



# **Intel® 810/810E/810E2/815/815E Chipset Dynamic Video Memory Technology**

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# 1. DVMT Overview for the Intel® 810, 810E, 810E2, 815, and 815E Chipsets with the PV 4.x Display Drivers

Dynamic Video Memory Technology (DVMT) enables optimum graphics and memory performance through Direct AGP and highly efficient memory utilization. DVMT ensures the most efficient use of all available memory – regardless of frame buffer presence or main memory sizing – for maximum 2D/3D graphics performance. DVMT dynamically responds to system requirements and applications allocating the proper amount of display and texturing memory upon operating system boot or real time. For example, a 3D application might require more texture memory to enhance the richness of 3D objects. The O/S views the integrated graphics driver as an application which uses Direct AGP to request re-allocation of additional memory for 3D applications and returns memory when not required.

## 1.1 Legacy VGA Memory

DVMT is a unique architecture that only uses 1MB from the system's physical memory. This 1MB is required for legacy VGA graphics support and compatibility. Upon boot the BIOS allocates 1 MB out of main memory for VGA graphics. An example of when VGA graphics memory is needed would be running under DOS when there is no driver loaded. Once the operating system boots this 1MB is not seen and is not visible by the operating system.

## 1.2 DVMT Graphics Footprint Size for the PV 4.x Graphics Drivers

Upon the operating system initialization, DVMT examines the operation system, main memory size, and the Graphics Performance Accelerator (GPA) card to determine the best memory footprint between the operating system and integrated graphics subsystem. *Note that the GPA card was previously referred to as the Add-In Memory Module (AIMM) in earlier Intel 815/815E chipset documentation, this will be referred to as the GPA card throughout this document. It is Intel's expectation that the memory industry will recognize the GPA card naming as synonymous with the previous AIMM nomenclature.*

The following tables illustrate how much memory is allocated under various operating systems, with and without the GPA card.

**Table 1. Total Graphics Memory *With the 4MB GPA Card***

System Memory Size	32MB	64MB	128MB
Windows* 98	(5 + 4) = 9MB	(8 + 4) = 12MB	(8 + 4) = 12MB
Windows* NT*4.0	NA	(8 + 4) = 12MB	(8 + 4) = 12MB
Windows* 2000	NA	(8 + 4) = 12MB	(8 + 4) = 12MB

**Table 2. Total Graphics Memory *Without the 4MB GPA Card***

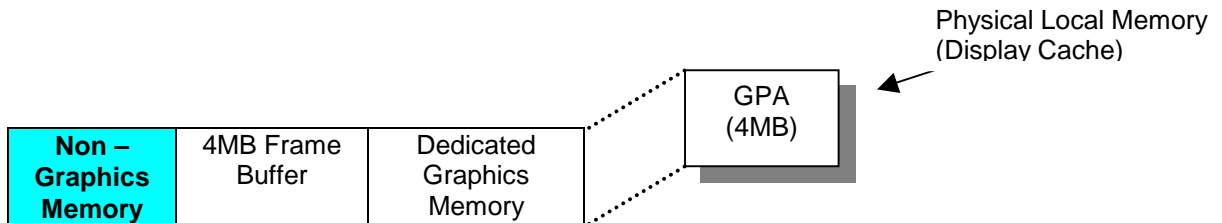
System Memory Size	32MB	64MB	128MB
Windows* 98	6MB	10MB	10MB
Windows* NT*4.0	NA	9MB	9MB
Windows* 2000	NA	9MB	10MB

Note: The above values in both tables do not include the 1 MB allocated for VGA memory.

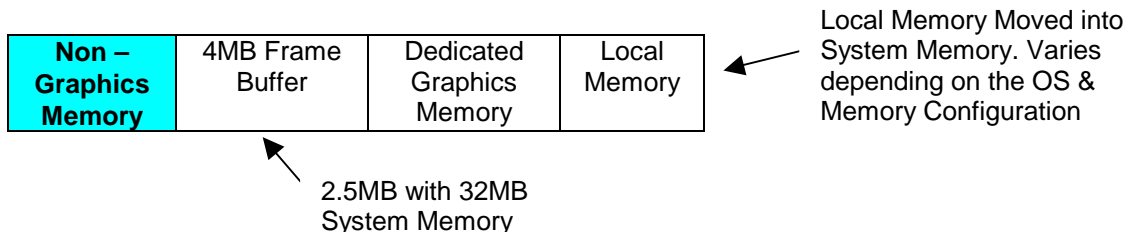
Once loaded, the OS and graphics driver allocates the buffers that the driver needs for performing graphics functions. The total graphics footprint allocates memory for commands, the frame buffer (resolution), the Z-buffer, GDI data, and off-screen memory. When the GPA card (4MB) is installed, the Z-buffer and GDI data

are managed directly by the driver from this memory, avoiding real-time OS memory manager calls and improving performance.

When the GPA card is not installed, the Z-Buffer and GDI data are allocated to system memory. In this configuration, DVMT will reduce the TOTAL graphics footprint in system memory to ensure the best usability and performance of the OS and graphics. Figures 1 and 2 show that when the GPA card is available this “local memory” or “Display Cache” is used for the Z-buffer and GDI data. When in a configuration without the GPA card, this “local memory” is moved into system memory. The local memory size will vary dependent upon the OS and memory size configurations. Also when the GPA card is not installed in a 32 MB system, the TOTAL graphics memory footprint is reduced to ensure usability of the OS. This is done by reducing the Frame Buffer size to 2.5 MB as noted in Figure 2 below. In this configuration the 24 bpp is not supported above 1024 x 768 screen resolution.



**Figure 1. Memory Model With the GPA Card**



**Figure 2. Memory Model Without the GPA Card**

## 2. Reported Video Memory on Intel 810, 810E, 810E2, 815, and 815E Chipsets with PV 4.x Display Drivers

In systems using Intel®DirectAGP chipsets, end users are presented with messages/displays concerning “video memory size”. Below are descriptions of these messages displayed by the operating system, video BIOS, and driver.

### 2.1 Video BIOS POST message

Users may first be presented with “video memory size” messaging in the video BIOS “splash” or “boot” message. This message displays the amount of main system memory that will be used solely for video BIOS purposes. DOS, for example, will use only this memory for display. Video BIOS will use either 512KB or 1MB based on system BIOS settings. From the operating system perspective, this memory is logically



removed from the system so that it is invisible (for example, a 64MB system using a 1MB setting in system BIOS will report 63MB of TOTAL system memory).

## 2.2 System BIOS POST message

During POST, some system BIOSes display the amount of **physical** "Display Cache" or the size of the GPA card in the system. This will be either 0MB or 4MB.

## 2.3 Windows NT/2000 Operating System "Adapter" property page

Microsoft Windows NT 4.0 and Windows 2000 operating systems contain a standard display property page that is displayed when the "Adapter" tab (with NO icon) is selected. This page displays the maximum amount of local, frame-buffer memory possible by the graphics device.

## 2.4 Intel's custom "Version" property page

Intel's graphics drivers include several custom property pages. One of these pages, entitled "Version", displays "Memory Size" and a number. This page displays the amount of memory totally dedicated to "local memory" for display. This can be as low as 1MB depending on the operating system and the amount of total system memory. Intel defines all items on this page. This page was NOT designed to display physical GPA card memory size.

The local memory size under all operating systems with any memory configuration is 4MB with the GPA card installed. However, when the GPA card is NOT installed the local memory size varies, depending on the operating system, and memory configuration.

The following is a table, which indicates how much memory is allocated and reported by the "Version" property page under the various Windows\* operating systems:

**Table 3. Version Property Page Memory Reported vs. OS and Memory Size.**

Operating Systems	Property Page Memory Size Reported With the GPA Card			Property Page Memory Size Reported With Out the GPA Card		
	32MB	64MB	128MB	32MB	64MB	128MB
Windows 95	4MB	4MB	4MB	*NP	*NP	*NP
Windows 95 OSR2.1	4MB	4MB	4MB	1MB	2MB	2MB
Windows 95 OSR2.5	4MB	4MB	4MB	1MB	2MB	2MB
Windows 98SE	4MB	4MB	4MB	1MB	2MB	2MB
Windows NT 4.0	*NP	4MB	4MB	*NP	1MB	1MB
Windows 2000	*NP	4MB	4MB	*NP	1MB	2MB

\*Note: NP = No Property Pages