

## INSIGHT

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### Dell Announces x86-64 Servers to Broaden Its Push into the Enterprise with 64-Bit Applications

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#### IDC OPINION

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Throughout the economic downturn of 2001–2003, Dell Computer kept growing its server business as well as its market share in terms of both revenue and unit shipments. At the same time, it leveraged volume shipments of 32-bit x86 servers to push into enterprise applications. Now, with the introduction of its eighth generation of servers, the company is adding 64-bit-capable servers based on Intel's EM64T Xeon processors alongside the 64-bit Itanium-based server models it already sells.

IDC believes that the new x86-64 servers will enable Dell to support 64-bit high-performance computing (HPC) workloads and 64-bit database workloads alongside 32-bit applications. This provides another path for customers to move to 64-bit computing — and to do so on their own timetable.

The following effects can be expected:

- ☒ Dell will compete toe to toe with x86-64 servers (including those based on AMD Opteron and Intel EM64T Xeon processors) made by IBM, HP, Sun, and others. This competition is likely to drive down average sales prices for server hardware in this category.
- ☒ By combining support for 32-bit workloads and 64-bit workloads on a single platform, Dell will be able to take its value proposition to a wider group of enterprise-class customers than before.
- ☒ Any eventual addition of 4-way x86-64 systems to Dell's product line will allow Dell servers to move "upstream" in the enterprise by competing more heavily with traditional scalable SMP servers that have four or more processors. The largest server that Dell sells is a four-processor server.

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#### IN THIS INSIGHT

In its announcement of its eighth generation of servers, Dell introduced four 64-bit-enabled server models, all of which leverage Intel's "Nocona" x86-64 microprocessor to build dual-processor server systems that run 32-bit workloads and 64-bit workloads. The four Dell servers include two rack-optimized servers and two tower-form-factor servers that can also be installed in a rack, if customers prefer to install

them that way. This introduction marks the first in a wave of new introductions that are designed to move Dell into the x86-64 computing space, which supports 64-bit computing alongside 32-bit computing.

## SITUATION OVERVIEW

On August 2, 2004, Dell announced four dual-processor servers based on Intel's Nocona x86-64 microprocessor, a 64-bit-capable microprocessor that supports both 32-bit operating systems and 64-bit operating systems. If needed, customers can run a 64-bit operating system and 64-bit applications on the same hardware platform that also runs 32-bit operating systems and 32-bit applications. The Nocona processor, based on Intel's EM64T implementation of x86-64 architecture, competes directly with the Opteron x86-64 processor from Advanced Micro Devices (AMD), which has been shipping since the spring of 2003.

IDC notes that the announcement of these servers is the launch of the eighth generation of Dell's industry-standard servers, demonstrating Dell's repeated update of its technology to meet the requirements of the volume server marketplace, which demands a faster infusion of new technology — and thus shorter life cycles — than traditional servers based on vendor-specific technology (e.g., ASICs, RISC chips, proprietary designs). Going forward, Dell will roll EM64T technology across its entire x86 server line, a process that is expected to be completed by early 2005.

Dell announced its x86-64 servers on the same day that two of its competitors, HP and IBM, announced x86-64 servers based on Intel EM64T Xeon processors. IDC expects these announcements by the top 3 x86 server vendors to increase worldwide competition in this market space, leading to competitive prices for the x86-64 servers, as well as maintaining pricing pressure on servers based on the AMD Opteron, the Intel Itanium, and RISC processors from multiple server vendors (see Table 1 and Figure 1).

**TABLE 1**

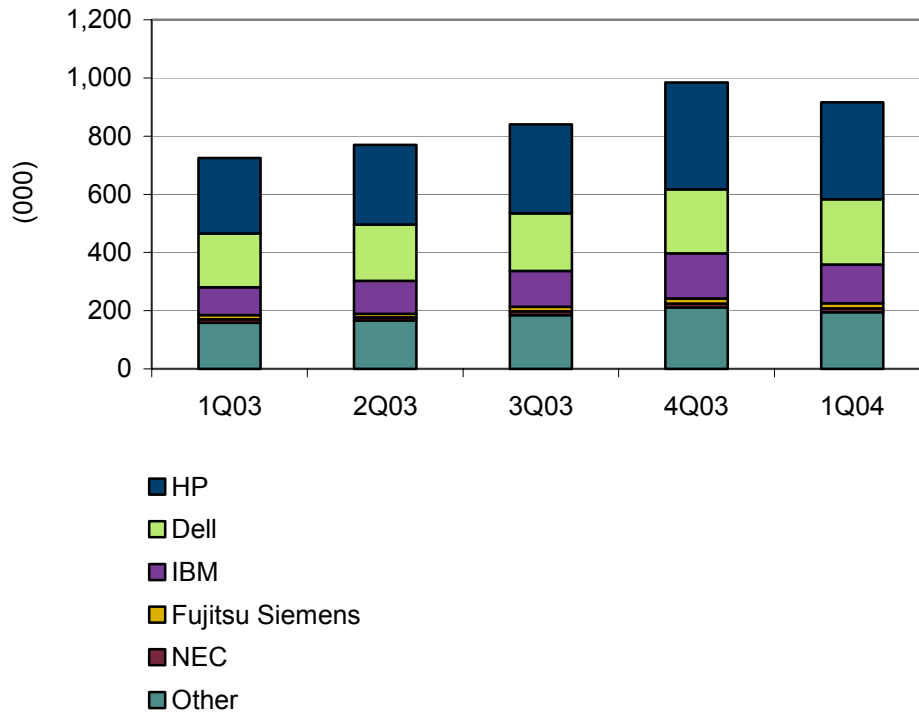
Worldwide x86 Server Shipments and Dell's Share of Shipments by CPU Capacity, 2001–2003

	2001		2002		2003	
	Total Shipments (000)	Dell's Share (%)	Total Shipments (000)	Dell's Share (%)	Total Shipments (000)	Dell's Share (%)
1 way	779.7	4.9	934.5	16.3	1,156.0	22.9
2 way	2,625.7	23.6	2,698.4	24.0	3,322.2	23.9
4 way	287.2	19.9	253.1	18.1	231.9	19.0

Source: IDC, 2004

**FIGURE 1**

Worldwide 2-Way x86 Server Shipments by Top 5 Vendor, 1Q03–1Q04



Source: IDC, 2004

The Dell announcement included the following server models:

- ☒ Dell's PowerEdge 1800 is based on dual 3.60GHz Intel Xeon microprocessors, a 1MB integrated cache, and the Intel E7520 chipset. This rackable tower model is designed for expandability. Intended for use as a departmental server, it has 400MHz DDR2 memory, PCI Express local I/O technology, six internal hard drives with up to 146GB capacity, and six additional I/O slots for PCI-X or PCI connectivity. In addition, Dell plans to outfit the 1800 with 8GB of memory, with capacity expanding to 16GB when models with special DIMMs become available.
- ☒ Dell's PowerEdge 1850, based on dual 3.60GHz Intel Xeon microprocessors with 1MB integrated cache, is a rack-dense server packaged in a 1u form factor. It is designed for performance, high availability, and manageability for tier 1 and tier 2 workloads. The 1850 includes an 800MHz front-side bus and supports up to 8GB of ECC DDR2 400MHz memory. As with all the new Dell 2P servers, memory capacity will expand to 16GB when the larger 4GB DIMMs become available. It uses the Intel 7520 chipset to support dual-channel memory and PCI Express

I/O. Onboard high-availability features include dual integrated Gigabit NICs to support fail-over and load-balancing functionality, hot-plug hard drives, standard hot-plug power supplies, and optional redundant power supplies. In addition the 1850 has optional spare-bank memory and memory-mirroring capability. There is also the option of integrated hardware RAID with 256MB of battery-backed cache.

- ☒ Dell's PowerEdge 2800 is based on dual 3.60GHz Intel Xeon microprocessors with 1MB integrated cache, is a 5u workgroup server. The 2800 is designed for scalability of applications and databases through support for additional memory and storage. The 2800 can be outfitted with as many as 10 hard drives. This model can be deployed as a standalone tower or as a rack-installed server. It supports the Intel 7520 chipset, 400MHz DDR2 memory, and three PCI Express slots. Its predecessor product is the Dell PowerEdge 2600. The PowerEdge 2800 ships with Dell OpenManage 4 systems management software, which supports an integrated IPMI 1.5 baseboard management controller designed for remote management across multiple x86 servers.
- ☒ Dell's PowerEdge 2850, based on dual 3.60GHz Intel Xeon microprocessors with 1MB integrated cache, is a 2u rack-optimized server that supports availability and expandability features. The 2850 supports up to 8GB of ECC DDR2 400MHz memory today (with 16GB support in the future, once large-capacity DIMMs become available), and it ships with an 800MHz front-side bus.

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## **IDC Analysis**

Over time, microprocessors at the heart of server systems have been getting more powerful, allowing customers to run workloads on smaller systems than was possible just a few years ago. Dell's support for the x86-64 platform is one step along this path.

In the past three years, Dell has seen its unit shipment mix shift more toward 1-way systems, which are particularly well suited for first- and second-tier workloads like Web and network infrastructure. In 2003, servers with more than four processors accounted for only 4.1% of Dell's total server shipments (down from 13% in 2001 and 8% in 2002).

The new generation of dual-processor x86-64 PowerEdge servers will allow Dell to support a wider range of workloads than was previously possible. Higher memory-addressing capability of Intel's Extended Memory 64 (EM64T) technology is intended to increase performance on memory-intensive applications such as databases and high-performance computing (HPC) applications. To take on more scalable workloads, the new servers have expanded memory, I/O, and hard drive features.

Dell is also touting its systems management feature enhancements that are designed to provide high availability for workloads and better serviceability for hardware. Improved RAS features and serviceability features are attributes that will encourage enterprise customers to deploy business-critical applications on these platforms.

### ***Common Components and Manageability***

Dell keeps its product lines simple to drive operational efficiency, which allows the company to effectively compete on price. Price-based competition has proven to be a powerful weapon in Dell's battle for market share with the larger server vendors — all of which offer a broader server product line with more point products than does Dell. In addition, Dell emphasizes price/performance and server models aimed at specific target markets as other leverage points in its competition with other vendors

Continuing that trend, one area Dell sees as differentiating value with its Nocona-based systems is in the common board and components consistency. Common BIOS/drivers minimize the number of software components customers need to track and update. With common SCSI HD carriers, Dell introduces consistency across platforms so that customers can more easily transfer data or storage drives across systems. Common components also allow customers to maintain image consistency across multiserver deployments of Dell servers.

Additionally, as a part of this launch, Dell is also expanding on remote management capabilities through new industry-standard tools. Dell has updated its server management tool to OpenManage 4, with new functionalities for managing servers and storage, and introduced IPMI 1.5 base management controller as well as an optional DRAC 4 management controller.

Finally, this announcement is the first wave of product refresh and enhancements from Dell based on the new Intel EM64T technology. With the new Nocona-based systems, Dell is not only offering customers the latest technology, but it is also staying in step with its primary competitors in the high-volume dual-processor server segment. When Intel extends the EM64T technology to its Xeon MP processors, we expect that Dell, as well as other x86 server vendors, such as HP and IBM, will offer 4-way servers based on the x86-64 platform. This will likely continue the price competition in the x86-64 space — taking it to larger servers running more demanding enterprise workloads — and this will benefit IT managers and end users.

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### **Competitive Analysis**

Dell made its August 2 announcement on the same day as two of its primary competitors, HP and IBM. All three server vendors are top contenders in the x86 server space worldwide, and all three support Linux and Windows on their current x86 server platforms (refer back to Figure 1).

The emergence of competing products on this platform brought with it an "open systems" dynamic, in that all of the major vendors — including Dell, HP, IBM, Fujitsu, and a wide range of smaller vendors worldwide — can be expected to compete directly on the basis of price, performance, and price/performance. They are facing the same competitive pressures, and this forces them to update their offerings frequently. Customers always benefit from this kind of dynamic in the marketplace because it drives competitive pricing and the addition of new features and functions over time.

As HP, IBM, and other vendors have fielded multiple Nocona-based servers, the competition in the Nocona-based server space is expected to be intense from the start, keeping entry prices low and benefiting customers, IDC believes. HP introduced the DL360 and DL380 rack-dense servers, as well as the ML350 and ML370 expandable servers (outfitted with additional memory, storage, and I/O) and the BL20p two-processor server blade.

IBM introduced a total of six Nocona-based servers, all in the xSeries line, including uniprocessor and dual-processor models, and a blade server based on Nocona that will fit into the IBM BladeCenter chassis. IBM named these servers the x206, x226, x236, x306 and x336, and x346 servers. Many more server vendors can be expected to join in as the entire Intel Xeon ecosystem starts to move to 64-capability through EM64T over time, building on the DP launch and adding an MP Xeon microprocessor code-named Potomac next year.

Given the number of server vendors supporting Nocona, IDC believes that Intel's entry into the x86-64 platform space will drive volume for these 64-bit-enabled x86-64 systems over time, applying pricing pressure on other x86-64 systems that are based on Opteron by means of volume economics. This increased volume can also be expected to change the pricing model for Itanium-based servers and RISC-based servers, which will increasingly compete on the basis of price with the x86-64 server models.

On another level, competition with the servers based on the AMD Opteron, which was originally introduced in the spring of 2003, can be expected to continue now that servers based on Intel Xeon x86-64 implementations are coming onto the market (with shipments starting in the summer of 2004). The x86-64 architecture, in both the Intel and AMD implementations, allows customers to bring 32-bit ISV applications and custom applications forward onto the new platform while adding new 64-bit applications and workloads. Further, IDC notes that some features of Opteron, including its support for HyperTransport I/O links and its fast processor-to-memory and processor-to-I/O links, can prove compelling to some customer segments, especially those running HPC scientific/technical workloads. Accordingly, the two x86-64 processor implementations, from Intel and from AMD, will likely compete very closely in customer evaluation cycles and buying cycles for some workload types.

Finally, it remains to be seen what impact Nocona-based servers will have on the overall volume server market. One hypothesis is that Nocona could kick off a server price war as the vendors bitterly fight for an early advantage in the volume server market. Increasingly, system vendors are turning to server add-ons as a way to make money in the volume server space. The server-based solutions add revenue from other components of the technology stack — systems software, middleware, system management software, and attached storage — and from large service contracts.

Dell intends to focus on its price competition with other vendors, because it views its presence in the market as tapping existing "profit pools" to draw more business to its competitively priced offerings. However, IDC notes that enterprise customers are likely to take a variety of factors into consideration when acquiring x86-64 servers. Enterprise customers are not driven by price alone. It is often the case that they may agree to pay more for some additional, perceived benefit in buying from a longtime

vendor under long-term services contracts that cover other kinds of equipment and software. Further, as noted above, many vendors will compete directly with Dell and will also place volume servers in IT sites as replacement systems for older servers.

## FUTURE OUTLOOK

Looking forward, IDC expects the x86-64 platform to become more widespread, extending throughout the x86 ecosystem over time as both Intel and AMD expand their x86-64 microprocessor offerings. The initial release of x86-64 Nocona processors will be followed by the release of an "MP" microprocessor in the fall and the release of more 64-bit-enabled x86-64 processors from both AMD and Intel in 2005.

The introduction of Dell's eighth-generation servers will give it the opportunity to:

- ☒ Gain a wider audience within the enterprise computing community than it had before
- ☒ Begin to compete more effectively with scalable RISC-based SMP servers that have four or more processors, because Dell will gain 64-bit capability that it did not have before. However, IDC notes that Dell's competitors will also have the opportunity to ship multiple Nocona-based servers in scale-out clusters as well as in larger SMP instances to replace older RISC-based SMP servers.

The additional memory and storage that is supported on x86-64 servers, compared with its 32-bit x86 servers, open the door for the migration of enterprise workloads that require mission-critical support, 64-bit memory addressability, and larger memory footprints. Initially HPC applications look to be the real sweet spot for these systems.

Other 64-bit workloads that could benefit from the new wave of x86-64 servers coming onto the market include multimedia/graphics workloads that rely on large datasets, such as digital content creation (DCC) and database. In addition, the ability to run 32-bit workloads or 64-bit workloads on the same x86-64 platform will give IT managers greater flexibility in deploying — at a pace that is convenient for the users.

IDC will be monitoring the x86-64 market space closely, including all vendors that are active in this market space, and will publish other studies about server developments and new server model announcements in the x86-64 space as the year progresses.

## LEARN MORE

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### Related Research

- ☒ *Intel Announces x86 Architecture with 64-Bit Extensions: A Bridge Between the 32-Bit and 64-Bit Computing Worlds* (IDC #31175, April 2004)
- ☒ *Worldwide Blade Server 2004–2008 Forecast and 2003 Vendor Shares* (IDC #31044, April 2004)

- ☒ *Worldwide and U.S. Server 2004–2008 Forecast* (IDC #31053, April 2004)
- ☒ *2003 Worldwide Server Market Review* (IDC #30813, February 2004)
- ☒ *AMD Launches Opteron Processor for Servers and Workstations* (IDC #29290, April 2003)

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