

# British Chip Designer Prepares for Wider Demand

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CAMBRIDGE, England — Near the southeastern edge of Cambridge, where this idyllic university town gives way to fields of green, sits the headquarters of [ARM Holdings](#). Neither the modest three-building campus nor its surroundings evoke notions of a thriving hotbed of computing.

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An ARM chip, and its cousins, may soon be embedded in things beyond nearly every cellphone.

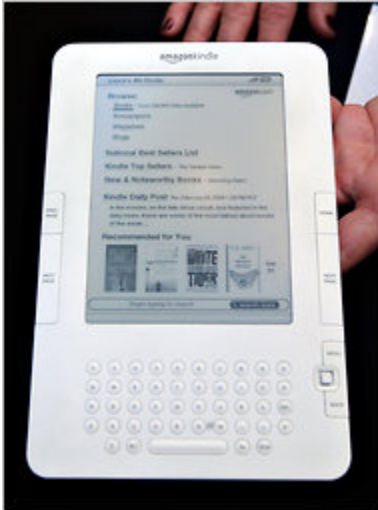
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Heidi Schumann for The New York Times

Warren East is chief of ARM Holdings, the quiet licensor of ubiquitous chips.

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Amazon's Kindle 2 e-reader also uses ARM chips.

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Henrik Kettunen/Bloomberg News

The Nokia N900 handset uses ARM chips.

But ARM, which designs the low-power chips that go into just about every cellphone sold today, commands a prime position when it comes to one of the next major technological revolutions. This is the so-called Internet of Things, when all sorts of everyday objects will have tiny chips placed inside them and gain the ability to process information and talk to the Web.

In this post-PC era, some analysts say, [Intel](#)'s familiar jingle — bummmm, bum, bum, bum, bum — will fade as the central soundtrack of computing. Instead, people will hear nothing, or rather the understated silence that has accompanied ARM's rise as one of the most important technology companies.

ARM bases its business on licensing chip designs to companies like [Apple](#), Samsung and [Qualcomm](#), which often tweak them to suit their needs. In addition to cellphones, a host of other devices these days run on ARM chips, including TVs from [Sony](#), the [Kindle](#) from [Amazon](#) and products as varied as hotel door locks, printers, slot machines and cars.

“Our customers sell about 4 billion chips a year,” said Warren East, the chief executive of ARM, during a recent interview.

Investors appear enthralled by ARM's business. Over the last year, the company's shares have nearly tripled, to a close on Friday of \$18.34, from a low of \$6.52. Rumors have swirled that Apple may acquire ARM, though such a move seems unlikely given ARM's broad partnership model.

"I laughed about it with the folks at Apple," Mr. East said. "It is completely nonsensical."

The number of ARM chips produced a year, which go into many different products, dwarfs the hundreds of millions of chips sold by Intel, the world's largest chip maker in terms of revenue. Inevitably, analysts often portray the companies as mortal enemies, dueling for dominance in the chip market. ARM executives play down such a dramatic story line in their typical, low-key fashion.

"People want there to be this David and Goliath struggle between us and Intel," Mr. East said. "It just isn't that way."

Mr. East and other ARM executives point to the difference in the companies' business models. Intel designs and manufactures its own PC and computer server products, commanding about \$50 to \$1,000 for each chip. ARM chips, by contrast, are made by a handful of contract chip manufacturers and cost 65 cents to \$20 each. ARM earns pennies or fractions of a penny off each chip through its licensing deals.

Last year, ARM's revenue came in at \$490 million, while Intel posted revenue of \$35 billion. Still, Mr. East pointed out, the total value of chips sold by ARM's licensees just about matched those of Intel.

"We don't look like Intel," he said. "We're never going to be a \$100 billion outfit."

Yet ARM just unveiled new chip designs that could carry its products into servers and networking equipment — Intel's turf. And Intel, seeing a future dominated by the smaller, cheaper chips that are ARM's stock in trade, and has started a forceful move into smartphones, TVs and consumer electronics through new lines of low-power chips.

"Even conservative estimates predict billions of devices coming online soon," said Bill Kircos, an Intel spokesman. "That's a great opportunity for all of us in the chip business."

Mr. Kircos maintained that Intel's manufacturing strengths would allow it to produce lower-power, cheaper chips at regular intervals, resulting in plenty of competition for ARM and its partners. Intel has partnerships with companies like [Nokia](#), [BMW](#) and [Google](#) as it looks to expand into new devices.

ARM executives agree that the future is with the billions of coming things — cars, refrigerators, TVs, clothes, buildings — that will have full-blown chips or at least Web-ready sensors inside them.

In many cases, they say, these things will need the lowest-power chips possible because they will be out in the world and away from a plug. Energy has replaced horsepower as the prime concern, and it is here, ARM executives said, that the company's skills will really shine.

“We evolved under these low-power pressures,” said Krisztian Flautner, a vice president of research at ARM. “It set us on a different evolutionary path.”

Since its inception in 1990, ARM has nurtured a low-power religion.

The company was spun out of the failing British PC maker Acorn Computers and stumbled upon Apple, which was in the process of making its Newton hand-held device, as an early customer and investor.

“Apple and the Newton made the company exist,” said Mike Muller, one of the founders of ARM and its chief technology officer. “The Newton never went anywhere, but it got ARM started and gave us some credibility.”

Dealing with hand-held devices and cellphones forced ARM to operate under severe power restrictions. It chased milliwatts, while Intel chased horsepower.

ARM’s low-power chips are echoed in its laidback culture. Mr. Muller recalled an early meeting in a Cambridge pub where the company’s first employees plotted ARM’s future. The engineers were asked to raise their hands if they wanted to become executives.

“A few hands went up,” Mr. Muller said. “You’re the new vice president of marketing, you’re the new head of sales and so on. We didn’t really have any experience in these areas.”

These traditions continue at the company where workers amble about the offices in jeans and casual shirts. The only signs of self-congratulation are a couple of rows of empty Champagne bottles stacked on some shelves, after being drained to celebrate the arrival of a new licensee.

Intel is a very different sort of company, doing just about everything on its own. It commands the highest profits in the business and has built a reputation as a fierce competitor. The company spends billions of dollars a year to keep its chip manufacturing plants ahead of rivals and has long demonstrated a penchant for making fast, big chips. Antitrust charges have followed the company as well, and it paid close to \$3 billion in fines and settlements over the last two years to deal with such concerns.

ARM has used cheap licenses as a means of attracting new business and depends on partners for its survival.

“We’ve always known Cambridge is not the center of the universe,” Mr. Muller said. “If you’re in Silicon Valley, you might make that mistake.”

The company offers choice to customers through various types of licenses. A customer can take ARM’s basic design at face value or choose a license that allows it to create custom products. In a blow to its longtime partner Intel, [Microsoft](#) recently acquired one of the those custom licenses, signaling that it too may go so far as to build its own ARM chip for phones and other devices.

“We’re encouraging specialists to do what they’re good at,” Mr. Muller said.

When talking about the company, Mr. East, the chief executive, deals in ARM’s trademark brand of hyperbolic humility. Company executives generally resist boasting, even as ARM chips command a monopoly in growth areas like smartphones.

Mr. East, for example, described ARM's offices as "a pretty boring place where engineers sit behind workstations." Yet when talking about the Internet of Things, Mr. Flautner and other ARM executives are anything but laid-back as they argue that Intel stands as an unwanted guest in the new world. Intel and Microsoft secure the vast majority of profits available in computers and servers, they say, leaving the likes of [Hewlett-Packard](#), [Dell](#) and Acer to fight over a few dollars per machine. Consumers electronics companies and others fail to see the merits in a repeat performance.

"Who cares about the PC?" Mr. Flautner said. "I would love to lose mine. Now, it's all about penetrating these weird markets that we can't even fully fathom yet."

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