



Technical Brief

Introducing Hybrid SLI Technology for Notebooks



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Introduction

NVIDIA® Hybrid SLI® enables NVIDIA® discrete GPUs and NVIDIA® motherboard GPUs to work together to provide significant performance scaling through GeForce® Boost and compelling battery life enhancement through HybridPower™.

This technical brief describes the GeForce Boost and HybridPower features. It also describes the setup requirements and instructions to enable and verify GeForce Boost and HybridPower functionality.

Hybrid SLI Technology

SLI technology enables two discrete GPUs to work together and provide increased graphics performance. Hybrid SLI technology extends SLI technology so that a motherboard GPU (mGPU) is combined to work with a discrete GPU (dGPU) to provide two key benefits to the user.

The GeForce Boost feature distributes GPU processing workload between the motherboard GPU and the discrete GPU to increase the visual performance of the system.

The HybridPower feature enables the system to switch off the dGPU when low power operation is the priority. In the save power mode the system will have enhanced battery life and quieter operation with less fan noise. Notebooks with Hybrid Power feature can play high definition BluRay DVDs in this lower power mode keeping the skin temperature low.

At all times the notebook displays are driven by the motherboard GPU so that there is no distracting screen blanking when the mode changes. This provides a seamless user experience.

Hybrid SLI Requirements

- ❑ Hybrid SLI is only supported on the Windows Vista operating system.
- ❑ Hybrid SLI is only supported with at least 256 MB dedicated memory for the mGPU.
- ❑ All displays must be attached to the mGPU for seamless mode switching.
- ❑ Hybrid SLI is only supported on OEM notebooks with specially developed software released for specific notebook configurations. Loading generic drivers on a Hybrid SLI notebook will cause hybrid features to disappear.

Hybrid SLI Modes

The two operating modes of a Hybrid SLI-enabled notebook are:

- ❑ **Boost Performance Mode**
The Hybrid SLI mode where the discrete GPU and motherboard GPU work collaboratively to provide higher performance (GeForce Boost).
- ❑ **Save Power Mode**
The Hybrid SLI mode where the dGPU completely shuts off and the mGPU renders and drives the display (HybridPower).

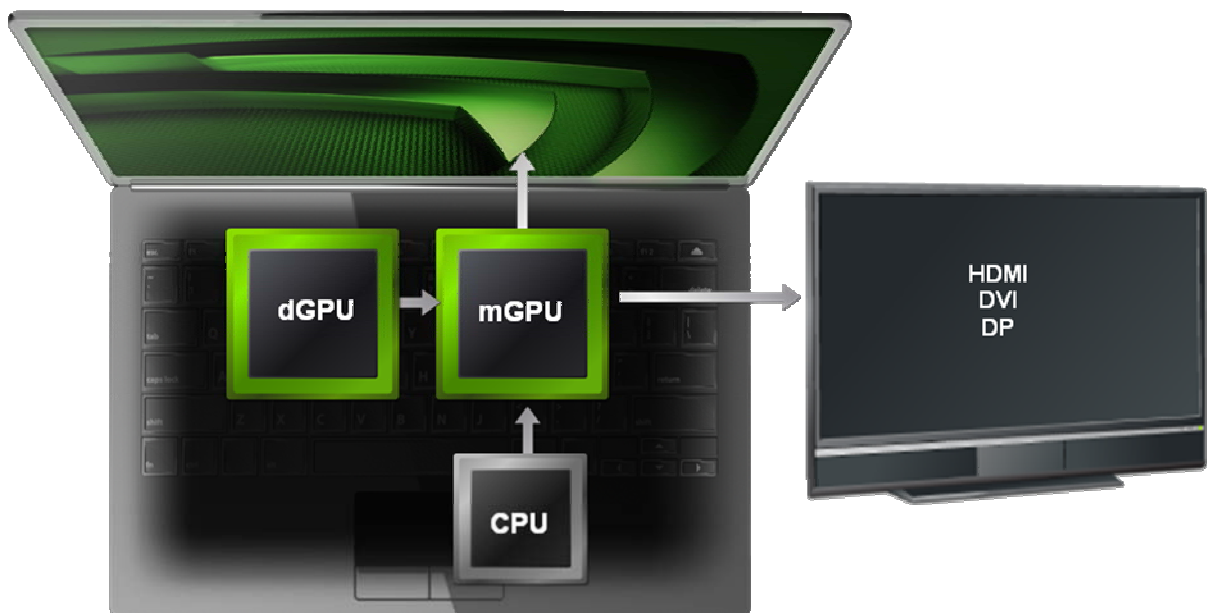


Figure 1. Hybrid SLI Block Diagram

Multi-GPU SLI Support in Hybrid SLI Systems

It is possible to have two high end dGPUs in a notebook working in standard SLI mode for rendering and have all display output handled by the mGPU. As with standard SLI, only one display connected to the notebook will be driven when running a full screen 3D game. It is also possible to switch into Save Power mode which will switch off both of the dGPUs. This allows extreme gaming notebook to meet EnergyStar standards and offer a longer battery life when not gaming, The Notebook also has a cooler skin temperature in this mode.

Hybrid SLI User Interface

Hybrid SLI capable notebooks will have additional graphics settings options in the Window Vista Power Profile (VPP) page. The notebook OEM determines the default settings for each VPP mode so most users may never need to make any adjustments while automatically enjoying the performance and power saving benefits that Hybrid SLI offers. Use this page if you want to modify the standard behavior of when to switch between Hybrid SLI modes.

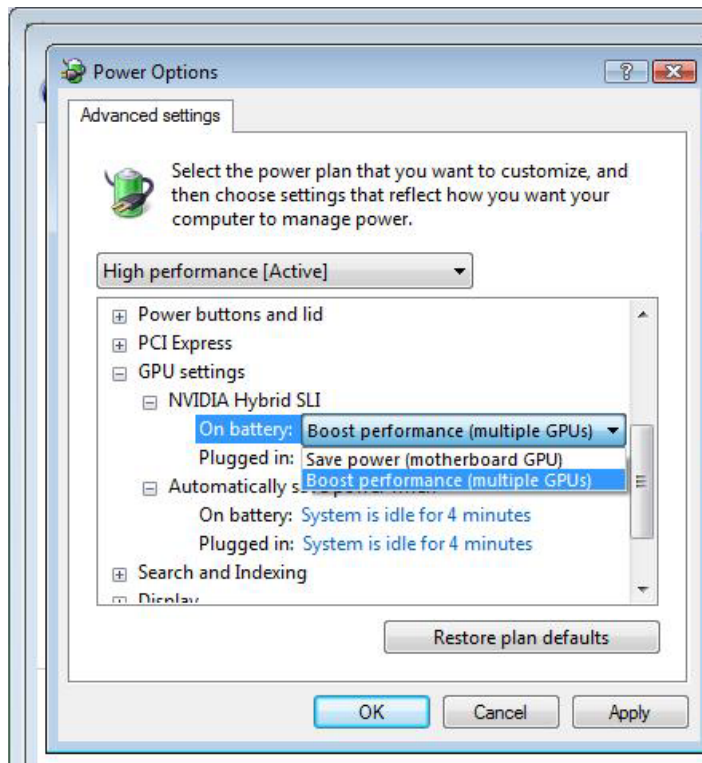


Figure 2. Selecting Hybrid SLI Modes through Vista Power Profile Page

There is also a simple user interface provided by the NVIDIA graphics driver which provides a small system tray icon to let the user know whether the system is currently in Boost Performance mode or Save Power mode.

Notice the small green chevrons on the system tray. Two chevrons indicate Boost Performance mode while a single chevron indicates Save Power mode. A small popup appears when the mouse hovers on these chevrons, displaying the Hybrid SLI mode that the notebook is operating in.

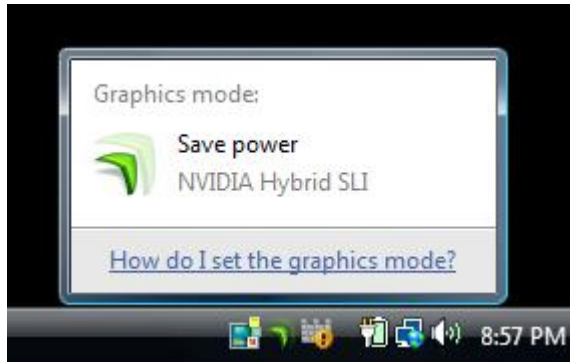


Figure 3. Hybrid SLI State in Sync with Vista Power Profile

There may be times when the system tries to switch hybrid mode to stay in sync with a change in the state of the Vista power plan, but the transition is not possible because a 3D or video application is currently running. If a mode change is rejected, the user is notified with an exclamation point on the Hybrid SLI icon.



Figure 4. Hybrid SLI State Out of Sync with Vista Power Profile

Following figure illustrates the means to change Hybrid SLI mode through the Battery icon on the system tray.

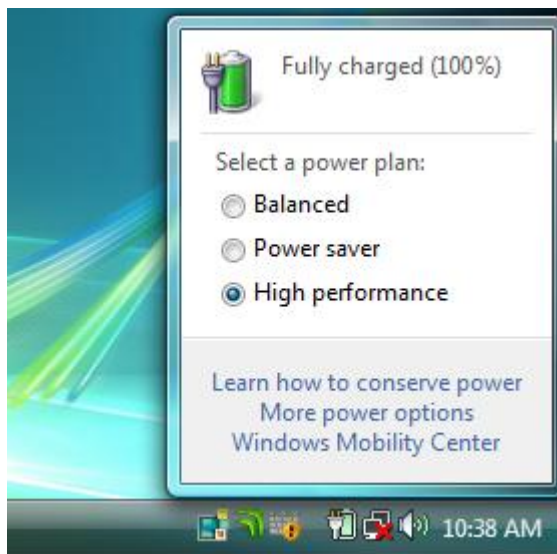


Figure 5. Changing Hybrid SLI Mode through System Tray Interface

Hybrid SLI Mode Change: Blocking Events

- ❑ Transitioning from Boost Performance mode to Save Power mode and vice versa may be blocked when there are open 3D or video applications. The Hybrid SLI driver prevents the transition to ensure there are no application crashes or data lost.
- ❑ The Hybrid SLI user interface provides a list of applications that are blocking the Hybrid SLI transition and asks the user to close those applications to complete the transition (Figure 8).

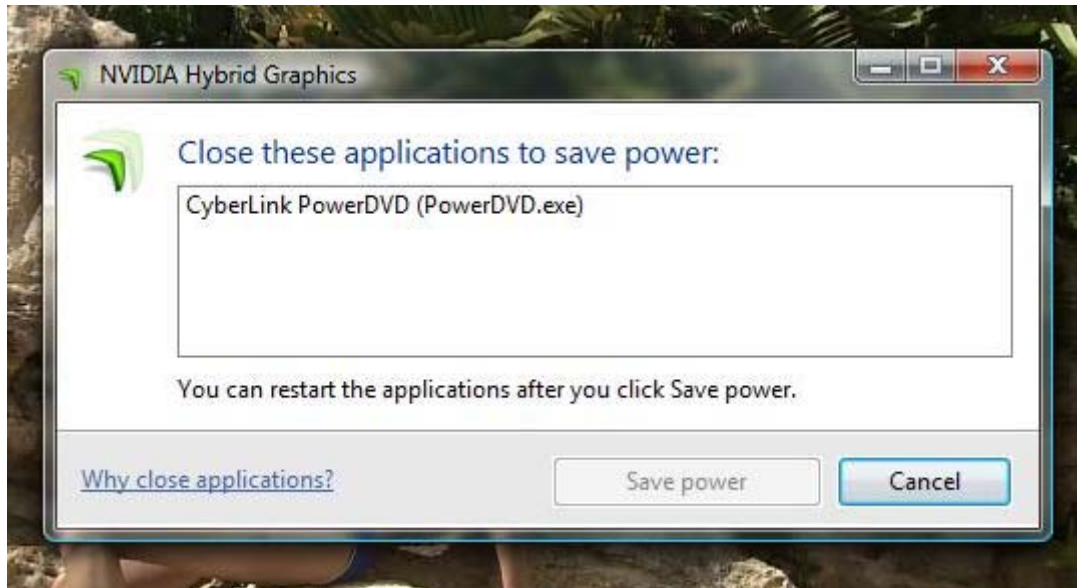


Figure 3. Open 3D or Video Applications Block Hybrid SLI Transition

Hybrid SLI FAQ

Q: Which OS supports Hybrid SLI?

A: Hybrid SLI is supported only by Windows Vista. It is not supported with any other operating system.

Q: How can I tell if Hybrid SLI is working?

A: You can force a change in the Hybrid SLI mode by changing the Vista Power Profile. Double click on the battery icon on the system tray to access VPP mode. First look at the Hybrid SLI icon on the system tray to see if it is changing. When you run a 3D application it will usually run much slower when the system is in Save Power mode and much faster in Boost Performance mode. You may also notice additional system fan noise when the system is in Boost Performance mode.

Q: What do I do if an application is blocking a hybrid transition?

A: You may choose to ignore the hybrid transition attempt if you do not want to close applications that are running. This may result in slower performance in Save Power mode or shorter battery life in Boost Performance mode. To switch into the other mode go to the application listed on the dialog and close it. Then try forcing the mode change again.

Q: Will performance of GeForce Boost increase if the frame buffer size of mGPU is increased? Is there a minimum frame buffer size required for GeForce Boost?

A: The minimum frame buffer size of the mGPU required for GeForce Boost support is 256MB. The performance of GeForce Boost depends on the processing powers of the dGPU and the mGPU and other system factors. For best scaling, a dGPU that is recommended for GeForce Boost should be used along with a Hybrid SLI enabled motherboard GPU

Q: What is the maximum number of monitors that can be connected in a system that has onboard GPU and dGPU?

A: The number of displays, including the LCD, that can be connected to a Hybrid SLI notebook depends on the notebook design, but is typically three or less with only two displays can be active at a time. The selection of which monitors to display on is managed in the display property page.

Q: Which hybrid mode should the user enter to best support HD DVD/Blu-ray playback?

A: Both Hybrid-Performance and Hybrid-Power modes deliver excellent playback of HD DVD and Blu-ray DVD titles at full 1080p resolution. Hybrid Power mode is recommended as it will offer the best acoustic and low power experience when watching high definition content.

Q: Is Hybrid SLI supported for Intel chipsets?

A: Hybrid SLI is supported only on NVIDIA motherboard GPU chipsets. The shared GPU architecture between dGPU and mGPU allows for a much

smoother user experience, as well as the performance benefit of SLI scaling. However, a feature called Dynamic Hybrid Graphics which is the ability to transition dynamically between an Intel notebook chipset and an NVIDIA discrete GPU is supported.

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