Enabling Hardware Accelerated Media Playback on the Intel® Atom™/Intel® SCH US15W Chipset Platform and IEGD

Case Study Using CyberLink PowerDVD* on Windows* XP

May 2010
Executive Summary

This paper aims at showcasing a special Windows* XP registry setting for the CyberLink PowerDVD* player. The CyberLink PowerDVD player with proper registry settings for Video Renderer Filter can be successfully used with IEGD to hardware accelerate media playback on the Intel® Atom™ Processor with Intel® System Controller Hub US15W Chipset platform.

This paper discusses differences between various available Video Renderer Filters, an important piece of video decoding and rendering, on Windows XP and how they relate to IEGD and PowerDVD.

Detailed instructions are outlined to set the PowerDVD registry key.

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Background

With the increase in connectivity of embedded devices to the Internet, the demand for watching high definition videos online or on locally stored media content on low-cost/low-power consuming devices has exploded. Due to the intense computing requirements of video processing, Intel has introduced an ultra low power platform which pairs the Intel® Atom™ processor with the Intel® System Controller Hub US15W chipset (Intel® SCH US15W chipset). This platform leverages dedicated hardware accelerators to decode high definition video in real-time while doing so within with a very low power profile. The Intel® SCH US15W chipset offers capability to decode partial or complete video bit-streams in hardware using DirectX Video Acceleration (DXVA) [1] on Windows* XP.

Media player applications that have software decoders available can use the DXVA API to hardware accelerate decoding and rendering of video. The Intel® Embedded Graphics Driver (IEGD) provides a Direct Driver Interface (DDI) to DXVA, and the embedded software stack uses the Variable Length Decoding (VLD) entry point to decode compressed video bit-streams completely in the hardware. After the video is decoded it is handed over to the Video Mixing Renderer (VMR) which uses the Microsoft* DirectDraw [6] or Microsoft* Direct3D* 9 [7] (Microsoft* DirectX* APIs) to render video using graphics hardware acceleration and add composition effects and transitions between multiple video streams, text and 2D/3D graphics.


IEGD and Video Renderers

On Windows* XP, two video mixing renderer filters (VMR-7 [2] and VMR-9 [3]) are compatible with DXVA. The VMR-7 filter uses Microsoft DirectDraw 7 and the VMR-9 filter uses Microsoft Direct3D 9. The VMR-9 filter has the ability to process video data directly with Direct3D APIs such as pixel shaders which might put additional load on GPU as compared to using a hardware overlay [4] plane in the Intel® SCH US15W chipset which inherently scales the video, and performs de-interlacing and color conversion at no cost to the 3D engine. Hardware overlay is efficient way of rendering video content with high
Hardware-accelerated Video Decode on the Intel® Atom™ Processor with the Intel® SCH US15W Chipset Platform

frame rate with no noticeable performance loss while rendering 3D objects simultaneously with rendering video. Direct3D 9 does not support Overlay surfaces [5] in Windows XP and supports hardware overlays starting with Windows® 7.

On Windows XP, IEGD supports VRM-7 as VMR-7 uses DirectDraw 7 which has support for overlay surfaces. One downside to using VMR-7 would be if the video is rendered on a hardware overlay plane then its composition with the frame buffer might not be possible if the hardware does not provide an alternative method for the video to blend with other 2D/3D objects. The Intel® SCH US15W Chipset and IEGD make it possible to make the overlay video transparent, and the 2D/3D data and windows visible or blended with the video. This effect is realized by an exclusive Intel® SCH US15W Chipset feature that enables per-pixel alpha blending between the overlay plane and frame buffer.

The CyberLink® PowerDVD Solution

We recommend using CyberLink® PowerDVD 8.0 (v3116D, OEM 2CH update) on Windows XP with IEGD 10.3.x. CyberLink PowerDVD 8.0 (v3116D, OEM 2CH update) can be obtained by directly contacting CyberLink; for any customer inquiry please contact Louis Chen at louis_chen@CyberLink.com.

PowerDVD has been tested to hardware accelerate videos encoded with the MPEG-2, H.264 and VC-1 formats using the more efficient VLD entry point on the Intel® SCH US15W chipset. PowerDVD by default connects with the VMR-9 renderer during playback on Windows XP. As VMR-9 is not completely supported by IEGD, it is recommended to force PowerDVD to choose VMR-7 as the video renderer. This can be accomplished by setting the hidden Windows registry key for PowerDVD as follows:

1. Close all open PowerDVD instances.
2. Go to Start > Run. In the dialog box type regedit and hit enter.
3. In the registry editor window, find the following key:
   HKEY_LOCAL_MACHINE\Software\CyberLink\PowerDVDB8
4. Right click on PowerDVD and select New > DWORD Value
5. In the right pane, name the key as DX_ForceVideoRenderer and set the DWORD value to 0x00000002.
6. Close the registry editor window and restart the PowerDVD player. This fix will enable PowerDVD to use the VMR-7 renderer.

While playing a DVD or other locally stored media, to ensure the hardware acceleration is being used, click PowerDVD settings and then select the Information tab.
Look for the following information to determine if the DXVA is being used by the codec or not:

**Video accelerator:** DirectX VA *(not in use)*

or

**Video accelerator:** DirectX VA *(in use)*

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**Summary**

This paper discussed details on DXVA-compatible Video Renderer Filters available on Windows XP and their compatibility with IEGD and US15W hardware. Configuration instructions were provided to set the PowerDVD registry key to efficiently make calls to DXVA and VMR7 to hardware accelerate video decoding and rendering.


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**References**

1. “*Introduction to DirectX VA*”,  

2. “*Video Mixing Renderer Filter 7*”,  

3. “*Video Mixing Renderer Filter 9*”,  

4. “*Hardware Overlay Support*”,  

5. “*Overlay Surface Overview*”,  

6. “*DirectDraw*”,  

7. “*Direct3D 9 Graphics*”,  
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Acronyms

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<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
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<tr>
<td>CPU</td>
<td>Central Processing Unit</td>
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<td>DDI</td>
<td>Device Driver Interface</td>
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<td>DXVA</td>
<td>DirectX Video Acceleration</td>
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<td>IEGD</td>
<td>Intel Embedded Graphics Driver</td>
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<td>GPU</td>
<td>Graphics Processing Unit</td>
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<td>MC</td>
<td>Motion Compensation</td>
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<td>SCH</td>
<td>System Controller Hub</td>
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<td>VLD</td>
<td>Variable Length Decoding</td>
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<td>VMR</td>
<td>Video Mixing Renderer</td>
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