

Enter “Dothan”

**Intel’s new processors for smoother video playback,
faster application response and better multi-tasking**

Date: 03. June 2004

Version 1.0

Dothan may be a sleepy town in the southern United States (Alabama to be exact), but it is also the latest in a long list of code names that the Intel corporation uses for its processor developments.

With the new processors, Intel® Pentium® M processors 735, 745 and 755, formerly code-named Dothan, Intel has announced a new step in the evolution of their mobile processors. The “Dothan” processors, which are an advanced version of Intel’s Pentium® M processor technology, are designed to increase notebook performance and offer smoother video playback, faster application response and better multi-tasking.



Intel® Pentium® M processors 735, 745 and 755, formerly code-named Dothan, Intel has announced a new step in the evolution of their mobile processors.

In this article, we take a closer look at mobile processor developments, including the following topics:

- What is a mobile processor and a brief history of mobile processors
- Dothan – What’s behind the code name?
- What does it all mean for mobile users?

What is a mobile processor and a brief history of mobile processors

Computers that are mobile have been around since the early 1980’s. Processors that are specifically designed for mobile computers have only been around for the last 7 years. By the mid 1990’s, many of the notebook manufacturers as well as Intel had begun to realise that the mobile computing sector was not only a big market, but that users of mobile computing devices had different needs. As such, the development of a specific mobile processor was quite logical.

A mobile processor distinguishes itself from a “desktop” processor (the normal type of computer that is built into a standard desk-based PC) through a number of features, including:

- Smaller size to fit into notebook form factors
- Better power saving features to help prolong battery operating times
- Better heat management so that notebook run cooler and ultimately consume less power

Mobile Pentium with MMX Technology

In September 1997, Intel released the first Mobile Intel Pentium chip that was designed specifically for use in notebooks. The Pentium processor with MMX technology was the first mobile processor to incorporate Intel's new set of 57 instructions that enable MMX technology features and functionality.

MMX technology allowed the CPU to process certain types of data typically found in multimedia and graphics software simultaneously. For users, this resulted in accelerated

performance on media-rich applications and life-like colour, better support for full-screen video and graphics, real-time animation, and 3D audio.

Intel Celeron Processor Goes Mobile

In January 1999, Intel announced further enhancements to the Pentium II mobile platform but also the introduction the mobile version of its low-cost Celeron processor. Designed to run at lower clock speeds, the Celeron had less on-chip cache. It marked the beginning of a choice for users of mobile computers: they could select the Mobile Pentium II processor for highest performance or the mobile Celeron processors as a budget alternative.

Centrino technology – a giant leap in mobile computing

In March 2003, mobile computing took a giant leap forward with technology that was conceived entirely for mobile computing. Intel® Centrino™ technology represents a completely new integrated solution for notebooks consisting of i) CPU (Pentium® M processor architecture), ii) chipset, and iii) wireless solution. It was designed as a mobility solution, focusing on

- reduced power consumption leading to extended battery operating times
- highly compatible wireless connectivity
- and a form factor that allows for smaller, thinner and more exciting designs to emerge

The original version of the Pentium® M processor architecture, which was code-named Baniyas, supported 1 MB of on-chip cache with power management that allows for power consumption savings by using the cache intelligently. In addition, the processor architecture also incorporated technologies designed to reduce power consumption; including:

- **Advanced Branch Prediction:** Analyses a program's past behaviour and predicts which operations it is likely to request in the future, resulting in higher performance.
- **Micro-Op Fusion:** When several operations are ready to execute at the same time, this technology merges them into a single operation, which improves both performance and power efficiency.
- **Power Optimised Processor System Bus:** Unlike many current systems, which provide power to components even when they are not in use, this technology implements architectural and circuit innovations that result in lower power consumption by providing power only where it is needed.
- **Dedicated Stack Manager:** Uses dedicated hardware to keep track of internal accounting, allowing the processor to execute program instructions without interruption. When combined, these technologies significantly improved performance without sacrificing battery life.

Dothan – What's behind the code name?

The Intel Pentium M processors 735, 745 and 755 are significant primarily because they are built on Intel's new 90 nm (nanometer) manufacturing process.

The 90 nm process creates transistors that are smaller, allowing more transistors per processor, faster processing and lower power consumption. The increased space available on the processors has been used to increase the size of their on-chip cache. This very fast segment of memory is where the processor stores frequently accessed data, and doubling its size results in a performance boost of up to 17 percent (as compared with the previous generation processor).

Code Name	Production Name	Improvements Embodied
Banias	Pentium M/Centrino	Advanced Branch Prediction, Micro-Op Fusion, Power Optimized Bus, Dedicated Stack Manager
Dothan	Pentium M/Centrino	90 nm Fabrication, 2MB L2 Cache
Alviso*	n/a	Dual-Channel DDR-II SDRAM Support, PCI Express Interconnections, High-end Audio
Calexico 2*	n/a	Low-power 802.11a/b/g and Bluetooth Wi-Fi hardware.
Somoma*	n/a	A complete mobile computing solution, combining Dothan processors with Alviso chipsets and Calexico 2 communications hardware.

* Indicates a code-named processor or processor technology that has currently not been launched. Specifications may change without prior notice.

With 2 MB of integrated, power-managed Level 2 (L2) cache, micro-architectural enhancements and frequencies up to 2 GHz, these processors also include the features designed specifically to improve mobile CPU performance, including: Advanced Branch Prediction, Power Aware Caches, Micro-Ops Fusion, Dedicated Stack Manager, and Advanced Power Control. Together these developments in overall performance and speed mean that the Intel® Pentium® M processor 735, 745 and 755 are powerful enough to replace desktop processors in all applications.

What does it all mean for mobile users?

In the end, all these technical developments mean just one thing: increased mobile computing performance.

- Smaller chip sizes mean smaller devices that run faster while using less electricity
- Improved architectures mean easier Wi-Fi connectivity and device interoperability

Toshiba customers, of course, will also benefit. The new Pentium® M processor 735, 745 and 755 will be implemented in the current professional Tecra®, Portégé® and Satellite series notebooks providing increased mobile and wireless performance from today's existing models.

Processor Highlights

Processor	Date	Major Technological Achievement	Clock Speed
80286	Feb. 1982	The first Intel processor to support software written for earlier processors. The first to be used in portable computing platforms using the X86 instruction set.	12, 10 and 6 MHz versions.
Intel386 SX	June 1988	A version of the Intel386 DX with no Math Co-processor, making it better suited for mobile computing.	33, 25, 20 and 16 MHz versions
Intel486 SX	April 1991	A version of the Intel486 DX with no Math Co-processor, making it better suited for mobile computing.	33, 25, 20 and 16 MHz versions
Intel Pentium	March 1993	Intel's first 32-bit processor	66 and 60 MHz versions
Mobile Intel Pentium	September 1997	Intel's first processor designed specifically for mobile computing.	233 and 200 MHz versions.
Mobile Intel Pentium II	April 1998	The first mobile-targeted processor in the Pentium II line.	266 and 233 MHz versions
Mobile Intel Celeron Processor	January 1999	The first mobile-targeted processor in the budget Celeron line	300 and 266 MHz versions.
Mobile Intel Pentium III	October 1999	The first mobile-targeted processor in the Pentium III line.	500, 450 and 400 MHz versions.
Low Voltage Mobile Intel Pentium III	June 2000	First low voltage Pentium III-class mobile processor.	600MHz
Low Voltage Mobile Intel Celeron	June 2000	First low voltage Celeron-class mobile processor.	500MHz
Ultra Low Voltage Mobile Intel Pentium III	January 2001	First ultra low voltage Pentium III-class mobile processor.	500MHz
Ultra Low Voltage Mobile Intel Celeron	January 2001	First ultra low voltage Celeron-class mobile processor.	500MHz
Mobile Intel Pentium III	March 2001	First mobile processor to exceed 1GHz clock speed.	1GHz
Pentium M processor	March 2003	0.13 micro fabrication, 1 MB low power L2 cache.	1GHz and 900 MHz