

Computer hacking and security costs

About once in 10 tries, a person can break into a typical computer system connected to a telephone network. All that person needs is a telephone link to a computer communications system like the commercial TELENET system.

By selecting an area code, then sequentially trying code numbers and listening for a recognizable signal, a "hacker," as these invaders are called, can identify a computer brand's characteristic signal. Manuals for that machine list standard passwords installed when the system was shipped from the factory. Sometimes these passwords are still applicable. Once the hacker gets into the system, he or she can discover other passwords or codes that allow access to, for instance, privileged accounts or sensitive data.

Although such unauthorized invasions of computer systems have been going on for more than a decade, new attention is focusing on computer security. In particular, fears concerning computer vulnerability have been fanned by the wide publicity given to a young group of Milwaukee hackers, the 414s (named for the city's telephone area code), who dialed into bank, laboratory and hospital computers "for fun," and by the movie "WarGames," which portrayed a high school student's accidental entry into a military computer system. Last week, the topic was a major concern in New York at the annual conference of the Association for Computing Machinery (ACM) and the subject of Senate hearings in Washington, D.C.

At the ACM meeting, Kenneth L. Thompson, a computer programmer at AT&T Bell Laboratories in Murray Hill, N.J., acknowledged that the acts of groups like the 414s have caused "extreme consternation" within the computer industry. He blamed the media for overstating the danger and glorifying the hackers.

"What they [the media] have done is to cause legislation to start popping up in state legislatures and [Congress] to stamp out this 'horrible' problem," Thompson said. This legislation would impose heavy criminal penalties for unauthorized access to computers. In Thompson's view, this is an unnecessarily harsh response to acts more like "computer joy-riding." The answer is to teach the youngsters "that what they are doing is nothing short of vandalism," Thompson said, "and that the whole activity should be viewed simply as very similar to breaking into someone else's house — even if you don't steal anything, even if the door is unlocked."

David H. Brandin, ACM president, however, said, "People that operate unprotected computer systems are guilty, too — of contributory negligence. . . . We need to raise their consciousness also."

But for most institutions, businesses

and government agencies, now heavily committed to computer use, new security problems keep cropping up (SN: 7/3/83, p. 12). Generally, the intrusions of hackers are a much less serious concern than the increasing number of people gaining access to computers where they work. Leslie D. Ball of Babson College in Babson Park, Mass., noted, for example, that an enormous number of workstations — which may be as simple as a portable keyboard with a liquid-crystal display — are now connected to large central computers or to other workstations.

"The 'trusted group' was once a small number of people within an organization who required access to the system or components of the system," Ball said. "Now that trusted group is so large, its membership can only be estimated." One panelist commented that the only way one company could find out how many personal computers, many with access to a network or the main computer, were in use was to count up the number of insurance claims after a fire caused damage to the offices.

Ball added, "This expanded, trusted group does not have the security awareness . . . [that] long-time employees at the central site have." Thus, seemingly routine security problems like losing data-carrying computer diskettes, writing over data that are not permanently stored elsewhere and leaving workstations turned on although they are not in use are widespread.

Media coverage of computer crimes seems to have alerted senior management in many companies to the substantial risks involved in failing to take reasonable precautions to protect a computer system from abuse. Lawyer Susan H. Nycum of Palo Alto, Calif., reported, "Many companies that had previously considered that their security measures were adequate are now asking me to perform updates to the security reviews and resulting security plans that they or we performed in the past."

However, despite current concerns, sales of security technology like encryption devices have not increased substantially, if at all. In many cases, although a wide variety of security measures are available, they are expensive to implement and frequently interfere with the convenience that authorized computer users expect. For example, passwords should be changed often, but not so often that people will forget them easily and need to write them down (creating a new security problem) or so seldom that passwords become generally known within an office. The correct balance is difficult to hit.

One security analyst commented, "We have a real problem here. The only thing you can do is to make [unauthorized access] more difficult. You can never make it impossible." It becomes question of how much a company is willing to pay — in inconvenience and in dollars. —I. Peterson

Bypass surgery not always necessary

A man suffering from heart disease and scheduled for open heart surgery asked his physician last week whether his bypass operation was one of the "unnecessary ones." His surgeon replied, "Certainly not."

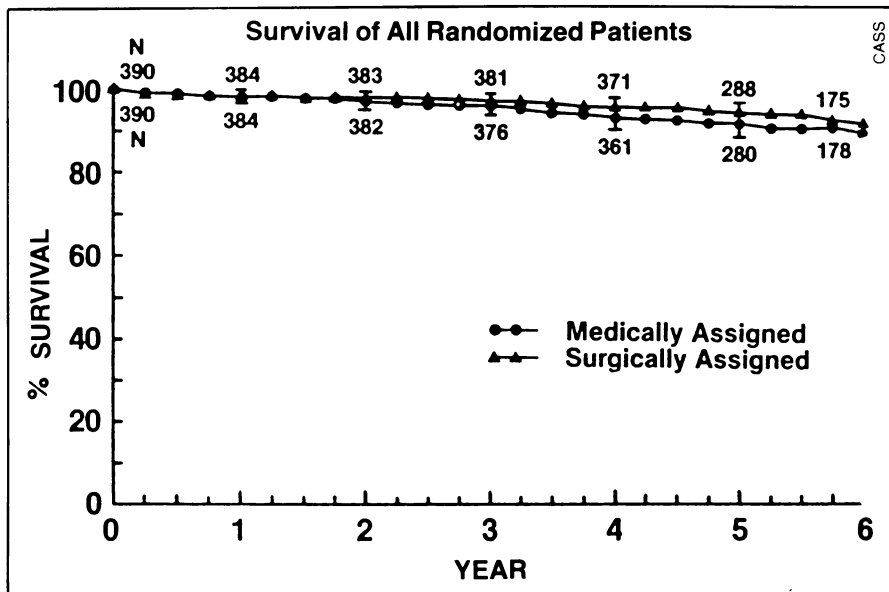
The patient asked the question, according to his surgeon, Henry Spotnitz of the Columbia Presbyterian Medical Complex in New York, because he had heard about the Coronary Artery Surgery Study (CASS), which the National Institutes of Health released last week. The study concludes that for patients with mild to moderate coronary artery disease, like those in the study, there are no significant survival differences between those who receive medical treatment and those who undergo surgery. For these mild to moderately diseased patients, surgery can be safely delayed until symptoms worsen, according to the study. Altogether, patients in this category accounted for 25,000 of last year's 170,000 bypass operations, which cost \$10,000-\$25,000 each.

In the 15-center, five-year study, 390 patients initially were treated medically and 390 had bypass surgery. The patients in the study either had mild to moderate chest pain, with or without a history of heart attack, or had no chest pain but a history of heart attack. The average age of the patients studied was 51; 90 percent were male, and 60 percent reported having had a prior heart attack. After five years, 95 percent of the surgically assigned patients and 92 percent of the medically assigned ones were alive.

The study also concludes that the "quality of life" was better in the surgically treated patients. The director of the CASS steering committee, Thomas Killip of Detroit's Henry Ford Hospital, said, "As expected, surgical patients in the study have enjoyed great relief from angina [chest pain] during follow-up. They were also able to exercise longer and took fewer drugs than the medical group. However, there is no difference between the two groups in recreational activity or return to work. There are more hospitalizations in the surgical patients."

The study was designed for learning more about the patients with mild symptoms where the need for bypass surgery is unclear and *not* for the patients with more severe symptoms. Eugene Passamani, associate director for cardiology at the National Institutes of Health in Bethesda, Md., said, "Coronary artery bypass surgery is clearly indicated in patients with 60 percent or greater narrowing of the left main coronary artery and in patients whose symptoms impose unacceptable limitations. In these two categories, surgery increases both the quantity and quality of life."

As for whether these results will have



any impact on medical practice, at least one physician thinks they won't. Cardiologist Bernadine Healy Bulkley, director of the coronary care unit and professor of medicine at the Johns Hopkins Medical Institutions in Baltimore, Md.,

said, "In many institutions it won't change what happens. For instance, here we never operate upon patients like these [in the study]. I'd say more than 50 percent of cardiologists do not recommend surgery for these patients." — J. C. Amatniek

Around and around with planetary rings

Even Galileo, with his primitive telescope at the beginning of the 17th century, could see the strange shapes flanking the disk of Saturn, though it would be nearly 50 years before they were concluded to represent a ring. The dark, narrow rings of Uranus eluded discovery until 1977, when their presence was revealed by their blockage of a star's light. It took a close-up look by Voyager 1 in 1979 to show Jupiter's rarified ring, which appeared as a thin streak in a single one of the spacecraft's thousands of photos.

Additional data, and improved ways to analyze them, have since revealed some of the complex and exotic details of these ringed worlds, but the questions still vastly outnumber the answers. At the recent annual meeting of the American Astronomical Society's Division for Planetary Sciences in Ithaca, N.Y., for example, it was clear that new surprises continue to abound.

Jupiter's ring has been taken to be a thin disk, far less substantive than the Saturnian ring system, possibly extending all the way in to the Jovian cloud tops from a bright outer edge. Now, however, Joseph H. Burns and Mark R. Showalter of Cornell University in Ithaca, together with Jeffrey N. Cuzzi and James B. Pollack of the NASA Ames Research Center in Mountain View, Calif., have proposed that it is not a disk at all but a doughnut-shaped torus, perhaps 10,000 kilometers thick at its maximum and about 15,000 km in radial width, with a thin, bright ring around it. The doughnut's thickness, the researchers hypothesize, is due to the fact that small particles would

be perturbed out of the ring's equatorial plane by Jupiter's tilted magnetic field. Voyager 2, which took most of the photos, was looking down at the ring from only 2° out of the horizontal, says Burns, so the line of sight through the bulging doughnut's near and far sides made it appear like a continuous disk.

There is also a gossamer-thin disk-like portion, however, the authors report, based on special processing of a few of the photos. But it is outside, not inside, the bright band, and appears to extend about 4,000 km to the orbit of the satellite Amalthea, which probably defines the ring's periphery.

Saturn's rings, too, appear to have a "gossamer" portion, filling the region between the outer edge of the wide A-ring and the narrow F-ring beyond it (whose "braided" appearance in some Voyager 1 photos is still a mystery).

Another unresolved issue in the study of Saturn's rings is the search for several tiny "moonlets" that have been hypothesized to account for some of the circumferential gaps in the ring system. Cuzzi and others combed photos of one such gap, called the Cassini division, between the A- and B-rings, for "embedded" moonlets that might have been keeping it open, but found none down to their resolution limit of about 5 km diameter. Along the edges of the A-ring's Encke division, however, Cuzzi and colleagues have now found regions with a wavy, scalloped appearance which Cuzzi says is just what would be produced by the gravitational effects of moonlets. Unfortunately, although the Voyager

photos show enough scalloped regions to suggest the presence of three or more moonlets about 20 km across, the presumed moonlets are all just off-camera in any photos sharp enough to show them.

One of Saturn's major ring mysteries is the strange, "spoke-like" features shown by the Voyagers to be forming radially across the rings (mostly the B-ring), each disappearing after a few hours' existence. Possibly formed by electrostatically charged particles levitated out of the ring plane, they have seemed to start distorting almost as soon as they appear, as particles at different radial distances from Saturn move at different orbital velocities by the established laws of Keplerian motion. Yet now, Bradford Smith and colleagues from the University of Arizona in Tucson have identified a spoke or two that seem to avoid Keplerian laws at first, growing radially while rotating with Saturn's magnetic field. Perhaps, he suggests, whatever charges the particles in the first place (a localized plasma cloud?) keeps them charged enough to remain under the magnetic field's influence for a while, until the weakening charge lets Kepler enter the fray. The best example, he says, held out for about two hours.

And Voyager 2 is on its way to Uranus.

— J. Eberhart



J. M. Cuzzi et al.

Voyager photo shows a scalloped edge along the inside of the Encke division in Saturn's rings, possibly due to waves caused by gravitational effects of an otherwise undetected "moonlet" (which would be out of photo to the left) in the gap. The waves would be propagating along perhaps 20° to 40° of longitude "downstream" from the little moon, while other waves propagate upstream along the gap's outer edge. To make the scallops more visible, the photo has been computer-processed to exaggerate their amplitude about 10-fold, as well as to straighten out the gap's (and the rings') normal curvature. The distribution of scalloped areas suggests that there may be three more such moonlets in the gap, though the moonlets' proposed locations, frustratingly, seem not to have been photographed at high enough resolution to reveal them.