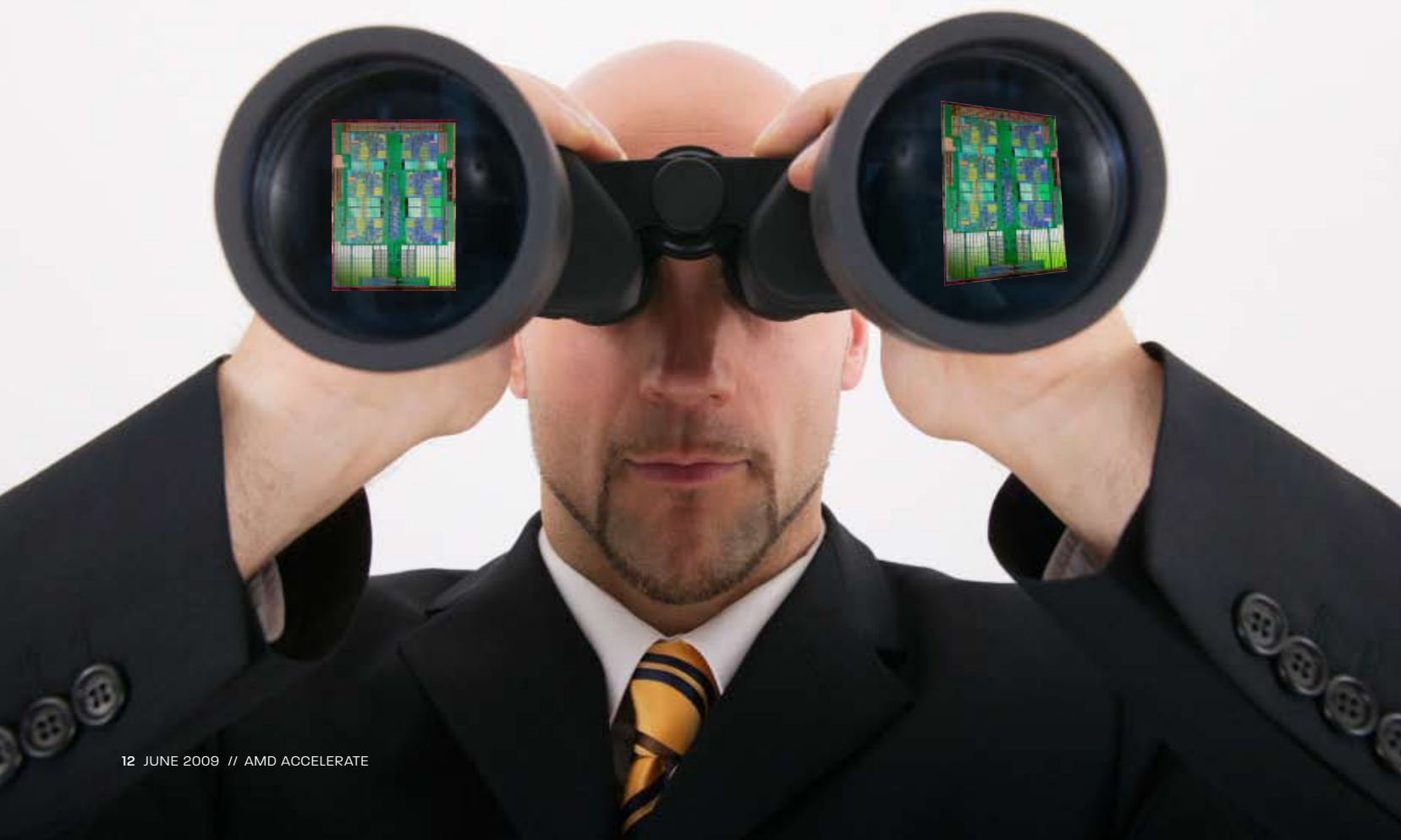


FIRST LOOK: **SIX-CORE AMD OPTERON™ PROCESSOR**

# TOP-LINE PERFORMANCE THAT'S BOTTOM- LINE EFFICIENT

The new Six-Core AMD Opteron™ processor, formerly code-named  
“Istanbul”, bridges two worlds—in technology. **BY TOM FARRE**



## IN TODAY'S TIGHT ECONOMY, IT professionals are looking to Six-Core AMD Opteron™ processor-based servers to give them the performance efficiency to handle heavy workloads with maximum value and energy savings at every price point.

Socket-compatible with a broad range of the AMD Opteron™ processor offerings, from Rev F (which began shipping in 2006) through the processor models formerly code-named “Shanghai,” the new Six-Core AMD Opteron processors (formerly code-named “Istanbul”) continue the tradition of delivering substantial performance gains over previous AMD Opteron processor models within the same power and thermal envelope. The Six-Core AMD Opteron processor launched on June 1, 2009.

The “Istanbul” processor was released ahead of schedule, according to John Fruehe,

2008 and was also ahead of schedule.

“With strong OEM and channel support expected at the launch of the processors code-named “Istanbul,” in part enabled by the processor’s stable platform infrastructure, IT executives should have a wide range of 12-, 24- and 48-core servers to choose from that offer exceptional performance-per-watt capabilities along with higher value than that of competitive products,” says Ron Myers, senior product marketing manager at AMD.

“The new Six-Core AMD Opteron processors deliver superior value through a bal-

anced envelope as previous AMD Opteron processor models and leverage AMD’s Direct Connect Architecture. Says Myers, “This means that users get more from the same trusted infrastructure and shorter time to benefit. It’s about protecting our customers’ investments.”

The “Istanbul” processors are expected to deliver performance that’s as much as 30 percent better than that of the current generation in 2P and 4P servers, according to AMD, and even more in certain memory- and bandwidth-intensive applications, thanks to HT Assist, a new feature for reducing the latency of bringing in a new cache line and for raising the effective bandwidth of the CPUs (see sidebar on page 14). These enhancements—combined with continued improvements to AMD-V™ hardware-assisted virtualization technologies and the AMD-P suite of industry-leading power management technologies—should appeal to enterprises and midsize firms running virtualization, Web servers, database management, e-mail and file/print servers—as well as large cloud computing clusters, frequency-intensive high-performance computing and integrated business systems.

### ISTANBUL IN TWO WORLDS

“As a city, Istanbul is the only one that sits on two continents (Asia and Europe),” says Fruehe.

As a processor, “Istanbul” also bridges

**“I THINK DROP-IN UPGRADES ARE A WONDERFUL THING FOR A SERVER OR DATA CENTER ADMINISTRATOR. IF YOU OWN A COMPATIBLE SERVER, IT MAKES SENSE TO EVALUATE THAT KIND OF UPGRADE.”**

— SCOTT WASSON,  
EDITOR AND FOUNDER  
THE TECH REPORT

director of business development for server/workstation products at AMD, and it is “everything we had hoped for, and more.” Its predecessor, the 45-nanometer Quad-Core AMD Opteron (formerly code-named “Shanghai”) was released in November

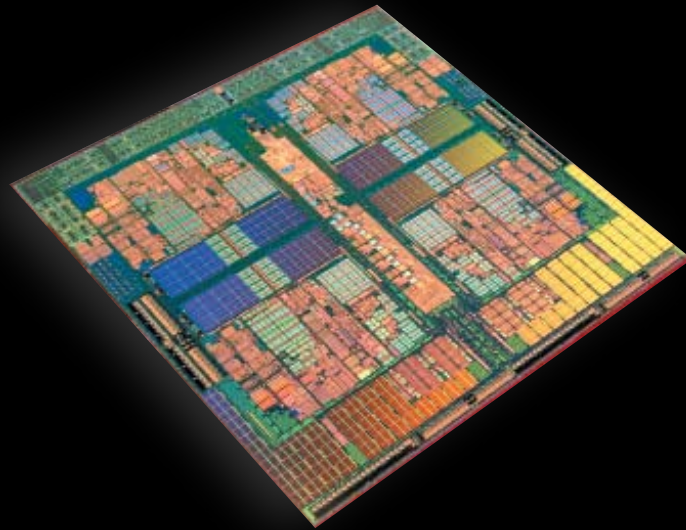
of performance, energy efficiency and lower ownership costs,” continues Myers. Even with the addition of more cores per processor and other performance enhancements, the processors code-named “Shanghai” operate within the same energy-effi-

two worlds: (1) the socket-F infrastructure that has been a foundation of AMD processors since 2006 and (2) the next generation of AMD Opteron™ processors, expected in the first quarter of 2010, which will boast more cores, twice the number of memory channels and higher interconnect speeds than ever before.

Just as the city of Istanbul combines aspects of both continents into one whole, the Six-Core AMD Opteron processor combines the best of certain tried-and-true technologies with futuristic innovation. This approach is typical of AMD's outlook on technology transitions: Take what works, and innovate upon it. As an example, "Istanbul"-processor-powered servers continue to support low-power DDR-2 memory, considered the current sweet spot in terms of performance and price, rather than the more power-hungry (and often more expensive) DDR-3 memory. AMD plans to support DDR-3 memory in a new processor line next year, when its price and power consumption are expected to come down. "If you are struggling to make the most of your IT budget," says Fruehe, "expensive memory, which can represent up to 50 percent of the cost of a server, is not a good idea."

This balanced approach extends to the server platform itself, with "Istanbul" processors offering backward compatibility across previous processor generations. "AMD's platform is built on longevity, not churn," says Fruehe. With IT staffs being cut back and resources stretched, platform stability can have a comparatively high value, because having to set up new platforms and server images to take advantage of processor improvements may be expensive and difficult to justify in today's economy.

In contrast to this potentially expensive procedure, AMD's stable platform can allow for easy transition to "Istanbul"-powered servers, which can translate into enhanced performance while still maintaining the same platforms and images as those of today's "Shanghai"-based systems. This can enable IT staff to quickly qualify and deploy these servers. Service spares don't have to change; IT teams don't have to be trained on new systems; and managing the new "Istanbul" systems will be similar to managing "Shanghai" systems, with many of the same drivers and management interfaces. According



## THE BEST OF "SHANGHAI" AND MORE

According to John Fruehe, director of business development for server/workstation products at AMD, a hot topic of conversation at a recent demonstration of 2P and 4P servers powered by the new Six-Core AMD Opteron™ processors code-named "Istanbul" was that the "Istanbul" processors share the "same DNA" as the Quad-Core AMD Opteron processors, formerly code-named "Shanghai."

Good point. The "Istanbul" processors share many of the great features of their "Shanghai" brethren: leading-edge 45-nanometer fabrication that helps improve speed and energy efficiency; 6 MB of L3 cache memory, which can be shared by all the cores; support for faster DDR2 800-MHz memory for enhanced bandwidth and energy efficiency; and higher clock speeds in the same electrical and thermal envelope. But "shared DNA" is not the entire story. The "Istanbul" processors improve upon the "Shanghai" processors in the following ways:

- **More cores.** "Istanbul" integrates six cores in the same processor, with each core having its own L1 and L2 caches and the shared L3 cache. The result can be better performance and performance per watt for multithreaded environments such as virtualization and database and Web serving.
- **HyperTransport 3.0.** The increased interconnect rate of HyperTransport 3.0 delivers speeds up to 19.2 GB/s at 4.8 GT/s. This can improve system bandwidth between processors and I/O, especially in 4P and 8P servers.
- **HT Assist.** New in "Istanbul" processors, HT Assist helps reduce memory-access latency and cache-probe traffic in multi-socket systems by storing a "directory" in the L3 cache. This, in turn, helps reduce unnecessary coherency synchronization requests between the cores and can lead to faster queries and enhanced performance for cache-sensitive applications such as database, virtualization and compute-intensive applications.

to Fruehe, users will gain the benefits of change without much of the extra baggage.

### A VIRTUALIZATION WORKHORSE

In addition, "Istanbul" processors should be able to benefit companies of all sizes that

are leveraging virtualization for consolidation, hosted client computing environments and disaster recovery/business continuity. Because of the platform stability from generation to generation, live migration of virtual machines is possible for servers pow-

## TECHNOLOGIES FOR SAVING ENERGY



With improved performance in the same electrical and thermal envelope as the previous generation, the Six-Core AMD Opteron™ processors code-named “Istanbul” deliver exceptional energy efficiency with the AMD-P suite of power management features. In addition, AMD leads the industry in giving software developers and IT administrators tools that allow granular management of a server’s energy consumption. In “Istanbul” these include the following:

AMD-P suite of efficiency features:

- **AMD PowerNow!™ Technology** with Independent Dynamic Core Technology enables processors and cores to dynamically operate at lower power and lower frequencies, depending on usage.
- **AMD CoolCore™ Technology** can reduce processor energy consumption, by dynamically turning off sections of a processor when inactive.
- **Dual Dynamic Power Management™**, also commonly known as “split plane” technology, allows for independent voltage control between the cores and the memory controller.
- **AMD Smart Fetch Technology** can reduce power consumption by allowing idle cores to write the contents of their L1 and L2 caches to the shared L3 cache and enter a “halt” state.
- **AMD PowerCap Manager** allows setting a fixed limit on a server processor’s power consumption.

Additional features of AMD Opteron processors:

- **APML Remote Power Management Interface (RPMI)**. This preview feature offers the ability to monitor and control platform power consumption via P-state limits.
- **AMD Core Select** gives users the ability to select, via the BIOS, the number of cores visible to software per CPU, a feature that can lower software licensing costs.

ered by a single-core AMD Opteron™ Rev E processor, first introduced in 2004, and for servers powered by every AMD Opteron processor introduced since then.

“Istanbul” processors also feature the continued maturation of AMD-V technology with the Rapid Virtualization Indexing (RVI) enhancement. This hardware assist to virtualization can help maximize the number of virtual machines per physical server and users and transactions per virtual machines, using software such as Windows Server® 2008 R2 Hyper-V, XenServer 4.1 from Citrix Systems and the recently announced

VMware vSphere.

The virtualization capabilities of “Istanbul” processors are already encompassed in the current versions of hypervisors from Citrix, Microsoft and VMware. This means that customers can take advantage of “Istanbul” processors without having to upgrade to the newest version of the hypervisor—often an expensive and complicated process.

“The AMD ecosystem of software partners, including Microsoft, Oracle, Sun Microsystems and VMware, illustrates strong confidence in the advanced virtualization capabilities AMD offers,” says Margaret Lewis,

director of Commercial Systems at AMD. “Enabled in part by features such as RVI and Extended Migration, the upcoming Six-Core AMD Opteron processors provide further evidence of the flexibility of AMD-V technology for customers that are turning to virtualization as a mainstream technology for their data centers.”

### UPGRADES MADE EASY

Easy server upgrades are a noteworthy feature of the “Istanbul” processor, given its socket, electrical and thermal compatibility with the previous generations of AMD Opteron processors. Just as server manufacturers can quickly bring the new “Istanbul” processor-powered servers to market, users running servers powered by previous AMD Opteron processor models can leverage the common infrastructure. Upgrading a server that features the Quad-Core AMD Opteron (“Shanghai”) processor to feature the new “Istanbul” processors requires only swapping out the processors and updating the BIOS.

This capability was demonstrated at a recent gathering of the computer press attended by Scott Wasson, editor and founder of The Tech Report, a PC hardware review Web site. “I think drop-in upgrades are a wonderful thing for a server or data center administrator,” says Wasson. “If you own a compatible server, it makes sense to evaluate that kind of upgrade.”

To help partners and customers take advantage of such upgrades, AMD has announced a global AMD Opteron processor upgrade program. The program, which covers Dual- and Quad-Core AMD Opteron processors as well as the new “Istanbul” six-core product, offers a discount of up to 35 percent in processor prices to those who upgrade the generation of their AMD Opteron processors through participating OEMs.

Easy upgrades for IT departments, performance gains and energy efficiency from innovative technologies, and a stable platform are qualities CIOs want—especially in a challenging economy. ■

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