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Change of Pace -- Big Bet Behind Intel Comeback: In Chips, Speed Isn't Everything; Semiconductor Giant Focuses On Products That Power Today's Wireless Gadgets; A Longer Life for Laptops

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Abstract (Article Summary)

Meanwhile, Intel's rivals are pushing hard. AMD in September introduced new desktop chips that are more powerful than Intel's by some measures, a blow to Intel's image as technology leader. Sun Microsystems Inc. is adopting a version of those chips in its server computers, as part of a technology partnership that could help AMD gain a stronger foothold in the corporate-computing market.

Centrino also gives Intel more leverage with the computer makers that actually buy its chips. In the past, it offered the manufacturers marketing subsidies if they put the "Intel Inside" logo on their machines. Now, Intel only provides the subsidies if computer makers use the three components of Centrino -- the Pentium M, the related chip sets and Wi-Fi chips. It marks the first time that Intel has tied marketing subsidies to chips other than microprocessors.

Intel's strategies go beyond portable computers. Power-saving features such as those on the Pentium M, for example, could help reduce electrical bills for companies that buy hundreds of servers that use Intel chips. "We are as obsessed now about power consumption as we are about performance," says Sean Maloney, an Intel executive vice president and general manager of its communications group.

Full Text (2132 words)

SANTA CLARA, Calif. -- Intel Corp. is the king of microprocessors, the semiconductors known as the brains of computers. Since the 1980s, the Silicon Valley giant has stayed ahead with a simple mantra: make its chips faster and faster.

But 2 1/2 years ago, Intel made a risky decision to abandon that narrow focus. Speed was becoming less important to personal-computer users, who mostly used the machines to surf the Web and run a few simple programs. So, in a shift that transformed its culture, Intel pushed its engineers to pursue an entirely different goal: Build chips that fit the new ways people actually use their computers.

That bet is beginning to pay off, helping Intel become one of the biggest winners to emerge from the long tech slump. In the new world of digital wireless gadgets, computer users care about other things besides speed -- such as long battery life and small size. Intel has reorganized the company to deliver chips that offer just that.

Intel recently reported its highest third-quarter revenue growth since 1996, amid a broad comeback in personal-computer sales. Net income more than doubled from the same period last year, and profit margins are approaching the record levels set during the tech boom. The company posted all-time sales records in most product categories, in a quarter that is not usually its strongest. Its stock has more than doubled this year to about $32.

Intel got a big boost from one of the first fruits of its new strategy: the Pentium M, a specially designed microprocessor for laptop computers. It's no speed demon, but it gobbles a lot less power than typical chips, giving portable computers a couple extra hours of battery life, and its small size makes it inexpensive to manufacture. Aided by the new product, Intel's gross profit on chips for notebook systems is about 75% of sales, 10 points higher than its margins on desktop PCs, estimates UBS Securities analyst Thomas Thornhill.

Intel is whipping up demand with a huge advertising blitz for a combination of chips called Centrino, which includes the Pentium M plus wireless networking and other accessory chips. The line's strong sales are expected to help Intel's gross margin -- profits before operating expenses -- to swell to 60% in the current quarter, up from 51% in the second quarter and near all-time peaks.

One sign of the new approach: Intel this year boosted the speed of its desktop microprocessors just once, compared with six times last year. Yet Intel has gained market share against chief rival Advanced Micro Devices Inc. More Centrino-style product bundles are on the way, which Intel hopes will make it even harder for rivals to keep pace.

"We are not playing the same game we played for 15 years," says Paul Otellini, Intel's president and chief operating officer, and the favorite to succeed Chief Executive Craig Barrett.

The results are all the more striking because of the doubts swirling around Intel as recently as a year ago. Mr. Barrett had sank more than $10 billion into acquisitions in an attempt to lessen Intel's reliance on the PC business, with little to show for it.

"I don't know of anything that we purchased that was worth what we paid for it," says Andy Bryant, Intel's chief financial officer. Its newer Itanium products, aimed at the largest computers, have won technical acclaim but few customers. And its cellphone and communications-chip units continue to lose money.

Meanwhile, Intel's rivals are pushing hard. AMD in September introduced new desktop chips that are more powerful than Intel's by some measures, a blow to Intel's image as technology leader. Sun Microsystems Inc. is adopting a version of those chips in its server computers, as part of a technology partnership that could help AMD gain a stronger foothold in the corporate-computing market.

In rethinking how it made and sold chips, Intel had to change the rules, because the old rules no longer worked. The focus on speed dated from an era when faster chips were needed regularly just to keep up with ever-more-complex software. By the late 1990s, however, most PC users no longer needed the hottest new chip for basic office tasks and surfing the Web. That meant they could hang on to their desktop machines for years, keeping down demand for Intel chips.

Intel's definition of performance was also a problem. Though many factors influence computing power, Intel pushed "clock speed," the operating frequency of a chip measured in megahertz or gigahertz. But raising clock speeds increases how much power a chip uses and how much heat it generates. This made the chips unattractive in many devices, particularly the smallest laptops, where power-hungry chips meant short battery life.

The trend away from sheer processing power was disguised for a while by frenetic spending by corporations on new computers around the Internet and the Year 2000 computer bug. But the trend hit full force in 2001, when Intel's revenue fell 21%, the first decline in 15 years.

Still, Intel engineers remained fixated on speed. Moreover, the teams designing new microprocessors and other chips worked largely independently of each other and of computer makers. "We did great for years just creating technology and throwing it over the fence to let people use it," Mr. Barrett says.

Mr. Otellini pushed for change. The 29-year veteran is the first top Intel executive who was not schooled as an engineer. Instead, the economics major rose through sales and marketing posts before running the microprocessor

business. He lobbied for a new approach based on what users really need rather than technical possibilities.

The first step was organizational. In early 2001, Mr. Otellini pushed through a new planning process that forced the business units to begin working together.

The result: Intel managers now start by assessing what users need in computers and other products. Then, they conceive "platforms" of multiple chips, not just microprocessors, to meet those needs. Instead of a one-size-fits-all approach, Intel now designs chips for four distinct markets: home computers; desktop and server computers for businesses; mobile gadgets, including laptops and cellular phones; and network-infrastructure devices such as routers and switches.

The first test of the new approach was a microprocessor for laptops. In the spring of 2001, engineers from Intel's office in Haifa, Israel, assembled in a conference room in Santa Clara to pitch top management on a radically new approach. Instead of taking a desktop microprocessor and modifying it for portables, the Israeli team wanted to start from scratch to make a chip that was less of a drain on a laptop's batteries.

Mr. Otellini interrupted their presentation and strode to a white board. He drew intersecting horizontal and vertical lines representing what users looked for in a laptop. Consumers had begun to favor smaller laptops, for example, which require fewer and smaller chips. Users wanted batteries to last longer than the two hours that was typical. And they wanted to use laptops to communicate wirelessly, which also saps batteries.

The exercise proved to Mr. Otellini and the engineers that they were right to start from scratch. Simply lowering the voltage consumed by a desktop chip, as Intel had done in the past, would never reduce power consumption enough. And the engineers needed to consider how other chips inside a computer, such as those that store information or manage graphics, use power.

Mr. Otellini's mandate thrust the Israeli design team into unfamiliar territory. Instead of exploiting the highest clock speeds possible, they had to try to improve computing performance while staying within a limit on clock speed.

Intel's earlier chips saved power by periodically turning off parts of the chip that weren't needed. On the new microprocessor, all features were turned off by default unless explicitly activated. Engineers rejected features that could have improved performance, because they would have reduced battery life. "This was the crazy trade-off all the time," recalls Mooly Eden, a vice president at the mobile platforms group in Haifa.

The limitations were hard to swallow for some Intel engineers, whose egos were closely tied to the speed rating on their chips. Suddenly, some of their ideas were turned down. "These turned out to be very long and very emotional arguments," Mr. Eden recalls. "Somebody would blame you for stopping innovation . . . . Some of these architects still look at me as persona non grata."

Using e-mail, weekly conference calls and in-person visits, Mr. Eden's team worked closely with separate teams in Israel and California designing auxiliary products called chip sets that work with the new microprocessor in novel ways to help conserve power. Later, the Haifa team also collaborated with Intel engineers in San Diego, who worked on chips to allow laptops to communicate using Wi- Fi. That technology allows users to tap into the Internet wirelessly in cafes, airports, homes and offices.

In March, Intel unveiled the results. The Pentium M used less than one-third the power of earlier chips. In tests, it performed calculations more quickly than many existing microprocessors with higher clock speeds. It was also about two-thirds their size, making it less costly to manufacture.

Yet the new chip commands a higher price: a 1.7 gigahertz Pentium M is roughly equivalent in performance to earlier portable chips operating at 2.4 gigahertz, but Intel gets $182 more for it.

Intel can demand higher prices in part because of its marketing muscle. In the 1990s, the company became the first chip maker to market itself directly to the public, making "Intel Inside" a powerful selling point for computers -- and boosting Intel's sales in the process.

(MORE)

To sell customers on its new approach to chips, Intel created a new brand -- Centrino -- and made it the centerpiece of a $300 million marketing campaign, visible on billboards, taxicabs, magazine pages, TV spots and cafe doors. The TV commercials don't dwell on speed or processing power; one typical spot shows people in airports using Wi- Fi to catch up on e-mail while waiting for flights.

Centrino also gives Intel more leverage with the computer makers that actually buy its chips. In the past, it offered the manufacturers marketing subsidies if they put the "Intel Inside" logo on their machines. Now, Intel only provides the subsidies if computer makers use the three components of Centrino -- the Pentium M, the related chip sets and Wi-Fi chips. It marks the first time that Intel has tied marketing subsidies to chips other than microprocessors.

Some computer makers privately objected to buying all the components from Intel, partly because Intel's Wi-Fi chips lagged behind rivals in some features. They still don't use the complete Centrino combination for all of their notebooks.

But the campaign is working. Shipments of the Pentium M nearly doubled between the second and third quarter, with more than half sold in Centrino combinations. John Lau, an analyst with Bank of America Securities, estimates that the Centrino subsidy costs Intel about $15 per machine, a fraction of the extra revenue generated from higher prices on the Pentium M.

"It's a beautiful [economic] model," says Jen-Hsun Huang, chief executive of Nvidia Corp., a maker of graphics chips that both collaborates and competes with Intel. "It's hard to do unless you have such strong power" in the marketplace.

Intel's strategies go beyond portable computers. Power-saving features such as those on the Pentium M, for example, could help reduce electrical bills for companies that buy hundreds of servers that use Intel chips. "We are as obsessed now about power consumption as we are about performance," says Sean Maloney, an Intel executive vice president and general manager of its communications group.

Intel also is looking for other places to use Centrino-style chip combinations, says Mr. Otellini. For example, Intel may incorporate Wi-Fi and data-compression technology into chips for PCs and other home gadgets, to make it easier to beam digitized music, photos and videos to stereos and televisions.

Intel has other big weapons. The massive factories that a year ago looked like costly mistakes are close to ready, just as PC demand is rebounding. Early next year, Intel will start churning out chips with transistors that are just 90 nanometers across -- about one-thousandth the width of a human hair -- while most rivals are still gearing up 130-nanometer production. The new technology will turn out chips that are faster, less expensive and use less power.

The new Intel factories -- in Oregon, New Mexico and Ireland -- will also use larger silicon wafers, cutting the cost of producing each chip by 25% to 30%. Mr. Bryant, the chief financial officer, says matching the output of one of the new $3 billion factories would take three factories using today's standard wafers, at a cost of $6 billion. Rivals have been slow to match Intel's upfront investments.