



New Device Enumeration for Intel[®] UMA

White Paper

September 2005



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Revision History

Revision	Description	Date
-001	• Initial Release	September 2005

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1 *Introduction*

1.1 **Purpose**

This document describes the changes that have occurred in the 14.X baseline for Intel's graphics driver concerning enumeration in the Microsoft Windows* Device Manager. The first change which occurred in the Intel® Graphics Media Accelerator Driver 14.0 version involves showing two of each display device under the Device Manger Monitors section. The second change introduces a new virtual monitor as part of the Dual Display Clone behavior starting in the Intel® Graphics Media Accelerator Driver Production Version 14.11.0.4277.

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2 Overview

2.1 Device Manager Enumeration Scheme Change

A new enumeration scheme was introduced in the Device Manager with the release of the 14.0 Intel® Graphics Media Accelerator Driver. Prior to 14.0, there was a one to one correlation between the number of physically attached monitors and the displays enumerated. With the new enumeration scheme, the number of devices listed is greater than what is connected to the platform. Users will see between two and five monitors (Default or Plug and Play*) displayed under the Monitors tab depending on if an SDVO ADD-IN card or SDVO Down solution is used.

2.2 Intel Dual Display Clone Enumeration

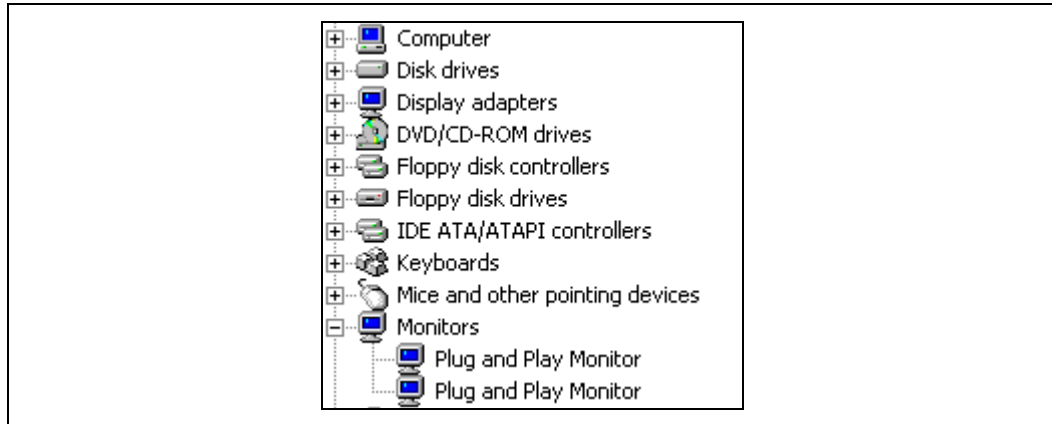
A new device enumeration was added in the Intel® Media Graphics Accelerator Production Version Driver 14.11.0.4277 to better support Dual Display Clone mode. This extra enumeration is a driver generated display with a multi-monitor modes list to represent the supported clone modes. When the “Hide modes this monitor cannot display” option is checked in the Display Properties an intersection of the two modes tables (plus any preferred timings listed in the devices’ EDID) is used. When this option is unchecked, a union of the two modes tables is used. This driver generated display will enumerate as either a “Default Monitor” or “Plug and Play Monitor” and list as the third or fifth monitor. In addition, this pseudo monitor will only enumerate on systems that can support Dual Display Clone.

2.3 Desktop

2.3.1 Desktop system without SDVO

In the scenario where no SDVO ADD-IN card or SDVO Down solution is present and only one monitor is attached to the system, two monitors are enumerated. Both displays are listed as “Plug and Play Monitor” provided the attached monitor has an EDID.

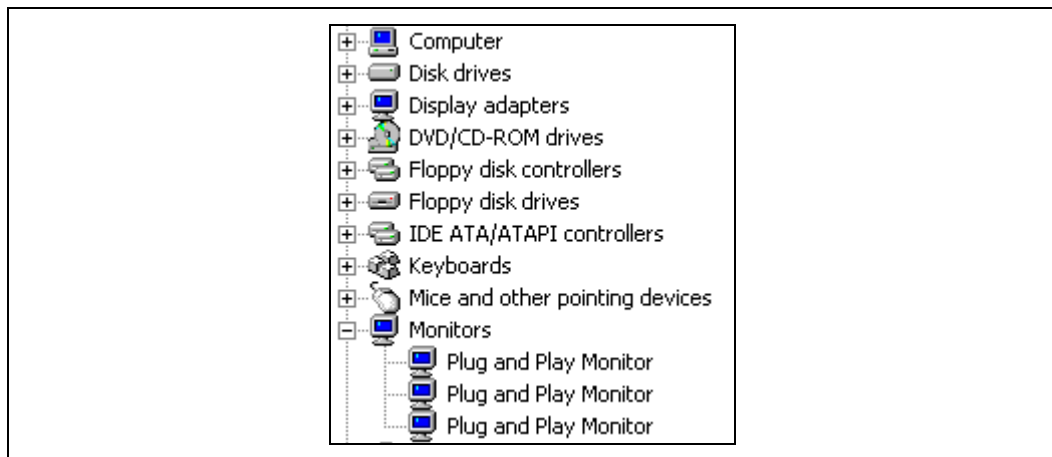
Figure 2-1. Device Manager with only one monitor attached



2.3.2 Desktop system with SDVO

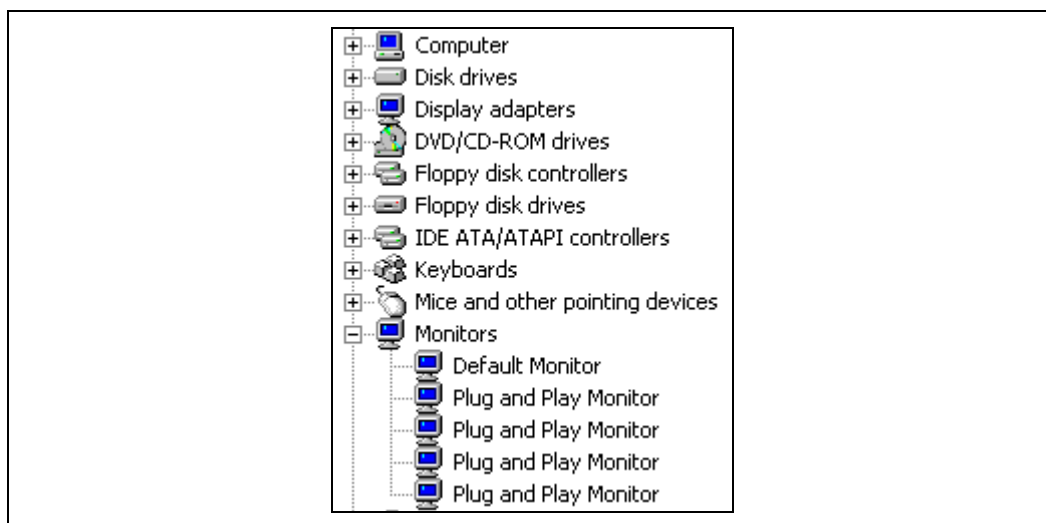
Users may see either three or five monitors enumerated depending on whether the SDVO ADD-IN card or SDVO Down solution is utilized. A system with a SDVO ADD-IN card or SDVO Down solution with only one monitor attached will enumerate three monitors. All three displays will list as “Plug and Play Monitor” provided the connected display has an EDID. In addition, the third display will always reflect the same type as the first two on the list, to denote the Clone display. This Clone device will have the same EDID as that of the attached display.

Figure 2-2. Device Manager with a single monitor and a SDVO ADD-IN card attached



With two displays attached, - the second one via the SDVO ADD-IN card or SDVO Down solution - five monitors are enumerated. Each physically attached EDID display enumerates as two “Plug and Play Monitor” devices, listing a total of four. The fifth monitor indicates the Clone display. As mentioned above, this Clone display will only show as “Plug and Play Monitor” if both connected monitors are EDID. If on the other hand, either of the attached displays is non-EDID, no EDID is generated for the Clone display and is therefore enumerated as a “Default Monitor” in the Device Manager.

Figure 2-3. Device Manager with two monitors attached



2.4 Mobile

Mobile systems will always show two LVDS panels in the Device Manager if the integrated LVDS port is used. As of Mobile Intel® 915GM Express chipset, mobile products also support integrated TV out. This means that there may also be two televisions listed in the device manager as well*.

Note: TV display devices will only show up if they are attached to the system or if the OEM has enabled one of the following VBT options.

- Display(s) must be attached for switching Hot Key
- Display must be attached for CUI/Hot Key

2.4.1 Mobile system without SDVO

In addition to showing LVDS panels and TVs, the Device Manager will also list three Default Monitors. If an actual CRT that has an EDID is connected, then two of the Default Monitors will enumerate with the proper PnP information for the display. The third monitor will always show as a “Default Monitor” per Intel’s Dual Display Clone requirements.

2.4.2 Mobile system with SDVO Down

SDVO solutions fall into one of three categories (TMDS, TV out, Combo). The category of the SDVO solution will dictate what is displayed in the Device Manager.

As mentioned above in Section 2.4.1, the system will already show two LVDS panels, three monitors, and possibly two TVs. What is shown in addition is listed below in the proper category of SDVO solution.

TMDS solution: Two more Default Monitors will enumerate in the Device Manager. If no display devices are attached, then a total of 5 Default Monitors will be listed in the Device



Manager. Each display device that is plugged in which has an EDID will cause two of the Default Monitors to re-enumerate with the PnP information in the EDID. Thus there may be two different displays listed while the fifth “Default Monitor” remains unchanged as per Intel’s Dual Display Clone requirements.

TV out solution: Two Generic Televisions will enumerate in the Device Manager. It is not typical for an OEM to implement this solution in conjunction with integrated TV out. Thus, the system configuration should appear to be the same as a mobile system without SDVO. However, if this is implemented in conjunction with integrated TV out, then there would be four Generic Televisions that enumerate in the Device Manager. Please note, that the Generic Televisions follow the same requirements to be enumerated as integrated televisions outlined in the note for Section 2.4.

Combo solution: Combo refers to a TMDS/TV out combo chip. Typically an OEM would not implement this solution in conjunction with an integrated TV out solution. The combo solution will enumerate two Default Monitors and two Generic Televisions. Essentially this solution combines the behaviors of the TMDS and TV out solutions. Thus, there could be a total of up to 11 display devices enumerated in the device manager (5 monitors, 2 LVDS panels, and 0-4 TVs).

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3 *New Enumeration Requirement from Microsoft**

Microsoft requires all display adapters to have a child device enumerated on each controller. This is an industry standard for all multi-function graphics adapters to pass WHQL. Previous to the 14.11.0.4277 driver, Intel was exempt from complying with these requirements. The waiver period has since expired, thus the change in the Device Manager enumeration scheme.