HP COMPAQ 8100 ELITE PCS WITH INTEL NEHALEM MICROARCHITECTURE

January 2010

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Introduction

This whitepaper discusses the HP implementation of new Intel microarchitecture codenamed Nehalem.

HP is a leading edge technology company offering the latest and greatest computing technology to our customers. Intel Nehalem-based microarchitecture will be available to Enterprise business-class machines starting with the HP Compaq 8100 Elite.

What's New

HP Compaq 8100 Elite systems are based on Intel Nehalem microarchitecture which is a significant departure from previous generation HP Elite systems based on Intel Core 2 microarchitecture. Both the processor and the chipset have been redesigned to deliver better performance and system responsiveness.

HP Compaq 8100 Elite systems are shipping with Intel Core i7, i5, and i3 processors coupled with the Intel Q57 Express chipset.

Note: The Intel processor naming convention can be a little confusing. The Intel Core 2 microarchitecture (Core 2 Duo, Core 2 Quad) is the older technology. The Intel Core microarchitecture (Core i7, Core i5, Core i3) is the newer technology.

Key Processor Features

The Intel Core i7, i5, and i3 processors have several key features to enhance system performance. Most notable is the architecture has changed and they now include an Integrated Memory Controller (IMC) making them monolithic processors. The IMC and the multiple processor cores are connected by the new QuickPath Interconnect (QPI).

Key Feature	
Integrated Memory Controller (IMC)	IMC offers high bandwidth and low latency for memory I/O leading to faster memory read and write cycles.
Hyper-Threading Technology (HT)	Hyper-Threading technology allows one physical processor core to be seen as two logical processors by firmware and software. Each logical processor can execute a thread allowing for two concurrent threads to be executed.
Turbo Boost Technology	A feature that automatically allows processor cores to run faster than its base operating frequency when other cores are not being utilized. Automatic performance boost.
QuickPath Interconnect (QPI)	A new high bandwidth, low latency bus that connects processor cores and memory.

Figure 1: Key features of the Intel Core i7, i5, and i3 processors

Graphics

Certain Intel Core processors include an Integrated Graphics Device (IGD) providing excellent graphical capabilities. For the Intel Core processor models that do not have an IGD, a PCI Express (PCIe) interconnect is integrated into all processors to support up to PCIe x16 video cards.

Previously, Intel Core 2 Duo and Core 2 Quad processors did not contain embedded graphical devices. All IGDs were located in the Graphics and Memory Controller Hub (GMCH) chipset.

Processor	**Integrated Graphics Device**
Core i3-5xx	Yes
Core i5-6xx	Yes
Core i5-7xx	No
Core i7-8xx	No
Pentium G6950	Yes

Figure 2: Integrated Graphic Device for Intel Core processors

Key Chipset Features

The Intel Q57 chipset in the HP Compaq 8100 Elite systems is based on Intel Nehalem microachitecture.

Intel Nehalem microarchitecture is a two chip solution with a processor and a Platform Controller Hub (PCH) controlling system I/O. The memory controller is now located within the processor. An Integrated Memory Controller (IMC) allows for lower latency and thus better performance. In some processor models, the graphics controller is also integrated into the processor and is known as an Integrated Graphics Device (IGD).

The previous Intel Core microarchitecture is a three chip solution with a processor, a Graphics and Memory Controller Hub (GMCH), and an I/O Controller Hub (ICH). The memory controller and graphics controller are external to the processor.

The change in the chipset layout is transparent to the user. Functionality of the major I/O subcomponents remains the same. In certain cases, there will be a performance gain.

607611-001, January 2010