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Document Number: AN_HDCPtest_02
January 6, 2006

Testing HDCP on ATI PCIe designs (R5xx, RV5xx, M5x)

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Introduction

The simplest way to test if an ATI R5xx, RV5xx or M5x graphics card is HDCP ready is to play back protected content which has the Macrovision or CGMS-A flag set. This can be done in Windows or DOS. ATI has DOS diagnostics available to verify HDCP functionality on the production line.

Basic requirements

- ATI desktop R5xx or RV5xx graphics controller or mobile M5x graphics controller
- 8.20 or later ATI graphics driver
- ATI diagnostics containing the HDCP test (available from your Field Applications Engineer or the Resource Center)
- Windows XP Pro SP2
- COPP source filter (COPPSrcFilter.dll part of COPP SDK v1.0 available from Microsoft)
- GraphEdit video testing application (part of DirectX 9.0c)
- Macrovision or CGMS-A flagged content

DOS Testing

ATI has provided a DOS diagnostic so that customers can verify HDCP functionality on their R5xx, RV5xx and M5x designs on the production line. This diagnostic is available on the Resource Center or directly from your ATI Field Applications Engineer. It requires an HDCP ready display monitor or TV.

Please follow these steps to set up the ATI HDCP Diagnostic utility on your system.

1. Download the HDCP Diagnostic Suite ZIP Package to your system.
2. Unzip the Diagnostic Suite into a directory that can be accessed through DOS.
3. Restart the system and enter DOS mode.
4. Open the directory that contains the Diagnostic Suite.
5. Enter “menu” to run the Diagnostic Suite.
6. Once in the program, there are three (3) test options available for the user:
    - Automatic HDCP Test – checks HDCP compatibility without displaying test signals
    - Visual HDCP Test – checks HDCP compatibility by sending HDCP protected content to the display
    - Automatic & Visual HDCP Test – a combination of the aforementioned tests
7. If an error has occurred, please consult your Application Engineer to determine the cause of the error. A board will fail the HDCP diagnostic testing if ANY of the components of the system is NOT HDCP supported.

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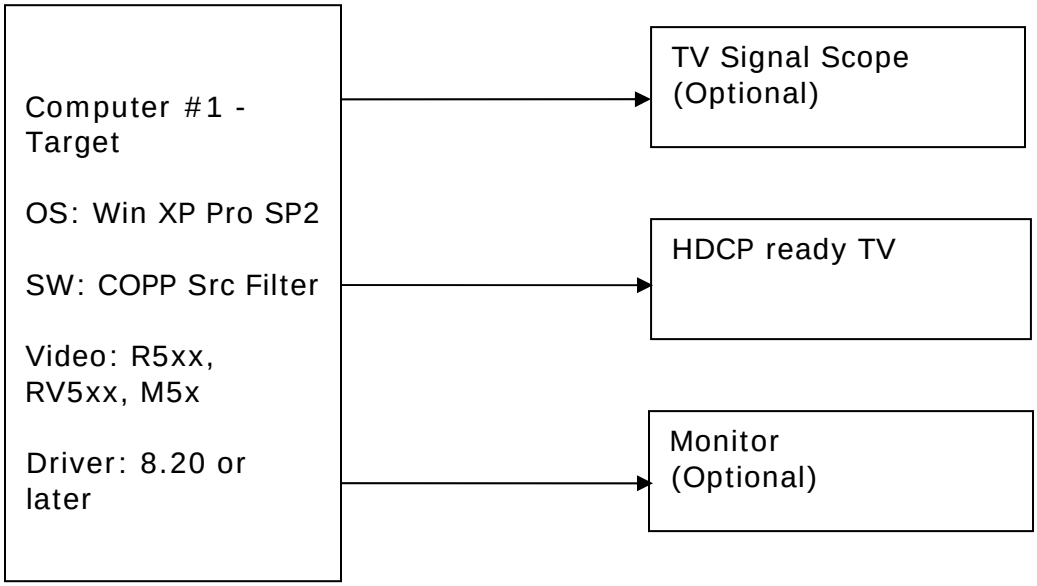
Windows Testing

ATI will only be supporting HDCP through the pre-defined Microsoft COPP API. Currently, only beta versions of a few DVD player applications have support for the COPP API. Since no HDCP ready content playback application has been released, the Windows testing can be done using a COPP filter, and a protected color bar video clip.

Setting up the test environment



The basic test setup is to have the main display on VGA and extended desktop on the TV. However the test can be done with just the TV as the primary display.

Setting up the target system

1. The target system should have the following pre-installed
    - WinXP Pro SP2
    - DirectX 9.0c
    - COPP SDK v1.0 (To install copy the sdk folder to target system)
2. Install ATI graphics driver version 8.20 or later
3. Extend the desktop onto the TV with either of the following methods:
    - If you have ATI control panel installed: Go in advanced view, then click the display manager aspect and drag the TV onto the second desktop and choose “Extend main onto HDTV”.
    - Alternatively, in Windows “Display Properties”: go in the Settings tab, click the “2” and check the “Extend my Windows desktop onto this monitor” option by the bottom left.

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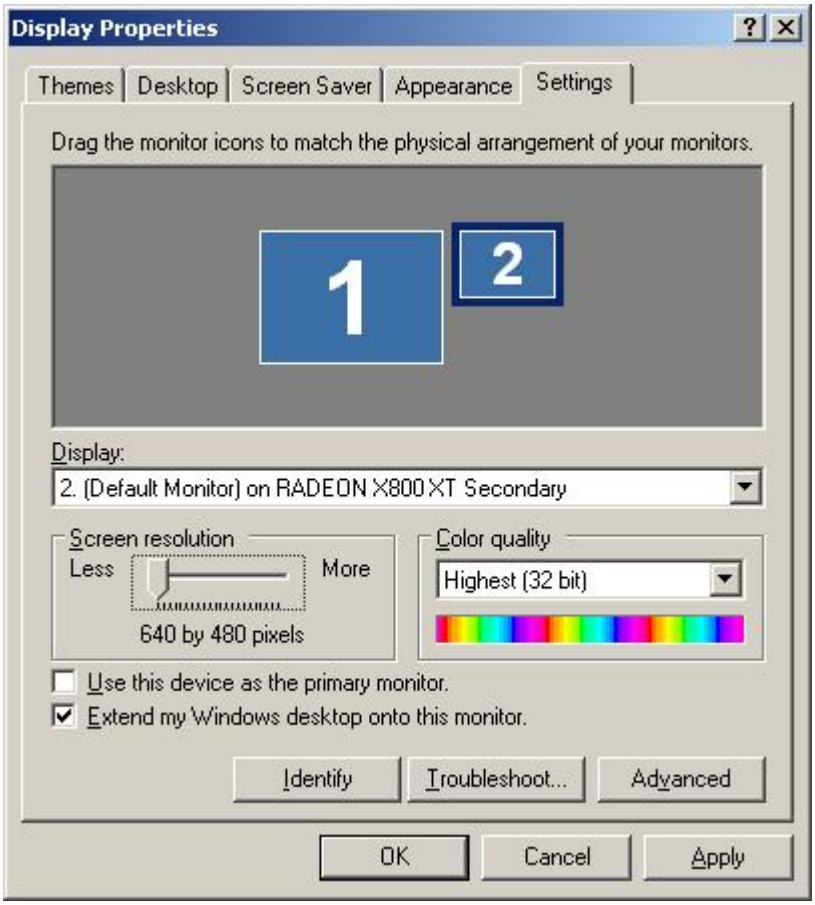
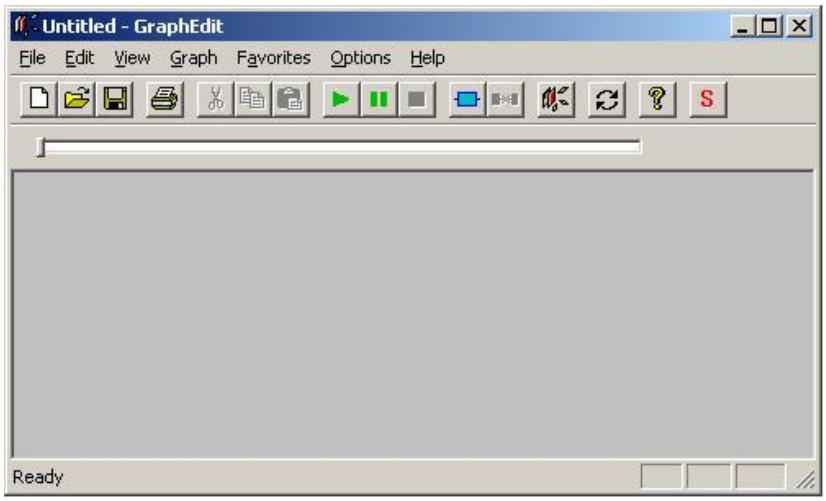


4. Register the COPP Source Filter:
   Start -> Run and type in “regsvr32 [PATH TO COPP SDK\Bin\COPPSrcFilter.dll]” (example: “regsvr32 C:\COPPSDK\Bin\COPPSrcFilter.dll” if that’s where the file is) and click OK.
5. Open GraphEdit (graphedt.exe)



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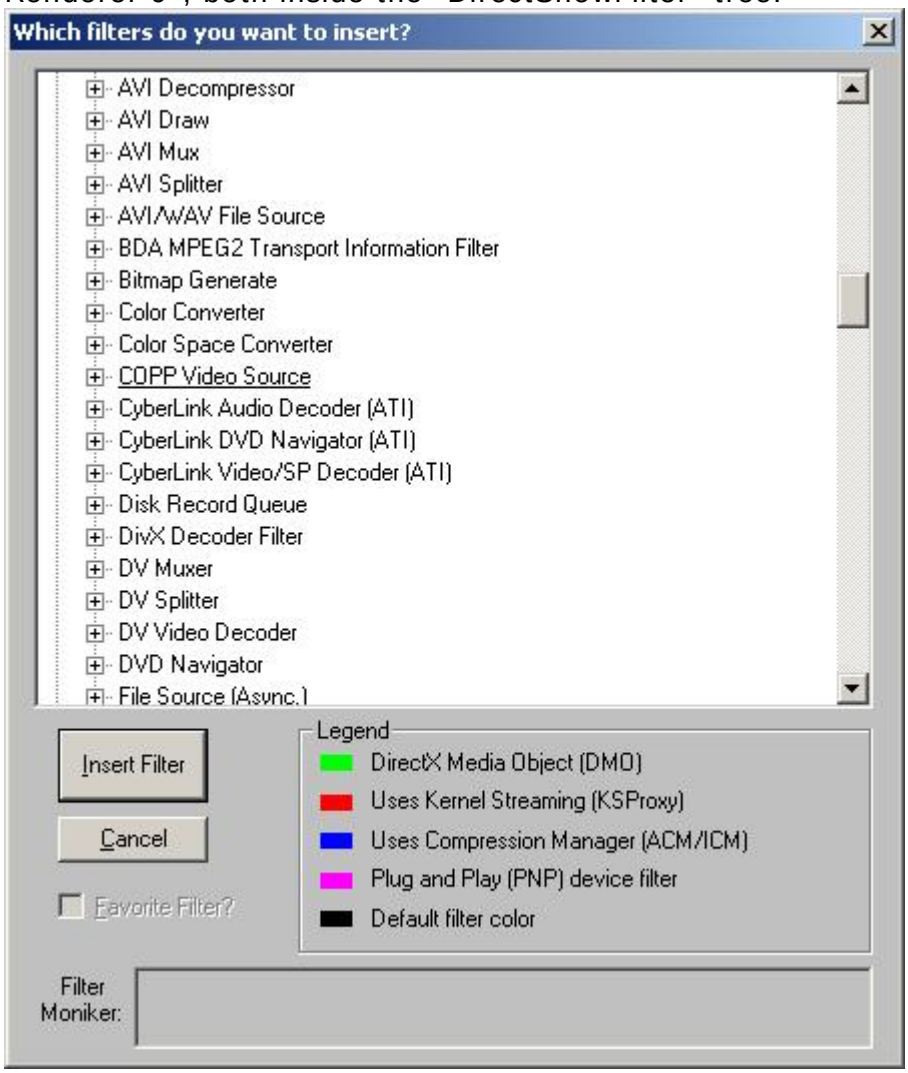
6. Click Graph -> Insert Filters, and add “COPP Video Source” and “Video Mixing Renderer 9”, both inside the “DirectShowFilter” tree.



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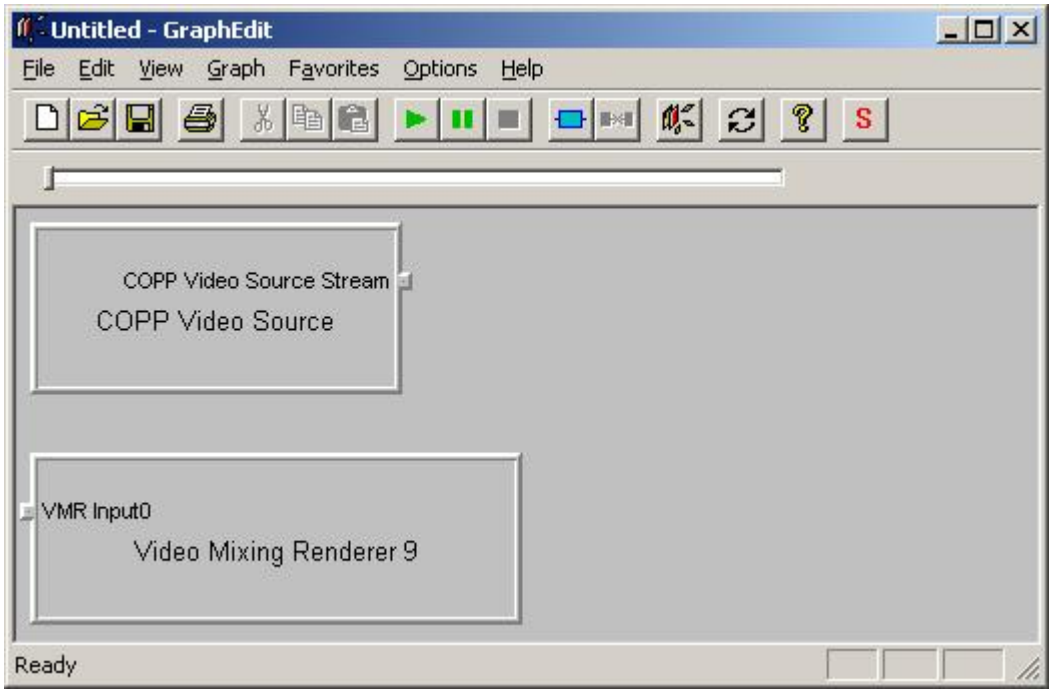
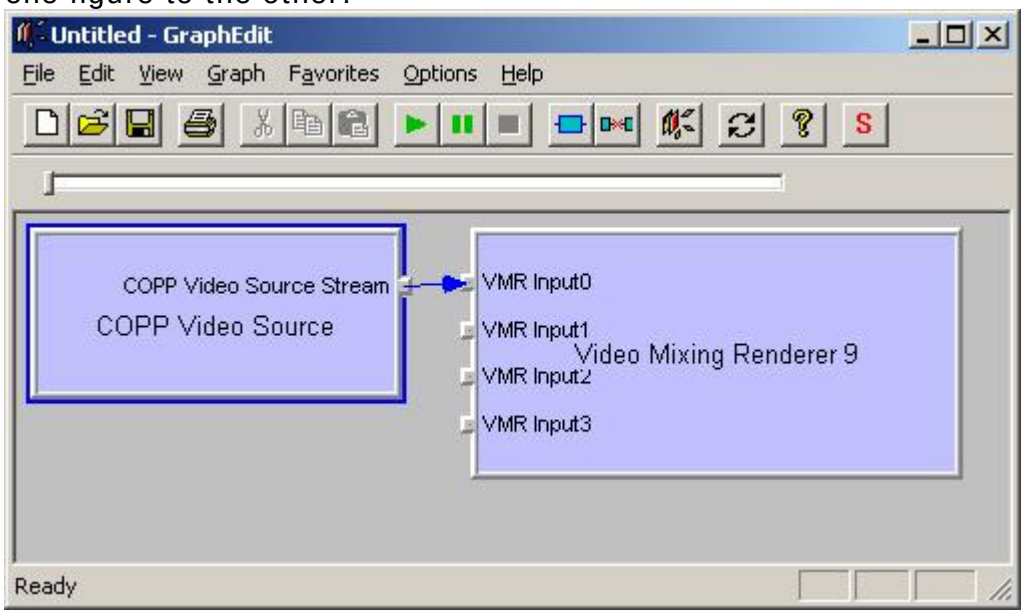
7. Close the filter screen.



8. Connect the COPP Video Source to Video Mixing Renderer 9 by dragging the head of one figure to the other:



Now the graph is complete, you may wish to save it for future use.

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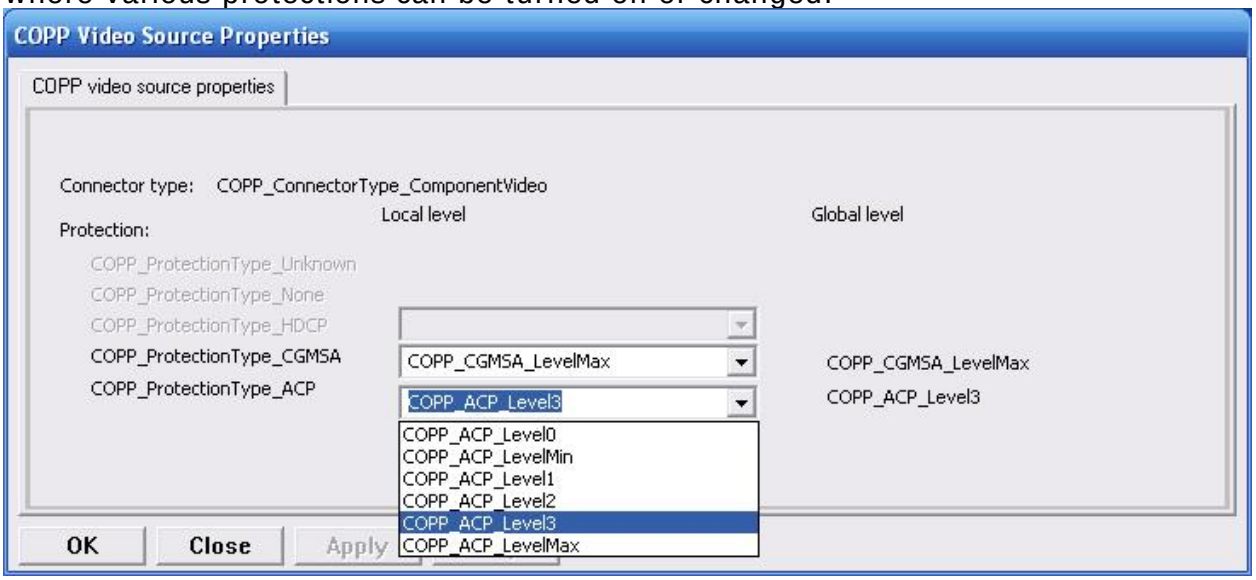
Testing COPP

With the above graph open in GraphEdit, choose Graph->Play from the menu to get an ActivieMovie Window. The ActiveMovie window will not display anything (only black) on the VGA monitor since there is no active protection on the video (COPP is not enabled on VGA). Move the ActiveMovie Window over to the extended desktop (the TV) to see it turn into a movie clip with many lines of colours in the background and a pink square scrolling through the middle to the right:

Right click on the “COPP Video Source” graph and choose “Filter Properties”. This is where various protections can be turned on or changed.



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The area under “Local level” consists of several selection boxes to set the available protection levels on the ActiveMovie playing on the TV.

To test HDCP, you need to connect an HDCP enabled TV to the graphics card through the HDCP enabled connector port on the TV. The HDCP selection box will become available with 4 levels of protections while the CGMSA and ACP selection box will be disabled.

The area under “Global level” displays the overall protection level set by each scheme (HDCP, CGMSA and ACP). The global level is always the highest protection level that’s set for that display. For example, if there are two COPP video sources playing on the TV and the first has ACP level 1 and the other has ACP level 2, then the global ACP level is 2.

Change the local protection level and click OK. To verify that the change has gone through, check the COPP Video Source Properties again and the global level should have changed to correspond to the protection that you’ve just set (assuming there is no other protected video playing on the same screen).

Setting different combinations of protection levels and verifying them sufficiently tests the COPP functionality in the driver. If all the protection levels are turned off then the ActiveMovie window should display only black.

Further COPP Testing

To test COPP further, connect a scope or a TV that reads VBI signals to check the protection level in the signals (line 20 and 21). Alternatively, you can set up a second computer to capture the signals from the target system and use a tool called TV VBI Viewer. More information on TV VBI Viewer can be found in Microsoft’s COPP Testing document.

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Document Revision History

AN_HDCPtest_01 – 12/28/2005 - First release of HDCP Test Process document
AN_HDCPtest_02 – 01/06/2006 - Added DOS diagnostic testing steps

Supporting documents

AN_DVIHDCP_xx: Implementing DVI with HDCP on ATI PCIe designs (R5xx, RV5xx, M5x)
AN_HDMIHDCP_xx: Implementing HDMI with HDCP on ATI PCIe designs (R5xx, RV5xx, M5x)
AN_DVIHDCPlogistics_xx: Process Logistics for DVI with HDCP on ATI PCIe designs (R5xx, RV5xx, M5x)