

intel® Technical Advisory

TA 719-02

5200 NE Elam Young Parkway
Hillsboro, OR 97124

October 27, 2004

Intel® Server Board SE7221BK1-E and Intel® Server Platform SR1425BK1-E Available memory limitation when 4 GB installed

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Products Affected

Product	Product Codes
SE7221BK1	BBKBB
SE7221BK1LX	BBKBBLX, SC78048
SR1425BK1	

Description

When the Intel® E7221 chipset is populated to its maximum memory capacity of 4 GB (Giga Bytes), the Operating System (OS) may report a significantly lower amount of available memory. This is only an issue when the maximum memory capacity of 4 GB is used with the Intel Server Board SE7221BK1-E.

Root Cause

System Resources require addressing which overlaps physical memory below 4 GB:

- System BIOS
- Motherboard Resources (I/O APIC)
- Memory Mapped I/O
- PCI Express* Configuration Space
- Additional PCI Device Memory
- VGA Memory (Video aperture)
- Other chipset and system devices

These requirements may reduce the addressable memory space available to and reported by the Operating System. These memory ranges, while unavailable to the OS, are still being utilized by subsystems such as I/O, PCI Express and Integrated Graphics and are critical to the proper functioning of the server.

Use of Available memory below 4 GB by system resources is not specific to Intel chipsets, but rather a limitation of existing PC architectures and current limitations of some 32-bit operating systems. Some 32-bit operating systems may not be capable of recognizing greater than 2 GB of memory. This issue potentially impacts any chipset with 4GB maximum memory configuration.

Intel has addressed this from a hardware perspective in future platforms, anticipating that future Operating Systems will provide greater than 4 GB of memory support.

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Figure 1. below is an accurate representation of the Intel Server Board SE7221BK1-E memory map with 4 GB of physical memory installed. Note the OS will report available memory only slightly above 3 GB when 4 GB is installed, and only slightly below 3 GB of available memory when 3GB is installed. Figure 2. on the following page shows a breakdown of onboard system resources and their general memory consumption characteristics when 4 GB of memory is installed in the system.

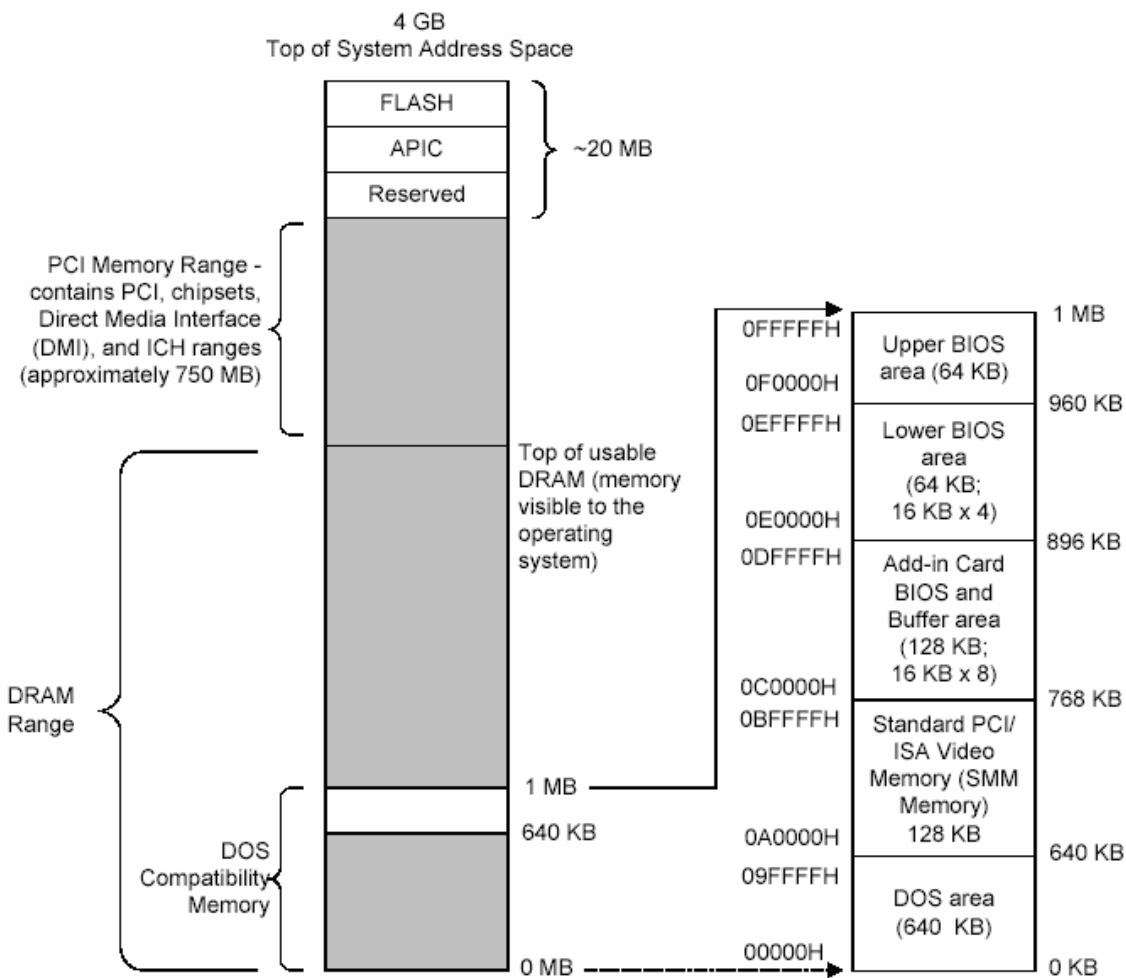


Figure 1. 4GB memory address range utilized by Intel® E7221 chipset resources.

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System Resource	Size	Physical Memory Remaining (4 GB Total System Memory)	Physical Memory Remaining (3 GB Total System Memory)
Firmware Hub flash memory (the BIOS)	1MB	3.99	3.00
Local APIC	4KB		
Area available to the chipset	2MB		
IO APIC (4 Kbytes)	4KB		
PCI Enumeration Area 1	256MB	3.84	3.00
PCI Express* area (256 MB)	256MB	3.58	3.00
PCI Enumeration Area 2 (if needed) (aligned on 256-MB boundary)	256MB	3.33	3.00
VGA memory	16MB	3.31	2.85
TSEG	1MB	3.30	2.84
Memory available to BIOS, OS, and applications.		3.30	2.84

Figure 2. Sample system memory map.

Corrective Action / Resolution

Intel Server Board SE7221BK1-E system BIOS will be updated to properly indicate the following information screens augment memory configuration characteristics for the Intel Server Board SE7221BK1-E and Intel Server Platform SR1425BK1-E customers.

- Total physical memory populated in the system
- Total memory dedicated to motherboard resources
- Total memory reported as available to the operating system

This information will align to the INT15h E820h standard that BIOS uses to communicate memory usage to the operating system. This BIOS feature will clarify the memory subsystem support and usage for the end user.