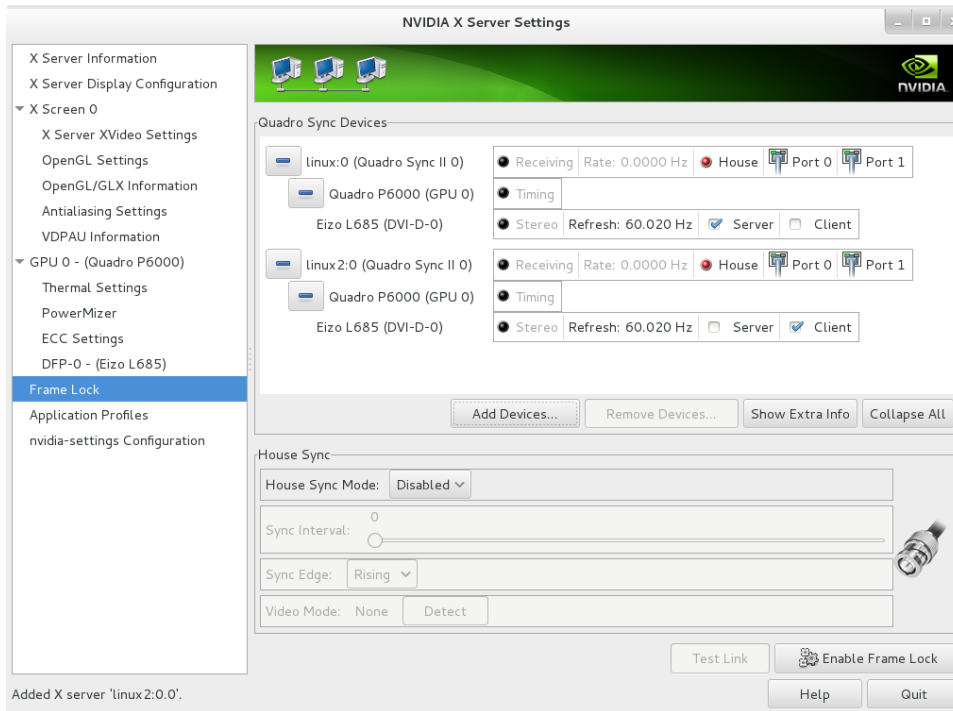
1. On the server, open the NVIDIA X Server Settings.
2. In the left pane, select **Frame Lock**.
3. Click **Add Devices**.



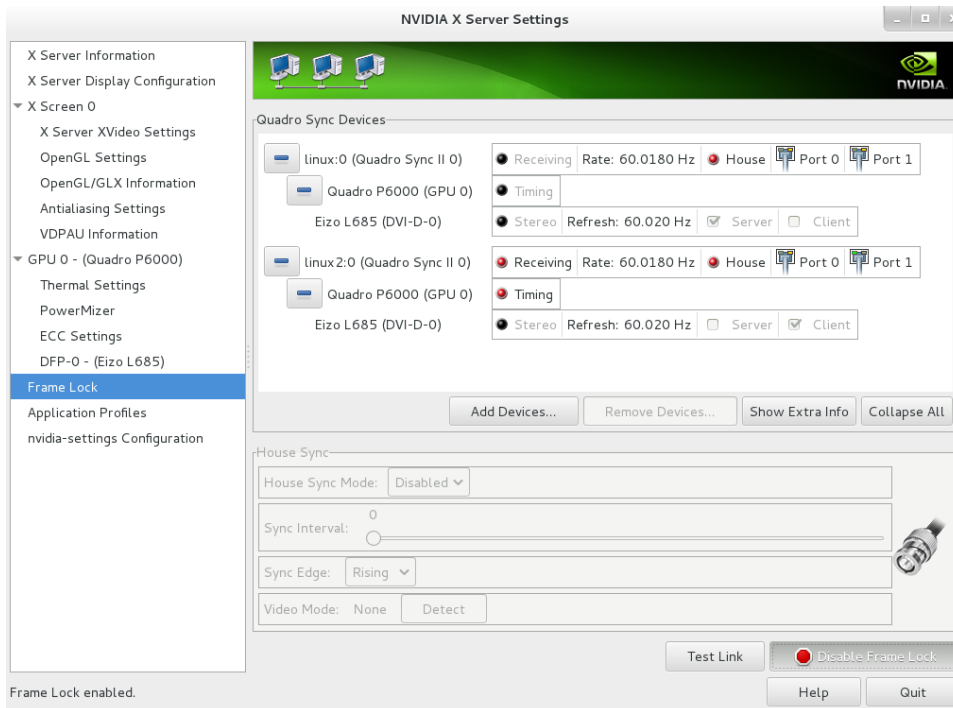
4. Enter the hostname/IP address and the XServer ID of the XServer you want to add (for example, `localhost:0.0` or in this case, `viz0:0.0`).



5. Select the server and client displays.
- There can only be one server per Frame Lock group.



6. Add the other nodes in the same way as Step 2 and set the Client displays.
7. Click **Enable Frame Lock**.



6.3 Configuring NVIDIA RTX PRO Sync from the Command Line

This section provides information about configuring the NVIDIA RTX PRO Sync from the command line.

6.3.1 Windows Sync Utility Command-Line Tool

On Windows, to simplify configuration automation, you can use the Sync Utility command-line tool.

To download the tool, go to <https://www.nvidia.com/en-us/drivers/sync-utility/>

The output from `configureSync.exe help` provides full help information, and here is an example for a simple configuration:

```
configureSync.exe enable server source=VSYNC display=0,0 display=1,0
```

This would enable a system to act as a timing server that is synchronized to the vertical sync pulse of GPU0, with the display on GPU1 acting as the timing client.

6.4 Linux nvidia-settings Command Line Tool

On Linux, you can configure settings using the command line with the `nvidia-settings` application that is installed with the driver. This tool can be used to query the current state, change the settings, and enable and disable Frame Lock.

1. To query the current state, run the following command.

```
nvidia-settings -V all -q gpus
```

2. Query the Frame Lock configuration for a particular display, for example:

```
nvidia-settings -q [dpy:6]/FramelockDisplayConfig
```

3. Set the `FramelockDisplayConfig` variable to 1 for a timing client or to 2 for a timing server, for example:

```
nvidia-settings -a [dpy:6]/FramelockDisplayConfig=2
```

4. To enable Frame Lock, run the following command.

```
nvidia-settings -a [gpu:0]/FramelockEnable=1
```

Chapter 7. Syncing the Timing Server to an External Timing Source

Only the Timing Server should be connected to the external sync source. If other nodes are part of the cluster, the nodes should be connected to the Timing Server using the RJ45 cable connectors. The Swap Barrier signal is sent over the RJ45 connector, so applications using this capability require this connection.

7.1 External Timing Sources

The NVIDIA RTX PRO Sync card supports the following types of external timing sources through the BNC connector on the card:

- > TTL: 3.3 V, 50% duty cycle, high impedance
- > Bi-Level Composite (NTSC/PAL): 75 Ω impedance
- > Tri-Level Composite (HDTV): 75 Ω impedance
 - SMPTE Standard 240 compliant



Caution: Here is some important information:

- > Using timing signal Voltages above specification, +3.3 V for TTL, ± 300 mV for Composite will damage the RTX PRO Sync card.
- > When using TTL Sync, you must use a high-quality signal generator. Variances in the external sync frequency will cause the displays to blink as they adjust their timings to follow the wandering input signal.
- > If the BNC port is configured as a Sync output, **do not** connect to an External Timing Source.

This might damage the NVIDIA RTX PRO Sync card and the External Timing Source.

To define a server delay:

1. When a valid signal is connected to the BNC connector, the LED below it lights solid green.
2. After the NVIDIA RTX PRO Sync card starts using the external signal, the same LED flashes green at the rate of the incoming sync signal.

- When using an external sync signal, Windows and Linux identify the incoming sync type.

The following settings are available to adjust how the card converts the external sync to the internal sync:

- For TTL signals, select which edge of the external sync pulse triggers the internal pulse:
 - Leading edge
 - Falling edge
 - Both edges
- Verify that the incoming signal is interlaced.
- Set a Sync Interval that defines how many incoming external sync pulses need to be received before the NVIDIA RTX PRO Sync card sends an internal pulse.
- The default value is 0, which means every external packet is sent internally.

Setting 1 will cause the NVIDIA RTX PRO Sync card to send every other received pulse, causing the internal sync pulses to run at half the speed of the external

- Enter a start **Sync Delay** in μ Seconds between the external signal and internal sync pulses.

Server Settings

Edit the properties of the frame synchronization pulses generated by the timing server.

⚠ Server refresh rate: **60.00 Hz**

The synchronization pulses are based on:

☐ The server refresh rate (Internal timing)

☐ The server refresh rate with BNC output enabled

☒ An external house sync signal

Sync frequency: **60.00 Hz**

Sync signal detection: **TTL**

☐ The signal is interlaced

Trigger sync pulses from the frame start signal using:

☐ Leading edges

☒ Falling edges

☐ Both edges (applies to TTL signals only)

Outgoing sync interval: Sync delay: μ s

⚠ Some settings have been automatically updated to match the incoming house sync signal.

OK Cancel Apply

7.1.1 Synchronizing to an External Sync Source for Windows

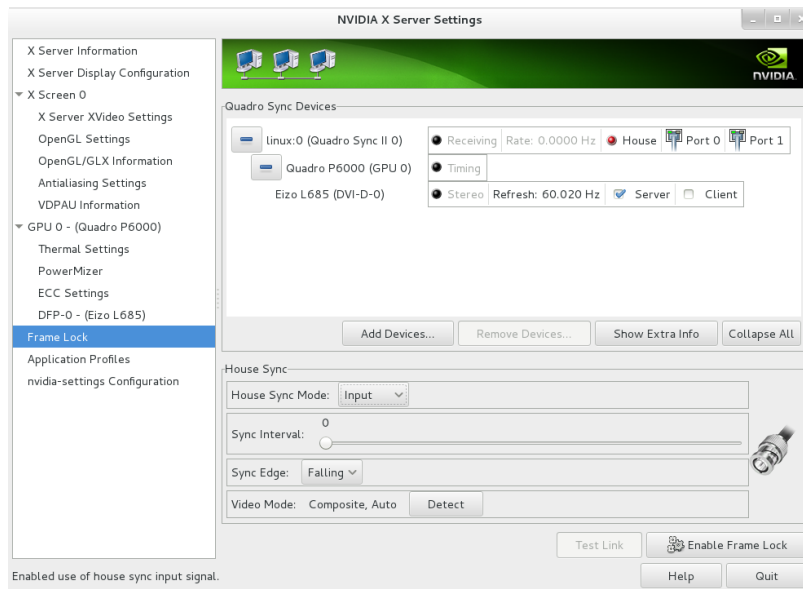
To synchronize to an external sync source for Windows:

1. Open the NVIDIA Control Panel.
2. Select **Synchronize Displays**.
3. Click **Server Settings**.
4. Click **An external house sync signal**.
5. Adjust the other options as needed.
6. Click **OK**.

7.1.2 Synchronizing to an External Sync Source for Linux

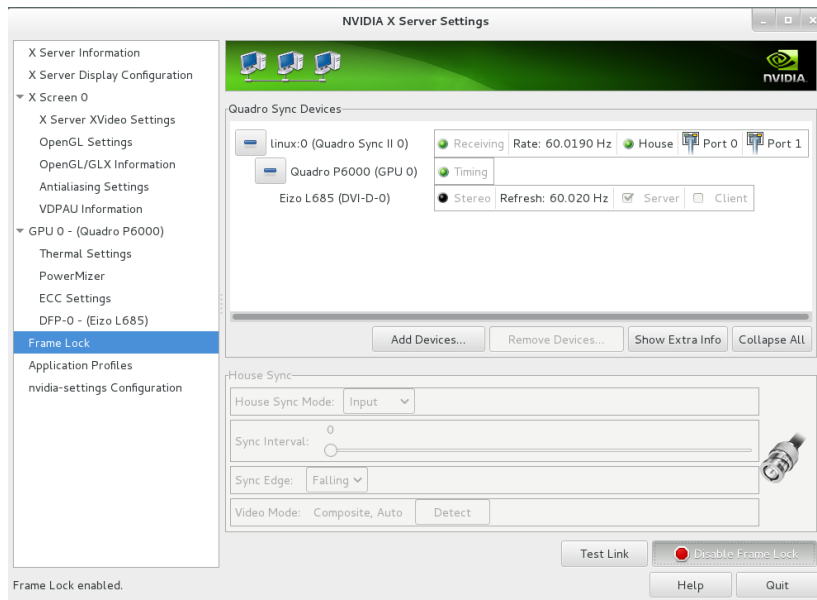
To synchronize to an external sync source for Linux:

1. Open the **NVIDIA X Server Settings**.
2. Select **Frame Lock** from the left menu.
3. Select **Add Device** if needed and configure a display to be the timing server.
4. From the **House Sync Mode** drop-down list, Select **Input**, and define other options.



5. Select **Enable Frame Lock**.

6. The UI now reflects the status in the Quadro list, and the **House Sync** options are grayed out until Frame Lock is disabled.



7.2 Synchronizing Different Resolutions

With NVIDIA RTX PRO Sync firmware version 2.18 and later, different resolutions can be synchronized if the resolutions use the same refresh rates. Here are the current restrictions of this feature:

- > Each system will support up to two different resolutions if the refresh rates are the same (within 50 PPM).
- > The displays of the same resolution must be connected to the same Quadro Sync card, and the NVIDIA RTX PRO Sync cards must be connected on CON0 as shown in Figure 3.



Note: This is currently limited to two NVIDIA RTX PRO Sync cards per system.

- > Configuration must be done with the Sync Utility on Windows.

There are no special commands to synchronize different resolutions, but the driver will only allow synchronization if the above restrictions are met.

7.3 Sync Multiply and Divide

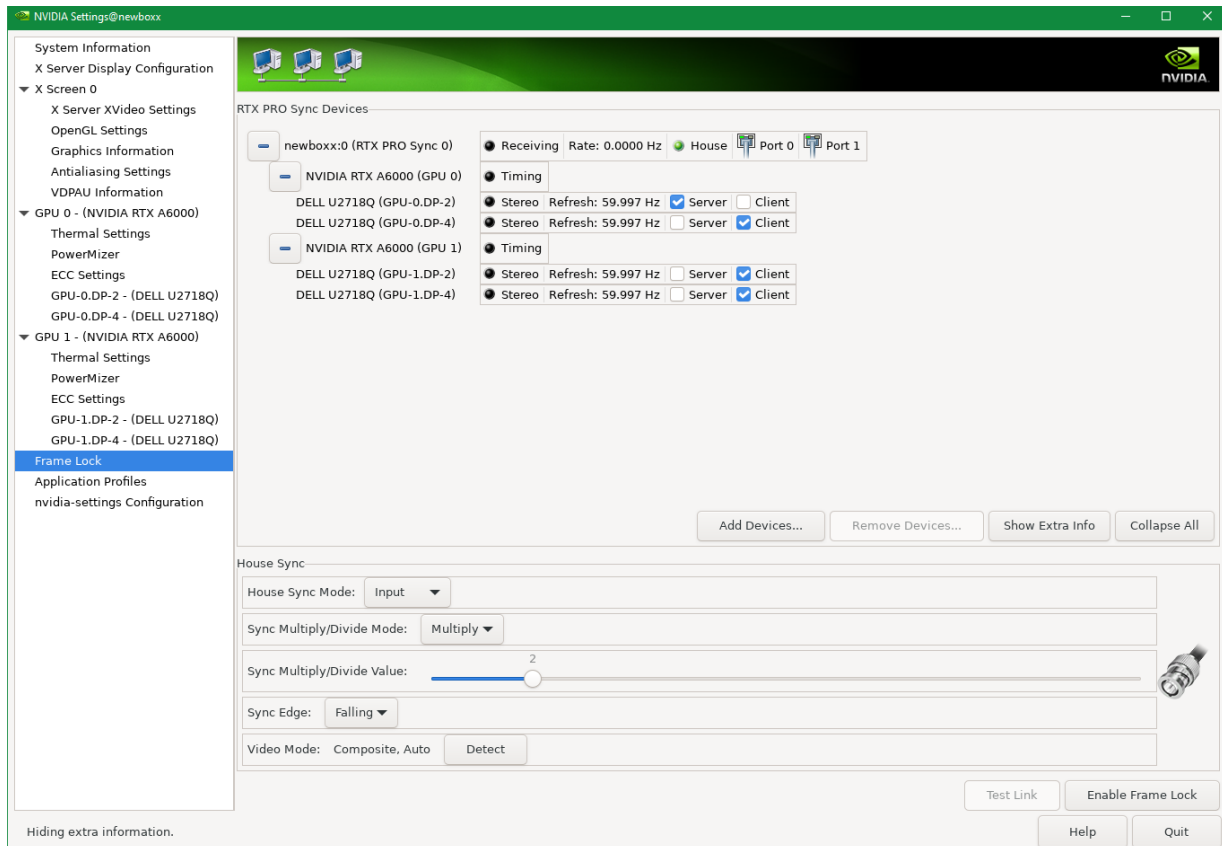
With NVIDIA RTX PRO Sync firmware version 2.18 and later, displays can be synchronized to an integer that is a multiple or a divisor of an external sync source. For example, with an external sync source of 60 Hz, displays with a refresh rate of 120Hz can be synchronized using a sync multiple of 2.

The possible values range from 1 to 8 to multiply and divide the rate of the external sync source:

- > On Windows, this feature requires using the configureSync.exe tool, with example syntax of:

```
configureSync.exe enable server source=HOUSESYNC multiplier=2 display=0,0
```
- > On Linux, the nvidia-settings GUI can be used to control multiplier and divider (refer to Figure 7).

Figure 7. Sync Multiply and Divide



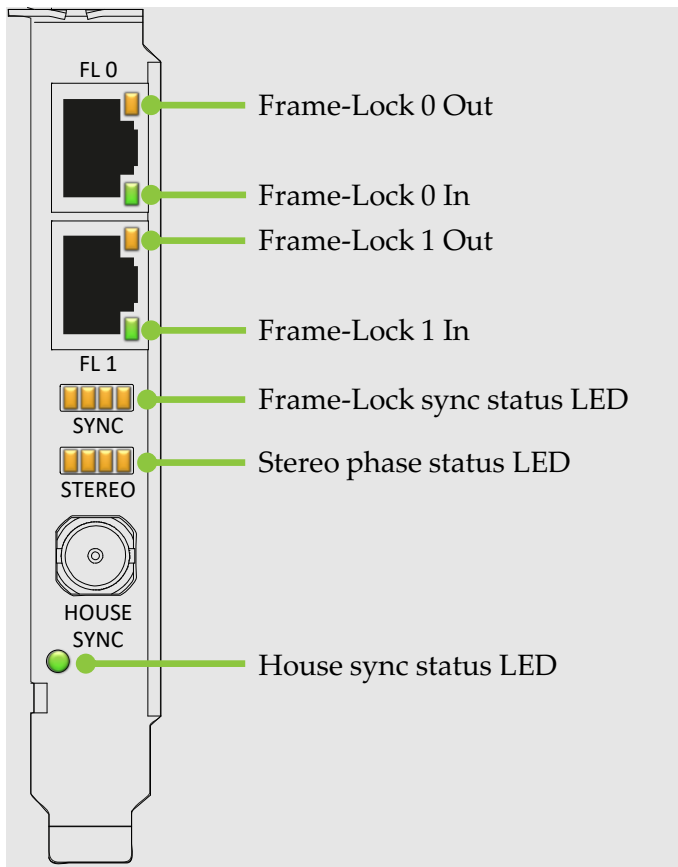
Chapter 8. Monitoring Display Synchronization

8.1 Board-Level Status Indicator

When working with synchronized displays, it can be difficult to verify that the displays are correctly synchronized. The NVIDIA RTX PRO Sync card provides both card- and driver-level indicators for the synchronization status information.

The bracket of the NVIDIA RTX PRO Sync card has multiple LEDs to provide configuration and status information. At system start-up, all LEDs turn on and stay on until the graphics driver loads. After the driver loads, the LEDs start to show the status of the card and GPUs. If the LEDs do not turn on at startup, verify that external power is correctly connected and providing power.

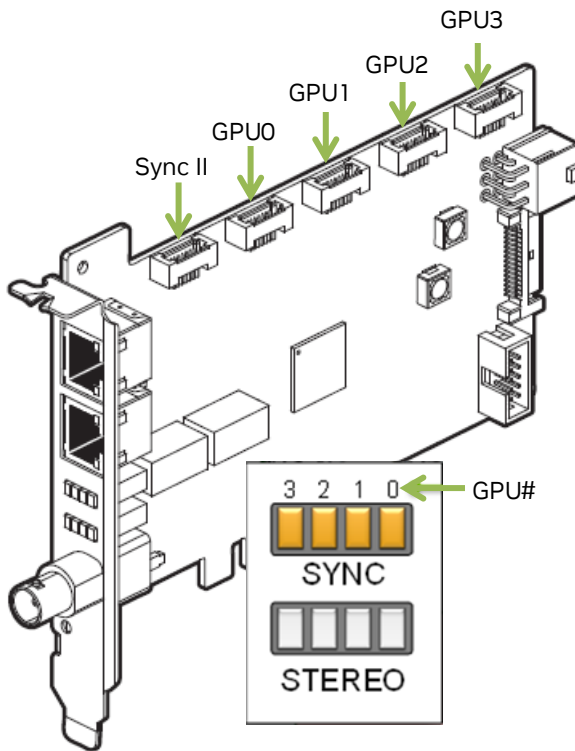
Refer to Figure 8 for the location of the LEDs.

Figure 8. Board Level Status Indicators

Note: If the bracket's LEDs do not turn on when the system starts up, shut down the system and verify that the external power to the NVIDIA RTX PRO Sync card is connected and is operating correctly.

8.1.1 Frame Lock and Stereo Sync Status LEDs

The two rows of status LEDs provide information on the current state of synchronization of the card. There is one LED for each of the GPUs that can be connected. The top row of LEDs, **Frame-Lock Sync status**, shows the synchronization status of the connected GPU (refer to Figure 9 and Table 1 for information about the Sync and Stereo LEDs).

Figure 9. Frame Lock and Stereo Sync Status LEDs**Table 1. Frame Lock and Stereo Sync Status LEDs**

SYNC LED Status		STEREO LED Status	
	GPU Not connected		Stereo not active/no GPU
	GPU present but not synchronized		Stereo locked
	GPU synchronized		Stereo in process of locking
	GPU is synchronized but within 5% of the threshold of losing sync		
	GPU is synchronizing		

8.1.2 Frame Lock Connector LEDs

The Frame Lock connector LEDs on the RJ45 ports indicate the state of the NVIDIA RTX PRO Sync card. The LEDs indicate whether the port is receiving (or sending) a Frame Lock signal. The ports auto-configure, so different nodes in the cluster might have different LED configurations. The following table provides information about the meaning of the LED status.

Table 2. Frame Lock LED Status

Frame Lock LEDs	Status	Meaning
Framelock 0 Out		Port is an output, but no signal is present.
Framelock 0 In		Port is an input, but no signal is detected.
Framelock 1 Out		Port is an output sending a signal; the frequency of the blinking is the refresh rate of the signal.
Framelock 1 In		Port is an input and receiving a signal, the frequency of the blinking is the refresh rate of the signal.

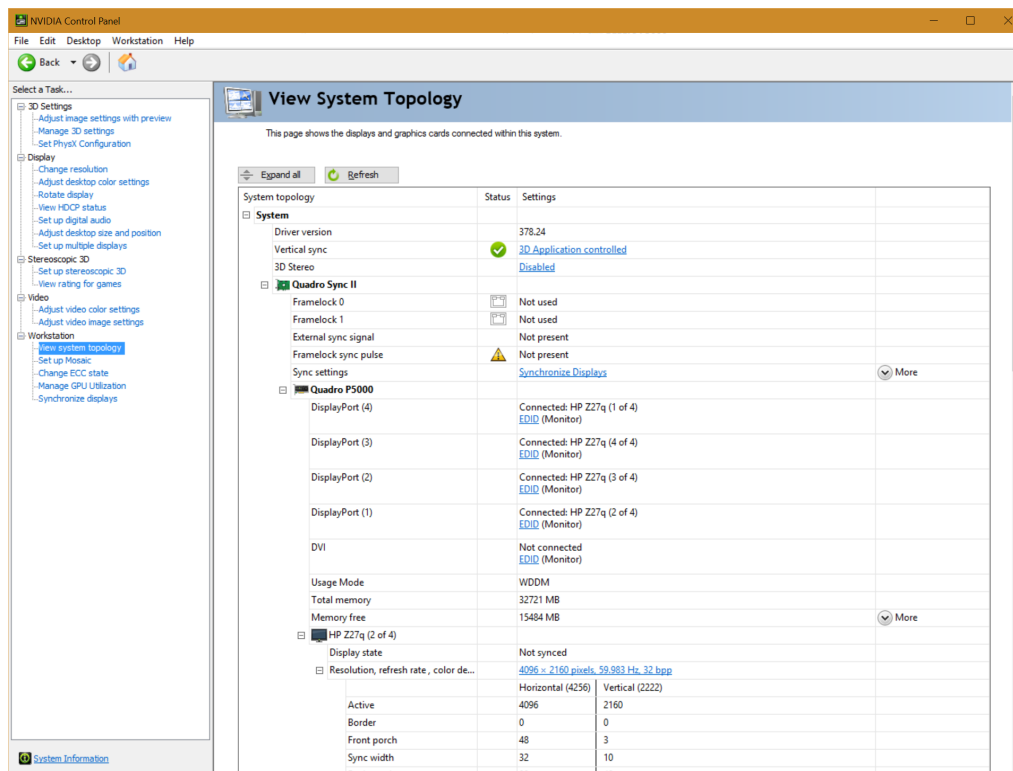


When connecting the Frame Lock ports, the timing server sends outputs on both ports, and all the other nodes configure themselves to one output and one input when they connect to the timing server.

8.2 System Topology Viewer for Windows

The System Topology Viewer provides an overview of the GPU displays and synchronization status (refer to Figure 10).

Figure 10. System Topology Viewer for Windows



To use the topology viewer:

1. Open the NVIDIA Control Panel.
2. In the left pane, select **View System Topology**.

With multiple GPUs and displays, you should maximize the size of the NVIDIA Control Panel.

3. Verify that the **Frame Lock sync pulse** and **External sync signal** settings are as expected.

System topology	Status	Settings
System		
Driver version	378.24	
Vertical sync	✓	3D Application controlled
3D Stereo		Disabled
Quadro Sync II		
FrameLock 0	Not used	
FrameLock 1	Not used	
External sync signal	Not present	
FrameLock sync pulse	Not present	
Sync settings		Synchronize Displays

4. Scroll down to the individual displays connected to the GPUs.

5. Verify that the **Timing** entry for the server is locked to the internal or external timing.

HP Z27q (1 of 4)		
Display state	Not synced	
Resolution, refresh rate, color de...	4096 x 2160 pixels, 59.983 Hz, 32 bpp	
	Horizontal (4256)	Vertical (2222)
Active	4096	2160
Border	0	0
Front porch	48	3
Sync width	32	10
Back porch	80	49
Polarity	Positive (+)	Negative (-)
Timing	The display is using internal timing	
EDID source	Monitor...	
OS Screen Identifier	2	
HDCP	⚠ Not supported	

6. Verify the other displays are locked to the sync pulse and, if using Stereo, that the client Stereo is in phase.

HP Z27q (1 of 4)		
Display state	Client	
Resolution, refresh rate, color de...	4096 x 2160 pixels, 59.983 Hz, 32 bpp	
	Horizontal (4256)	Vertical (2222)
Active	4096	2160
Border	0	0
Front porch	48	3
Sync width	32	10
Back porch	80	49
Polarity	Positive (+)	Negative (-)
Timing	✔ The display is locked to the frame lock sync pulse	
EDID source	Monitor...	
OS Screen Identifier	2	
Stereo sync	✔ Client Stereo is in phase with the server	
HDCP	⚠ Not supported	

To save the topology as a JSON file, which is useful to compare states between systems, click **Save Logfile**.

Chapter 9. Sync Timing Tolerance

The NVIDIA RTX PRO Sync card can align displays and sync sources up to ± 50 ppm difference in the display timings. If the timings are outside this range, the card cannot synchronize them. The Frame Lock status LEDs on the card indicate that the card is approaching these limits.

To calculate the PPM, use this formula:

$$\text{PPM} = \text{abs}(\text{Display_Timing} - \text{Reference_Timing}) / \text{Reference_Timing} * 1.0\text{E}+6$$

The following table provides information about sync timing tolerance limits.

Table 3. Examples of Sync Timing Tolerance

Display Refresh Rate (Hz)	Low (Hz)	High (Hz)
200.000	199.996	200.004
120.000	119.9976	120.0024
100.000	99.998	100.002
60.000	59.9988	60.0012
50.000	49.999	50.001

Chapter 10. Frequently Asked Questions

- > **Can the NVIDIA RTX PRO Sync card be used with a Quadro M Maxwell or K Kepler series GPUs?**

No.

- > **Can you use the fifth port on the NVIDIA RTX PRO Sync card to synchronize a fifth GPU?**

No.

- > **Can two GPUs be synchronized with NVLink bridge on supported GPUs?**

Sort of. While it is true that the NVLink bridge includes some of the same synchronization signals that NVIDIA RTX PRO Sync uses, these signals are only active when the following conditions are met:

- The GPUs that are linked by using NVLink are configured in Mosaic mode.
- The GPUs in the NVLink pair are synchronized.

You cannot synchronize these GPUs to an external sync.

- > **Mosaic works without NVLink. Can multi-GPUs be synchronized using the PCIe bus rather than using a ribbon cable?**

No, for Sync functions to work, the NVIDIA RTX PRO Sync card needs to be physically connected to the GPU. Even though Mosaic mode can be enabled when GPUs are connected through the PCIe bus, it is not synchronized.

If the GPUs are connected to an NVIDIA RTX PRO Sync card, Mosaic will be synchronized.

- > **Can you configure and monitor an NVIDIA RTX PRO Sync card remotely on a Windows System?**

Yes, you can use NVWMI to configure the NVIDIA RTX PRO Sync card remotely. NVWMI also supports Sync Event monitoring.

- > **Do you support different lengths of internal cables with the RTX PRO Sync card?**

Yes, the NVIDIA RTX PRO Sync card ships with four 12" and two 24" sync cables.

> **What is the difference between Quadro Sync II and NVIDIA RTX PRO Sync cards?**

The NVIDIA RTX PRO Sync card is a rebranding of the Quadro Sync II card that was aligned with the launch of the NVIDIA RTX PRO Blackwell cards. Both cards offer equivalent features and enable the same functionality.

> **In what order do I need to connect the GPUs to the NVIDIA RTX PRO Sync card?**

Connect the NVIDIA RTX PRO Sync card and up to four supported NVIDIA GPUs with the included cables. On the GPU, make sure to connect to the connector labeled “SYNC.” There is no need to connect the GPU to the connectors on the NVIDIA RTX PRO Sync card in any order.

> **Does it matter which connector I use when connecting two NVIDIA RTX PRO Sync cards together?**

Only when using two NVIDIA RTX PRO Sync cards in a system. In that case, each NVIDIA RTX PRO Sync card must be connected to the other NVIDIA RTX PRO Sync card using the CON0 connector as shown in Figure 3. When a system uses only one NVIDIA RTX PRO Sync card, any connector can be used to connect to the GPU.

Chapter 11. Compliance and Certifications

The NVIDIA RTX PRO Sync card complies with the following regulations:

- > Australian Communications Authority and Radio Spectrum Management Group of New Zealand (C-Tick)
- > Bureau of Standards, Metrology and Inspection (BSMI)
- > China Compulsory Certification (CCC)
- > Conformité Européenne (CE)
- > Federal Communications Commission (FCC) – Class B
- > Interference-Causing Equipment Standard (ICES)
- > Imaging Science Foundation (ISF)
- > Korean Communication Commissions (KCC)
- > Underwriters Laboratories (UL, CUL)
- > Voluntary Control Council for Interference (VCCI)

Chapter 12. Important Safety Information

NVIDIA products are designed to operate safely when installed and used according to product instructions and general safety practices. The guidelines included in this document explain the potential risks associated with equipment operation and provide important safety practices designed to minimize these risks. By carefully following the information contained in this document, and the specific instructions provided with your product, you can protect yourself from hazards and create a safer environment.

The product is designed and tested to meet IEC-60950-1, the Standard for the Safety of Information Technology Equipment. This also covers the national implementation of IEC-60950-1-based safety standards worldwide, for example, UL-60950-1. These standards reduce the risk of injury from the following hazards:

- > **Electric shock:** Hazardous voltage levels contained in parts of the product
- > **Fire:** Overload, temperature, material flammability
- > **Mechanical:** Sharp edges, moving parts, instability
- > **Energy:** Circuits with high energy levels (240-volt amperes) or potential as burn hazards
- > **Heat:** Accessible parts of the product at hot temperatures
- > **Chemical:** Chemical fumes and vapors
- > **Radiation:** Noise, ionizing, laser, ultrasonic waves

Retain and follow all product safety and operating instructions. Always refer to the documentation supplied with your equipment. Observe all warnings on the product and in the operating instructions.



Caution: Failure to follow these safety instructions could result in fire, electric shock, or other injury or damage.

To reduce the risk of bodily injury, electric shock, fire, and damage to the equipment, observe the safety labels included on the equipment.

Table 4. Equipment Symbols

Sign	Meaning
	This symbol in conjunction with any of the following symbols indicates the presence of a potential hazard. The potential for injury exists if warnings are not observed. Consult your documentation for specific details
	This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel. WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.
	This symbol indicates the presence of electric shock hazards. The area contains no user or field-serviceable parts. Do not open for any reason. WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure.

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