Reference Guide

Getting the most out of your HTPC

Table of Contents

Introduction

This guide is meant serve as a reference for readers who would like to learn how to achieve the very best home theater personal computer (HTPC) setup.

A Home Theater PC (HTPC) combines the functions of a personal computer, digital video recorder (DVR), and an optical disk player. When connected to a large-screen display, it can be used for an endless combination of applications. You can play streaming music through a home stereo system, watch Internet videos, DVDs, or HD Blu-ray content, or even use the HTPC as a TV receiver and digital video recorder. These are only a few of the uses of a properly configured HTPC.

This guide focuses on the NVIDIA® GeForce® 9-Series of motherboard GPUs for Intel PCs. We also recommend GeForce 8-Series motherboard GPUs for AMD PCs or GeForce discrete GPUs for premium HTPCs.

Figure 1: Home theater powered by a GeForce 9-Series mGPU HTPC

The highly-integrated nature of GeForce 9300/9400 mGPUs and powerful onboard graphics makes them perfect for enabling new small form factor designs. This makes HTPCs slimmer, quieter, and right at home among other home stereo components.

These mGPUs offer the most advanced media center capabilities of any motherboard to date, with the ability to offload every HD video codec from

the CPU and onto the GPU. Movies encoded with H.264, MPEG-2, and VC-1 now use less than 10% of an Intel Core 2 system's resources and less than 20% of an Intel Pentium Dual-Core system's resources, saving users money. And now, home media enthusiasts can connect their GeForce 9 Series media PCs directly to HDMI-based receivers to power 7.1 audio systems.

Simply put, GeForce 9-series motherboard GPUs turbo charge both the optimized visual computing PC and the media center PC.

Installing Drivers

Windows Vista Drivers

A set of drivers are included with NVIDIA GeForce 9300/9400 motherboards. However, it is recommended that you download the latest drivers found on the NVIDIA website.

- http://www.nvidia.com/Download/index.aspx?lang=en-us

1. **Install the latest NVIDIA nForce® Platform driver.**
   NOTE: When the install is initiated, a dialog will appear displaying a list of drivers. Deselect the integrated GPU driver so that it is NOT installed. This is to ensure that the newer GeForce GPU driver is installed instead, which may contain updates and performance enhancements.

2. **Install the latest GeForce GPU driver.**
   The NVIDIA® PhysX™ System Software package is included with the GeForce driver, and is installed automatically.

3. **Install the latest HDMI audio driver.**

4. **Install the Realtek HD audio driver.**

- Realtek HD Audio Driver for Windows:
  http://www.realtek.com

Available Movie Players

All of the following movie players support the playback of HD movies and content.

Cyberlink PowerDVD

http://www.cyberlink.com/

Corel WinDVD

http://www.corel.com/

### Arcsoft TotalMedia Theatre

http://www.arcsoft.com/

Configuring 7.1 Audio

This section details how to enable NVDIA HDMI output for full 7.1 channel audio support at high bit rates.

1. Access the **Sound** option in the **Windows Vista Control Panel**.

2. If you do not see **NVIDIA HDMI Output** as a choice, please install the HDMI Audio drivers.

3. Make sure **NVIDIA HDMI Output** is set as the default audio device. This option will only be available if HDMI is connected to a receiver.

4. Select **NVIDIA HDMI Output** and click the **Properties** button located in the bottom right of the Sound dialog box.
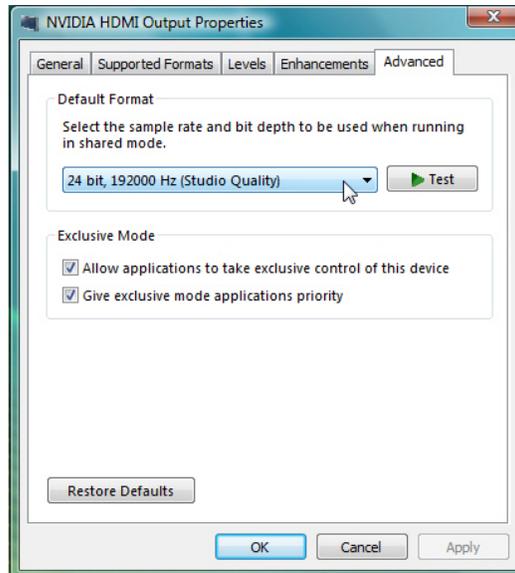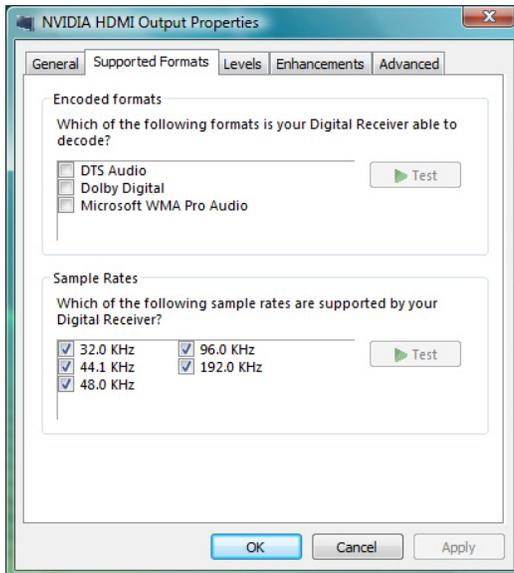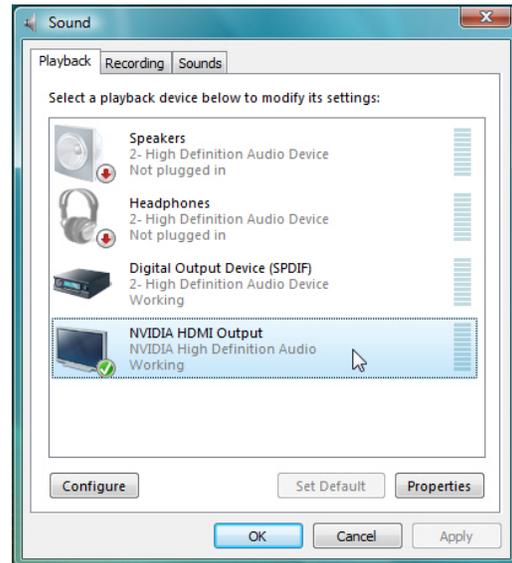
Figure 2: NVIDIA HDMI Output Properties

5. Once inside the **NVIDIA HDMI Output Properties**, select the **Supported Formats** tab and deselect the **DTS Audio**, **Dolby Digital**, and **Microsoft WMA Pro Audio settings** as shown in **Figure 2Error! Reference source not found.**. This will force the receiver to play 7.1 channel audio once the Blu-ray playback software is configured properly.

6. If **24-bit, 192000 Hz (Studio Quality)** is selected as show in **Figure 2**, keep in mind that Blu-ray players currently output 7.1 LPCM at 16-bit 48kHz. Even though GeForce 9-Series mGPUs can output 7.1 LPCM sampled at 24-bit 192 kHz, current Blu-ray software players do not directly support this, which means that Windows Vista will up-sample the output to the higher quality format.

CyberLink PowerDVD

Follow these instructions for enabling 7.1 channel audio in CyberLink PowerDVD.

Enabling 7.1 Channel Audio in PowerDVD

Figure 3: Accessing the configuration settings in Cyberlink PowerDVD

1. Access the Cyberlink PowerDVD *Configuration Settings* by clicking the tool button as shown in *Figure 3*.

2. Select the *Audio* tab.

3. Once inside the configuration, select the *8 speaker* option in the Speaker environment section as show in the dialog to the right.
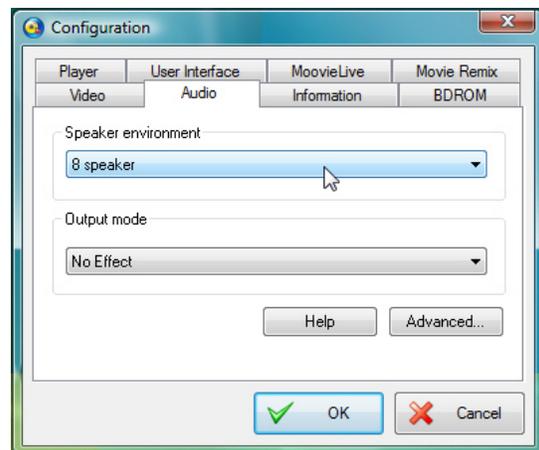
Corel WinDVD

Follow these instructions for enabling 7.1 channel audio in Corel WinDVD.

Enabling 7.1 Channel Audio in WinDVD

Figure 4: Accessing the Audio Playback Device settings in Corel WinDVD

1. Open the ***Audio Playback Device*** settings as shown in ***Figure 4***.

2. Select the ***8 speaker*** setting in the ***Device Selection*** section as shown in the dialog to the right.
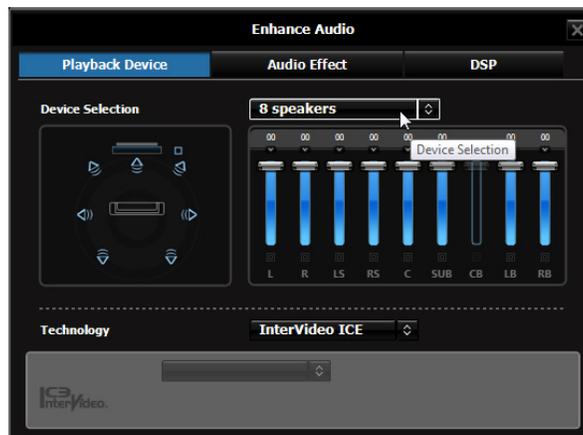
Arcsoft TotalMedia Theatre

Follow these instructions for enabling 7.1 channel audio in ArcSoft TotalMedia Theatre.

Enabling 7.1 Channel Audio in TotalMedia Theatre

Figure 5: Accessing the Setup controls in ArcSoft TotalMedia Theatre

1. Access **Setup** options by clicking the tool button as shown in **Figure 5**.

2. Select the **Audio** tab.

3. Select the **7.1 Channels** setting in the **Audio Output Mode** section as shown in the Setup dialog to the right.
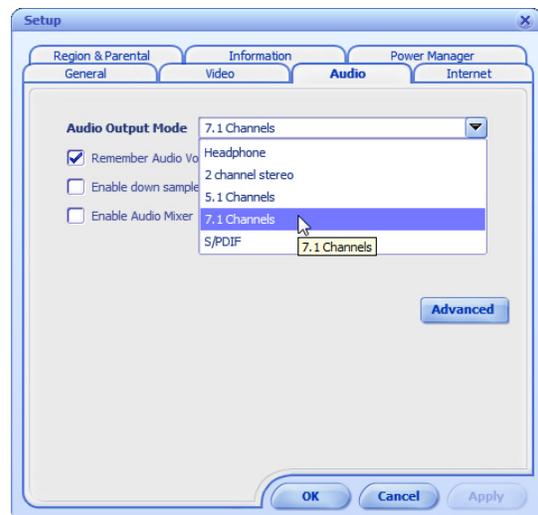
What To Look For In Your HTPC

High-Definition H.264, VC-1, and MPEG-2 Hardware Acceleration

When playing high-definition content, systems without hardware acceleration are forced to rely upon the CPU for high-definition codec processing. As a result, the CPU is strained with a severe load, slowing system responsiveness and ultimately resulting in poor performance. In stark contrast, a system with hardware acceleration harnesses the power of the GPU to have near complete CPU offload when processing any of the three high-definition codecs. In doing so, the system continues to offer the best user experience as there are no performance bottlenecks.
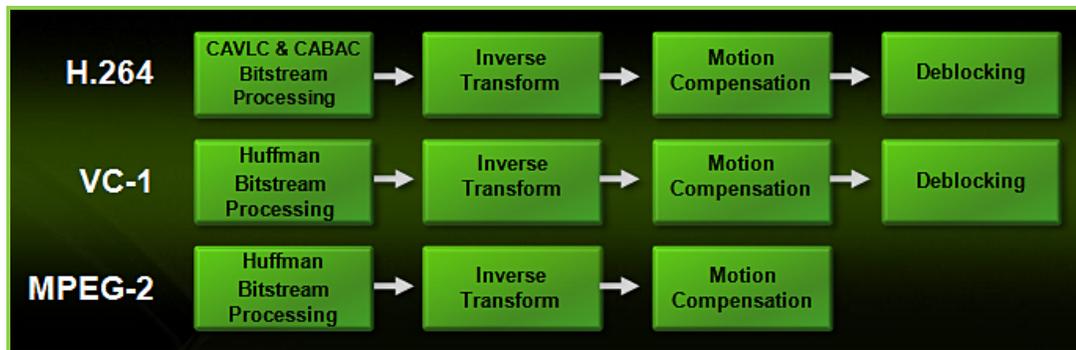

Figure 6: HD Codec Offload Support of GeForce 9 Series mGPUs

NVIDIA® PureVideo® HD technology offloads the playback of H.264, VC-1, and MPEG-2 based HD movies from the CPU. This allows users to watch movies while simultaneously using their computers for other CPU-intensive tasks.

High Definition Video Quality

Not every HD player is created equally. The sophistication of the hardware and decoding algorithms affect the ultimate visual quality you experience when viewing

HD content. GeForce 9 series mGPUs provide the very highest in HD visual quality. In fact, they score a 100% on the HQV visual quality benchmark, significantly higher than other integrated platforms.

Dynamic Contrast Enhancement

DCE dynamically calculates contrast values for each individual frame to create an optimized version of the original source material. Other PC video solutions use a single static contrast adjustment which affects every scene in the same manner. This may lead to inappropriate contrast changes in scenes that do not need it.

GeForce 9 series mGPUs also features a new dynamic contrast enhancement technology which optimizes source material to offer the highest possible quality.

24-bit 8-channel LPCM Audio

8-channel LPCM uncompressed audio streams enable a home theater to drive 7.1 surround sound home theater systems comprised of right, left, center, left surround, left rear, right surround, right rear, and LFE/subwoofer channels.

GeForce 9 Series mGPUs are able to pass video and 8-channel audio signals natively through the A/V receiver or through an HDTV using HDMI without the need for other connectors. Other integrated motherboards do not have this capability with popular consumer DVD software.

Figure 7: GeForce 9 Series mGPUs Offer Full 7.1 LPCM Audio Support

NVIDIA makes it possible to watch Blu-ray HD content with full support for a 7.1 LPCM audio stream over HDMI. Can you imagine a better media center PC? With the GeForce 9 Series motherboard GPUs, it just works.

Inverse Telecine (3:2 & 2:2 Pulldown Correction)

Pulldown correction recovers original film images from films-converted-to-video (DVDs, 1080i HD content), providing more accurate movie playback and superior picture quality. When videos are edited after they have been converted from 24 to 25 or 30 frames, the edits can disrupt the normal 3:2 or 2:2 pulldown cadence. NVIDIA PureVideo uses advanced processing techniques to detect poor edits, recover the original content, and display perfect picture detail frame after frame for smooth, natural looking video.

Support for Blu-ray 2.0

The latest Blu-ray technology is typically referred to as Blu-ray Profile 2.0. This profile includes a wealth of functionality beyond just the movie itself, including BD-Live and picture-in-picture. Blu-ray 2.0 is fully supported on GeForce 9 series mGPUs.
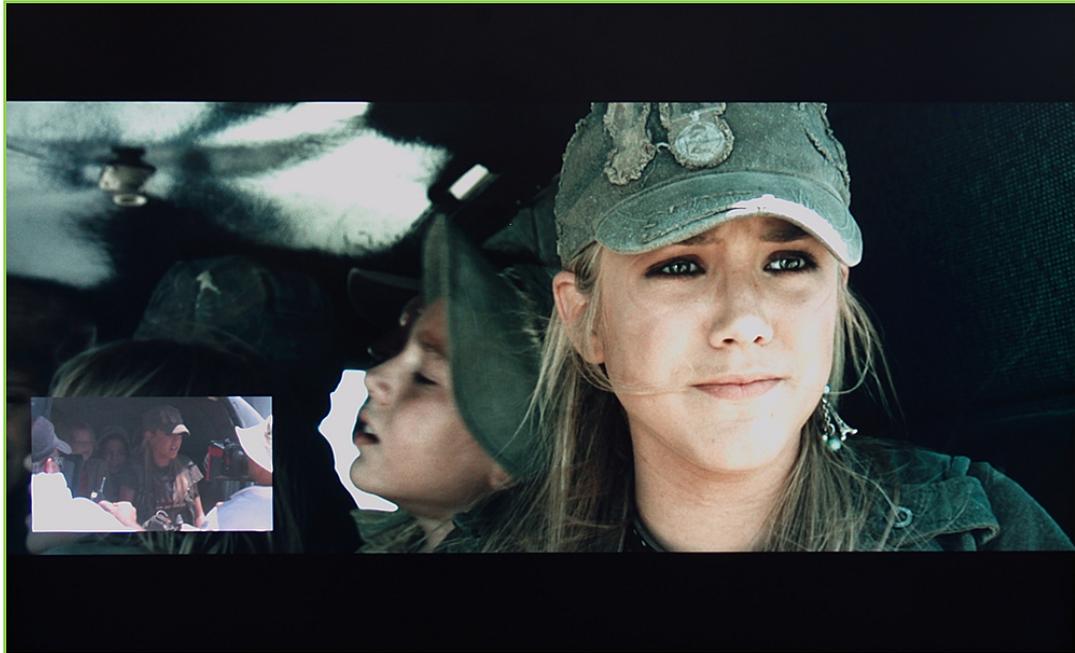
Figure 8: Take Advantage of Blu-ray 2.0

Dual-Stream Decode Hardware Acceleration

Dual-stream decode adds picture-in-picture (PIP) functionality to movies, allowing for a more immersive viewing experience.

Often the PIP content is coupled with advanced BD-J (Java) features, so offloading processing from the CPU is even more important for titles with these advanced features.

GeForce 9 series mGPUs support dual-stream hardware acceleration which offloads the CPU so the workload is handled by the more powerful GPU.

Challenges to designing the perfect HTPC

Proper Cooling

When choosing a CPU cooler, look for the largest cooler possible that will fit in the case. Typically, larger fans can be run at lower RPMs, which reduces noise while simultaneously providing adequate airflow for both the CPU and the passive heat sink used to cool the GeForce 9300/9400 controller and GPU.

Additionally, keep in mind that choosing sleek cases for appearance is fine as long as ventilation and airflow are taken into account. Ensure at least 1 fan is attached to the chassis to blow air into the case.

Low Profile "Slim" Cases

Slim cases are typically short, with fewer expansion slots for components such as hard drives and TV tuners. What they lack in expandability however, they make up for in elegance.

Proper cooling present unique challenges in designing slim case systems as lower profiles limit the size and number of fans, as well as the overall airflow. Further complicating matters, slim cases can be noisy because in order to get the same cooling power out of a smaller fan, they typically run faster and louder.

In order to strike a balance between cooling and noise you should ensure the case has at as many low noise fans as the case can support. In some cases this may involve replacing fans that came with the case with separately purchased fans. When supported by the case, larger fans are preferred over smaller fans as they can cool with less noise than their smaller counterparts.

GeForce 9 series mGPUs are the perfect motherboards for slim setups because they entirely eliminate the need for add-on graphics and sound

adapters. This saves previous space that can be used for other expansion cards such as TV tuners.

Quiet Acoustics

Many users prefer a system that silently plays all of the content they expect of their HTPCs. So whether it is a quiet scene or a booming battle, all you hear is the pure sound of 8 channel audio. There are many individual decisions that can affect the overall noise of your HTPC build.

Case

When choosing larger ATX cases, noise control becomes a factor as bigger cases typically have larger power supplies and numerous system fans.

Many users choose to replace the fans included with their case & CPU with separately purchased, low noise fans. This can be one of the best ways to quickly reduce the sound coming from your HTPC.

Hard Disk Drive

Picking a hard drive entails a number of considerations: capacity, performance, noise, reliability, and warranty. A number of drive manufacturers design drives specifically for home theater and console environments. Choosing a large, cheap drive may result in more noise and heat. A bit of research can go a long way.

Power Supply Unit (PSU)

It is easy to buy more power supply than is really needed. Larger supplies are typically louder, and are not designed for HTPC environments. When purchasing an HTPC case, consider getting one with a built-in PSU, as it has been designed to run quietly while providing sufficient power for the number of optical and hard drive bays built into the enclosure.

Alternatively, many manufacturers provide data regarding the noise produced by their PSUs, making it easy for users to shop for a quiet and powerful power supply.

Example Configurations

	$370 Entry AMD System	$420 Entry Intel System	$1,100 Premium System
CPU	Athlon X2	Pentium Dual Core	Core 2 Duo
CPU Cooling	Fan (included)	Fan (included)	Low Profile Fan
Case	Full size HTPC case	Full size HTPC case	Slim size HTPC case
System Fans	Fan (included)	Fan (included)	2 Low Noise Fans
Motherboard	GeForce 8300	GeForce 9300	GeForce 9400
Form Factor	µATX	µATX	µATX
Memory	2GB DDR2-800	2GB DDR2-800	4GB DDR2-1066
Hard Drive	250GB SATA	250GB SATA	1.5TB SATA
Optical Drive	Blu-ray Rom Drive	Blu-ray Rom Drive	Combination DVD-RW, BD-ROM Drive
PSU	400 Watt (included)	400 Watt (included)	550 Watt Ultra Quiet
TV Tuner			USB HD Tuner

System Prices gathered from Newegg.com

The Entry System

For those users who would like to bring all the functionality of a PC to their television screen, the entry system packs a ton of functionality into a tight budget.

Connect to a large screen display and watch the latest TV shows at no cost on sites like Hulu. Or, play streaming music through your home stereo. Invite friends over and turn your TV into a picture frame displaying your latest photos. HTPCs offer a wealth of opportunities to unleash your creativity.

The Premium System

For those who are looking for even more from their HTPC, the premium system allows a user to do everything the entry system can, but also adds features such as the ability to use your HTPC as a TV receiver as well as a digital video recorder. All in a sleek, slim case that blends in perfectly with your other living room electronics.

Support

Online Resources & Communities

There are many online resources dedicated to providing information and support for HTPC builders:

General HTPC

http://www.avsforum.com

http://www.missingremote.com

http://www.remotecentral.com/

PC Hardware Reviews & Help

http://www.anandtech.com/

http://arstechnica.com

http://www.silentpcreview.com/

http://www.pcstats.com

HD TV Tuner

http://www.hdtvtunerinfo.com/index.html

Frequently Asked Questions

1. **Q: Does it include Dual-Link DVI support?**
   A: Dual-link DVI is supported in the chip. The 9-Series mGPU is capable of driving flat panel displays at up to WQXGA resolutions of 2560x1600.
   NOTE: Not all 9-series motherboards from our partners support this feature. It varies by vendor.

2. **Q: Does it support multiple monitors?**
   A: Yes, all of the GeForce 9-Series motherboards support two monitors.

3. **Q: What level of PureVideo HD support is build into GeForce 9-Series mGPUs?**
   A: PureVideo HD offloads 100% of movie playback for all Blu-ray video formats including H.264, VC1, and MPEG-2, delivering stunning, stutter-free video more efficiently than a CPU. This allows users to watch movies while simultaneously using their computers for other CPU intensive tasks.

4. **Q: What level of HD audio is supported on GeForce 9-Series mGPUs?**
   A: NVIDIA makes it possible to watch Blu-ray HD content with full support for 7.1 LPCM audio stream over HDMI. Can you imagine a better media center PC? With the GeForce 9-series of motherboard GPUs, it just works.

5. **Q: Do you plan to support the .MKV format?**
   A: Matroska is an extensible open standard Audio/Video container, and is usually found as .mkv files (matroska video) and .mka files (matroska audio). Support for .MKV files is a function of the ISV player.

6. **Q: Will you support Linux players?**
   A: We are working with the ISVs to see how soon this can be enabled.

7. **Q: Do you support Windows Media Player?**
   A: Yes, PureVideo supports Windows Media Player. However, WMP does not support Blu-ray playback; only PowerDVD, WinDVD and Totalmedia player currently support Blu-ray playback. Nero's Showtime also supports BD playback, but with limited compatibility. WMP only has a hardware acceleration option for WMV and MPEG 2 (DVD and HD) files.

8. **Q: What is the audio support for the GeForce 9300 and 9400?**
   A: GeForce 9-Series mGPUs support High Definition audio interface allowing

motherboard vendors to offer multiple audio codec support. The HDMI audio interface supports up to 7.1 audio channels and can stream LPCM 192 kHz format.

9. **Q: Do you need a separate cable to support HDMI or SPDIF output?**
    A: No, no additional cables are required to support HDMI or SPDIF on GeForce 9-series motherboards. The LPCM 7.1 audio is carried natively over the HDMI connector, or over the optical audio connector.