



AMD: Evolution of an Innovator

AMD Enters the Market as a Second Source Provider

1976

- AMD and Intel sign their first comprehensive cross-license agreement, where AMD and Intel both agree to license to each other all patents each company holds.

1982

- IBM selects an Intel microprocessor for its PC but only on the condition that there is a reliable second source supplier for its PC processor needs. As a result, AMD renews a comprehensive cross-license agreement with Intel and becomes IBM's second-source manufacturer of the 8086 and 8088 microprocessors.
- A California judge later said that – by agreeing to be a second source for Intel, “AMD came to Intel's help when the latter needed assistance in establishing [its microprocessor] architecture in the marketplace.” This move helped Intel to establish x86 as the dominant PC architecture.

1987

- Intel notifies AMD it is terminating the second source agreement, an aggressive move to prevent AMD from producing a 486-compatible microprocessor. This begins years of legal disputes between AMD and Intel, and limits customer choice to a single source for PC microprocessors for the next several years.

1990

- In late 1990, AMD releases the Am386[®] microprocessor family, based on Intel's 80386. Sales of the Am386 are strong due to its exceptional performance.

1991

- In October 1991, Intel commenced a federal court action for copyright infringement. An arbitrator subsequently awarded AMD full rights to make and sell the Am386. The Supreme Court of California upheld this decision in 1994.

1993

- The Am486[®] microprocessor is introduced; it powers Compaq computers and thousands of other manufacturers' PCs.

1994

- Intel and HP announce the development of a proprietary 64-bit microprocessor architecture (code-named “Merced” and eventually launched as “Itanium”), based on an entirely new instruction set called “IA-64,” which is incompatible with the millions of existing x86-based PCs and software applications.
- Albert Yu, Intel senior vice president and general manager of the Microprocessor Products Group, declares, “If I were competitors, I'd be really worried. If you think you have a future, you don't.”

AMD Challenges Intel

1995

- AMD introduces the AMD-K5[®] microprocessor, its first independently designed, socket-compatible x86 microprocessor.

1997

- AMD introduces the successful AMD-K6[®] microprocessor, a pin-compatible alternative to Intel's Pentium™ microprocessor. Its introduction heralds the return of competition and helps drive PC costs down below \$1,000 to create PCs that are affordable for the average consumer.

1998

- AMD substantially advances the PC platform with the launch of the AMD-K6-2 microprocessor, featuring 3DNow!™ technology. Invented by AMD, 3DNow! technology was the first x86 innovation to significantly enhance 3D graphics, multimedia, and other floating-point-intensive applications for Microsoft[®] Windows[®]-compatible PCs.
- Intel announces that Merced (Itanium) is delayed. Itanium does not ship for another three years.

AMD Leads Innovation

1999

- AMD makes a clean break from creating Intel-compatible chips with the introduction of the world's fastest x86 microprocessor, the AMD Athlon™. AMD Athlon processors were designed specifically from the ground up to run Microsoft Windows exceptionally well. AMD Athlon processors offer several innovations that set them apart from competing Intel products and represent the first time that AMD beat Intel to market with a new generation of x86 microprocessor for Microsoft Windows-based computers.
- Jerry Sanders, AMD's chairman and CEO, states, "For the first time in the history of the computer industry, AMD leads the competition in delivering an entirely new generation of processors that offers higher performance and processing capabilities based on a more advanced architectural design. This announcement is truly a watershed for the entire industry because it heralds new choices based on superior processor technology."
- AMD previews the world's first 64-bit x86 multi-core architecture at the *Microprocessor Forum*.

2000

- AMD is first to break the historic 1GHz (one billion clock cycles per second) barrier with the AMD Athlon processor.
- AMD introduced PowerNow!™ technology, which allowed PC manufacturers to deliver cooler, quieter running notebook systems with extended system battery life.
- Despite Intel's efforts to exercise its market power to compel the computer industry to adopt the costly Rambus DRAM (or "RDRAM") as a new memory standard, AMD works with numerous PC OEMs and chipset vendors to help establish SDRAM as the standard PC memory type. SDRAM and its later generations are developed by an open standards setting body and feature lower costs and higher yields.
- AMD announces the world's first PC platform supporting Double Data Rate (DDR) memory technology, which increased peak data throughput to the processor by up to 100% at comparable costs. This enabled manufacturers to boost PC performance tremendously without sacrificing their bottom line.

2001

- AMD drives the development and widespread adoption of its HyperTransport™ technology, which allows computers to run faster and more efficiently. HyperTransport adopters include Sun Microsystems, Agilent, Apple Computer, Broadcom, Cisco Systems, IBM, nVidia and Texas Instruments.
- With the launch of the AMD Athlon XP microprocessor, AMD introduces processor model numbers that help consumers better understand overall PC application performance (Megahertz (MHz) is no longer valid as an accurate measure of PC performance due to the vastly different architectures, technologies and applications).
- AMD Athlon XP microprocessor features QuantiSpeed™ architecture, a design created to help ensure superior application performance.
- Intel's proprietary 64-bit Itanium microprocessor launches three years late and at a cost of nearly \$2 billion. The technology is regarded as expensive, incompatible with x86-based hardware and software, and is generally rejected by the marketplace. The industry nicknames Itanium "The Itanic."

2002

- AMD's Athlon XP family debuts Cool'n'Quiet™ technology, an on-chip power management solution for compact desktop PCs. Cool'n'Quiet effectively lowers the power consumption and enables a quieter-running system while delivering performance on demand to help maximize the computing experience.

2003

- The launch of the AMD Opteron™ and AMD Athlon™ 64 microprocessors changes the future of the computer industry by extending x86 to 64 bits with the AMD64 architecture – featuring simultaneous 32- and 64-bit computing.
- Intel denies any plan to develop similar x86-based 64 bit technology.
 - Intel president and CEO-elect Paul Otellini says that Intel may not produce a 64-bit desktop chip until 2008 or 2009 (*CNET News.com*, Feb. 20, 2003)
 - Intel CEO Craig Barrett says, "We have no plans at this stage for a 64-bit address extension like the AMD device for the desktop." (*Reuters*, Sept. 25, 2003)
- AMD introduces the industry's first processor with an integrated memory controller, which "feeds" data from memory to the processor faster and more efficiently for improved performance over competing designs.
- AMD delivers Direct Connect Architecture, which directly connects processors, memory controllers and input/output (I/O) functions, reducing bottlenecks and increasing performance.

AMD Extends Innovation Leadership

2004

- AMD Athlon 64 processor named *Microprocessor Report's* "Desktop PC Chip of the Year."
- More than 40 percent of *Forbes* Global 100 companies or their affiliates use AMD64 processor-based systems to run critical enterprise applications.
- AMD enjoys the support of more than 2,000 AMD64 technology partners including Microsoft, Sun, IBM, HP, Cray, SuSe Linux and Fujitsu Siemens. Three of the top four enterprise computing manufacturers worldwide offer AMD64 solutions: Sun, HP and IBM.
- Intel changes course, follows AMD's lead into x86-based 64-bit computing with the announcement of a compatible microprocessor solution based on the AMD's 64-bit technology. The decision is viewed as a death blow to Intel's proprietary 64-bit Itanium microprocessor.
- Itanium co-development partner HP announces that it is discontinuing its line of Itanium-based workstations.
- *Microprocessor Report* analyst Tim Halfhill reports that Intel developed its 64-bit extensions to the 32-bit x86 instruction set by reading AMD's documentation. "In every case, we found Intel had patterned its 64-bit x86 architecture after AMD64 in almost every detail."

- Intel follows AMD's lead by evolving microprocessor performance measurement from MHz to model numbers.
- AMD demonstrates the first x86 dual-core microprocessor.
- At the World Economic Forum Annual Meeting, AMD launches its 50x15 initiative; a commitment to deliver basic computing and Internet connectivity to 50 percent of the world's population by the year 2015. Later this year in India, AMD launches the Personal Internet Communicator (PIC), a new category of computing device created specifically for developing markets; service providers distribute PICs to consumers via low monthly subscription fees. (Suggested cost is \$185, without monitor, and \$250 with monitor).
- AMD leads industry with hardware-enabled virus protection which, when enabled by Microsoft Windows XP Service Pack 2, offers virus protection for certain types of attacks, paving the way for a more secure Microsoft Windows XP computing environment.

2005

- AMD launches Dual-Core AMD Opteron processors for servers and workstations, and also unveils the AMD Athlon 64 X2 Dual-Core processor for consumer and business users. Leading OEMs, including Sun, HP, IBM and Supermicro announce their support to offer broad portfolios of dual-core Opteron systems. AMD's dual-core Opteron processors use only a quarter of the power of comparable dual-core server chips.
- *The Wall Street Journal* says, "AMD, which once slavishly followed Intel's technology directions, was first to champion a memory technology called DDR, for double data-rate, that is now widely used. Its first Opteron systems, delivered two years ago, were the first x86 chips to crunch 64 bits of data at a time, which allow chips to tap into more memory than earlier 32-bit chips. Intel has followed both moves." (Apr. 21, 2005)
- *BusinessWeek* says, "AMD's approach will let server makers switch from their current single-core chips without paying additional costs for new motherboard and chipsets. That could tip the balance for spendthrift businesses." (Apr. 19, 2005)
- Morgan Stanley analyst Mark Edelstone writes "We currently believe that AMD has a lead in dual core processors and advantages in integration and power dissipation over Intel." (Feb. 9, 2005)
- Insight 64 principal analyst Nathan Brookwood says, "Prior to the 2003 launch of the AMD Opteron and AMD Athlon 64 processors, some industry observers questioned whether it was logical or possible to develop an ecosystem around a 64-bit architecture compatible with the 32-bit x86 industry standard. Two years and more than 1,000 software packages later, the industry has embraced 64-bit computing based on AMD64 technology and it's now obvious those earlier doubts were ill-founded. With AMD64 technology's innovative Direct Connect Architecture, the company has clearly established itself as a technological powerhouse and a formidable competitor." (Mar. 2, 2005)
- AMD continues its commitment to the 50x15 Initiative at the World Economic Forum Annual Meeting, announcing a partnership with MIT Media Lab chairman Nicholas Negroponte and other industry leaders to develop the world's first \$100 laptop. AMD also debuts working prototype of 2nd generation PIC device.
- *CNet News.com* says, "In the past few years, AMD has touted ideas such as 64-bit computing and faster input-output links first, putting Intel in the uncomfortable position of a follower." (Feb. 25, 2005)
- Microsoft confirms that it is canceling development of a Windows operating system for the Itanium 2 microprocessor.

© 2005 Advanced Micro Devices.

AMD, the AMD Arrow logo, AMD-K5, AMD-K6, AMD Athlon, AMD Opteron and combinations thereof, and Am386, Am486, 3DNow!, PowerNow!, QuantiSpeed, and Cool'n'Quiet are trademarks of Advanced Micro Devices. HyperTransport is a licensed trademark of the HyperTransport Technology Consortium. Other Hyper names and product names may be trademarks of their respective companies.