Fake batteries blow up in the industry's face

By Rick Merritt
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San Francisco — The disturbing image of exploding cell phones and incendiary notebook computers is sending shivers down the spines of consumer electronics OEMs and the chip makers that serve them. Rising reports of incidents in which counterfeit batteries have overheated, caught fire or blown up are dogging a portable-systems industry caught between the slow pace of battery technology and the quick step of new features at ever-lower costs.

A handful of chip makers are building security schemes into their next-generation power ICs to help stem a problem that could, manufacturers fear, undermine consumer confidence and affect sales, or possibly even lead to regulatory action. "You could shut down a whole freaking industry here," said Dave Heacock, vice president of portable power management for Texas Instruments Inc. (Dallas).

TI and chip makers Maxim Integrated Products Inc. (Sunnyvale, Calif.) and Microchip Technology Inc. (Chandler, Ariz.) are building strong authentication into their battery charger or battery management ICs to prevent their use in phony battery packs.

No one knows the full scope of the battery piracy problem, but in late June the U.S. Consumer Product Safety

Commission (CPSC) put out its first recall of counterfeits — about 50,000 Verizon Wireless cell phones with fake LG Electronics batteries (see www.cpsc.gov/CPSCPUB/PREREL/prhtml04/04559.html). Verizon received 18 reports of injuries or property damage from the batteries, including a teenager who had a phone explode in his pocket and a woman who had a car accident when her handset blew up.

The only other U.S. cell phone battery recall this year was of 140,000 legitimate batteries made in China by Coslight International Group of Hong Kong for the Kyocera 7135 smart phone. Kyocera had four battery failure reports on the product, including one "minor burn" (see www.cpsc.gov/CPSCPUB/PREREL/prhtml04/04068.html).

"No one has accurate data on this because the companies are not willing to talk about it," said Brian Barnett, managing director of Tiax LLC, a battery consulting firm. "But when you ask people in the industry, they generally say they are seeing more incidents, and it's a concern."

As chairman of an advisory board for the Portable Power Conference here last week, Barnett tried unsuccessfully to get people to speak on some of the safety issues. "It's extremely hard to get people to talk about this topic," he said.

Indeed, the reported battery failures are "the tip of the iceberg," said Stuart Lipoff, a battery consultant with IP Action Partners (Newton, Mass.). "Most of the cases are under gag orders or settle out of court."

Persistent problems

Today's mainstream lithium-ion batteries went through years of development and testing to ensure the volatile lithium they contain was safe in notebook computers, PDAs and cell phones. Nevertheless, failures and recalls continue to nag the portable sector and are on the rise in handsets.

Stung by several reports of catastrophic battery failures late last year, Nokia pointed a finger at counterfeit batteries and put up information on its Web site to help consumers identify fake

battery packs (see www.nokia.com/nokia/0,,49192,00.html). More than 5 million counterfeit batteries were seized and destroyed worldwide last year, Nokia said in a statement.

"The cell phone problem is a growing one," said a spokesman for the CPSC in Washington. That individual said the government agency has had an ongoing investigation into counterfeit batteries for "a few months."

Simple product defects account for many of the failures. Industry watchers also point to competitive pressures to add new features, yet make systems smaller and cheaper. Lately, new low-cost battery sources — particularly in China — are taking a share of the blame, as with the recalled Kyocera batteries.

Nor is the problem confined to cell phones. "The computer industry ships 47 million notebooks a year, and the problems are in the parts per million," said John Wozniak, a power-management specialist in Hewlett-Packard Co.'s notebook group. But Tom Hildner, a technology strategist on power issues in IBM Corp.'s PC group, said he thought the problem was less widespread in notebooks than in cell phones, where users more frequently change batteries.

Battery counterfeiters are most prevalent in South America, South Africa and India, said Heacock of TI. Companies disassemble large battery packs into their component cells to make several smaller packs out of them, selling at retail or over the Web. "The next thing you know these cells are going into places they were never designed for," Heacock said.

However, Heacock also leveled blame at OEMs that, without testing, strip out of their designs "a simple temperature sensor that costs less than 10 cents but would trigger a safe mode to stop charging, turn on a power amplifier and take steps to make sure you have no catastrophic failures — all in the relentless pursuit of lower costs."

Indeed, even top-tier companies are not above taking a step backward in battery technology to cut costs. Wozniak of HP said that Dell Computer now sells its Inspirion notebook with an optional nickel-metal-hydride battery to hit a lower price point. HP is testing a similar option it may offer before the end of the year, he said.

The NiMH battery offers about 15 to 20 percent less capacity, but also costs about 20 percent less than the lithium-ion model. "It's about $8 a pack less," said Wozniak.

End users can be just as parsimonious when it comes to paying for battery technology. For instance, they didn't start buying batteries with the latest 2.4-amp-hour densities until the packs came down to price parity with previous-generation packs. "These cells have been around for more than a year, and we still have on hand half of what we originally bought," said Wozniak.

Chip makers are taking separate roads to tackle the counterfeiting problem, but all the routes promise negligible cost increases.

"For the most part they are using simple challenge/response mechanisms with something like 64-bit encryption," said Wozniak of HP. "Sony is doing something in its own batteries. Maxim has a whole road map of chips for this, and Microchip will handle it in software in its next-generation fuel-gauge ICs."

Chips are already making their way to market, he said. "There are chips becoming available for notebooks. There's been a lot of activity since these incidents with handhelds."

Generally the software approaches are the lowest in cost but easiest to compromise, and the hardware approaches more costly but tougher to crack. "They all work OK, but you have to weigh the costs against the level of security you want," said Hildner of IBM. "We would like to see an industry standard if this is something everyone is going to do, but we also want to differentiate ourselves in this area, and I can see potential for that."

TI hopes to tap into that desire for customization with a "rolling key" approach it will implement in hardware and software across a range of products using both one- and two-wire buses.

"We've made it flexible enough that each OEM can have their own secret sauce with some control over how they roll it out," said Heacock. "You won't even see the costs in a notebook computer, but in an entry-level cell phone it might costs 30 cents."

The Dallas Semiconductor division of Maxim is already sampling its 2703, a new device that uses the SHA-1 hashing algorithm to authenticate, over a single wire, a key on a battery pack of any portable system. The chip, which will cost 35 cents and be in production by the end of the year, is the first of a line of planned products in this area.

"We have customers making digital cameras, cell phones and notebooks who want to use this. It's a hot topic today," said Gene Armstrong, an executive director who oversees battery and thermal-management products for the company. "When Nokia has phones blowing up on people and blaming it on counterfeit batteries, it gets people's attention."

Nokia Takes Aim at Unsafe, Low-Quality Counterfeit Batteries

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At an audio conference hosted in Espoo today, Nokia outlined its battle plan in the company's ongoing war against unsafe, low-quality counterfeit products. Tens of thousands of counterfeit products have been seized in recent raids in Belgium, the United Kingdom, and other countries in the EU, bringing the total global number of seized and destroyed products in 2003 to more than 5 million. As a result of these raids, authorities gained valuable leads on a counterfeit network, enabling them to begin immediate actions against those involved.

"I want to stress that consumer safety is our top concern," said Janne Jormalainen, Vice President, Mobile Enhancements, Nokia Mobile Phones. "We believe consumers are unknowingly being fooled into buying unsafe, low-quality batteries and we are actively taking measures to combat the illegal counterfeit operation at the root of this problem."

Counterfeit batteries have also misled consumer groups. Yesterday, Test-Aankoop, a Belgian consumer group, acknowledged their recent test results which led them to announce Nokia batteries were unsafe were "most probably unreliable" due to the inclusion of counterfeit batteries in their test sample. Test-Aankoop has agreed to a new, independent test of batteries - using only Nokia original batteries - and will provide the results of these tests as soon as possible.

Today's conference included illustrations on how consumers can recognize the most obvious examples of counterfeit batteries. These examples will be posted on the nokia.com website. Nokia also announced plans to unveil "aggressive, regional anti-counterfeit measures."

In response to the program, Mr. Jormalainen commented: "We are dealing with a very sophisticated enemy who has become very adept at manufacturing products, which to the average consumer appear to be Nokia original accessories. To avoid giving counterfeiters a head start on our anti-counterfeiting measures, we are purposely withholding information until such time as the program has been officially announced."

About Nokia

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