

Akamai Strives For a Safer, Speedier Net

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It was dark and eerily quiet here Monday in the network command center of Akamai Technologies Inc., an unusual company whose mission of easing Internet traffic jams gives it a clear view of what's happening on the Internet.

Co-founder Tom Leighton, an applied mathematics professor at the nearby Massachusetts Institute of Technology, was pacing in front of large wall monitors displaying revolving globes and blinking charts - - graphics that do for the Internet what heart monitors do for humans. A single red spike in an illuminated graph suggested a major Internet traffic carrier had dropped a batch of communications, but otherwise there were no hints of data disasters.

"This is all normal," he declared. "In fact, it looks unusually good right now."

Such was not the case the morning of June 15, when the Internet's heartbeat skipped a few mega-beats and a Priority 1 alert popped up on Akamai's wall display, sending the few humans present scurrying to telephone federal authorities and alert Akamai's customers to the fact that something was amiss.

In the June 15 incident, unidentified attackers (who still have not been caught) used vulnerabilities in the Internet's address system to interrupt traffic to Yahoo, Google, Microsoft and other large customers of Akamai's traffic management services. Leighton declined to specify what was unusual about the method -- "We don't want copycats" -- except to say it was aimed at the system for looking up Internet domain names.

"That was a very sophisticated attack; the nature of it was novel," Leighton recalled.

Akamai worked with federal authorities to shut down the zombie "botnets," or virus-infected computers, that had been unwittingly used to launch the attack, then designed ways to thwart repeats.

There was enormous irony in the fact that hackers had succeeded, at least for a few hours, in sharply slowing traffic to and from big Web sites that had hired Akamai to speed up their traffic and make it more reliable.

While Akamai is hardly a household name, it handles about 15 percent of all Internet traffic, and it helps serve the Web sites of more than 1,000 government and commercial customers, including most major news and search sites, FedEx, Apple Computer, the FBI, Defense Department and the Homeland Security Department. Akamai also handled Web video streaming this summer for the Olympics, Major League Baseball and both presidential nominating conventions.

Akamai has built a private data network of 14,000 computer servers stationed in 70 countries that sits on top of the public Internet and routes data by special formulas that seek to find the least crowded pathways. It's kind of like having a talking computer on your car dashboard tell you not to go down 16th Street into Washington this afternoon because an accident has caused a two-mile backup.

On Monday, its computers were processing 802,166 "hits" per second, or requests for individual Web page elements. The company tries to speed up those requests by storing copies of popular

Web content in multiple locations so they can be sent shorter distances. The firm offers other services, too, including protecting particular Internet addresses so hackers cannot use various ruses to siphon away Web traffic.

Many experts found the June 15 attack, followed a month later by other Internet infrastructure attacks, particularly worrisome because it suggested that hackers were learning how to sneak around the Internet's few defenders.

"It's scary as hell," Leighton said. "The challenge for us is to stay ahead of the attackers."

That is no trivial task, judging by the increasingly pessimistic reports on cyber-security. The latest Internet Security Threat Report issued by Symantec Corp. found a sharp increase -- about 400 percent -- in the number of hacker attacks on electronic commerce sites during the first half of this year.

No wonder Leighton said he believes the Internet is "totally, totally insecure," a "chaotic situation" in dire need of fixing: "The question is, what are we going to do about it?"

For him the question is not rhetorical. In addition to serving as chief scientist at six-year-old Akamai and teaching at MIT, Leighton chairs the cyber-security subcommittee of the President's Information Technology Advisory Committee, which is holding a public hearing on the topic next month.

Leighton said more funding is needed to research Internet security, and the subcommittee may recommend more federal grants for such research. He believes the fixes include technically achievable tweaks to the Internet address system, but that the decentralized, public nature of the decades-old computer network makes such changes tough.

The wiry math whiz has been tackling Internet technology challenges since 1995, when a fellow professor down the hall at MIT told him he was worried that the Internet's open architecture could lead to crippling traffic problems unless someone did something. That professor was Tim Berners-Lee, inventor of the World Wide Web. Leighton headed the prestigious algorithms group in MIT's computer science department at the time and accepted the challenge.

"This was a great chance for the people in my group to work on something that was real," he recalled. "As mathematicians, 90 percent of what we do is way out there."

With help from graduate students, he researched ways to minimize Internet traffic congestion, leading to several student theses, including one by Daniel Lewin proposing new mathematical formulas for routing data.

Lewin's original work might have stayed in a dusty library were it not for what Leighton called a "fluke conversation" in which a business student suggested Lewin enter the annual \$50,000 entrepreneur contest at MIT's Sloan School of Management to help repay his college debts. After Leighton and Lewin lost the contest in 1998, they did more research and built a prototype that attracted venture capital. Within a year they had created an unprofitable company, named it after the Hawaiian word for "intelligent" and staged a splashy public stock offering.

Lewin was killed three years later when terrorists flew American Flight 11 into the World Trade Center. Akamai, meanwhile, took a wild ride up and down in market valuation before finally turning profitable in the first two quarters this year. Today it employs nearly 600 and earns about \$200 million in annual revenue.

Akamai likes to say it optimizes the Web. While it has made impressive contributions, let's hope Akamai and its clever co-founder don't stop dreaming up new ways to make the Web a smarter, safer place.

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