



**AMERICAN TELEPHONE MILESTONES**

- 1876 - Telephone invented by Alexander Graham Bell
- 1889 - First public pay phone
- 1905 - First outdoor phone booth
- 1915 - Transcontinental service begins
- 1919 - First dial exchange installed
- 1925 - Commercial transmission of photographs by telephone
- 1927 - First transatlantic call
- 1935 - First round-the-world call, New York to New York
- 1947 - Transistor invented at Bell Laboratories
- 1951 - Direct long-distance dialing introduced
- 1957 - Laser invented at Bell Laboratories
- 1962 - First telecommunications satellite, Telstar
- 1963 - Touch-Tone service introduced
- 1965 - Electronic central office begins service
- 1977 - First commercial fiber-optic cable
- 1982 - AT&T digital switch begins operation

SOURCE: AT&T

**DATA SPEED**

With analog signals, the equivalent of 8 pages can be sent over phone lines in one minute.  
With a digital signal, about 400 pages can be sent in a minute.

**TECHNOLOGY**

**Ring In the Age of Super Phones**

*Computer power makes systems faster, adds more features*

**By Simson L. Garfinkel**  
Staff writer of The Christian Science Monitor

BOSTON

TELEPHONE customers in Hudson County, N.J., have a powerful service at their fingertips. They can trace calls, block unwanted calls, or learn a caller's number before picking up the receiver.

"As soon as you hang up from a call that you want traced, you have to immediately press the access code, \*57, and then that call is traced," explains Barbara Walcoff, a spokeswoman for New Jersey Bell.

A permanent record of traced calls, complete with the number of the caller, is then made at a telephone company office and given to police for investigation.

Call Trace, Call Block, and Caller ID are just three of a plethora of

new features and services that regional telephone companies in the US plan to offer within the next decade, all made possible by the computerization of telephone system.

In addition, businesses will be able to connect their computers directly to the telephone system and transmit information at much faster speeds.

Digital-based services are scheduled to be offered soon to customers in New York, all of New England, California, and parts of Florida.

For most telephone companies, the non-digital switches are the way of the past.

"[E]verything we are installing now is digital," says Jerry Johnson, New England Telephone's managing director of network planning in Boston.

In New Jersey, 40 percent of the telephone company's customers can take advantage of these services today, says Ms. Walcoff, a number that is expected to increase to 70 percent by the year's end.

While only 37,000 customers in New Jersey have subscribed to at least one of the new telephone ser-

**Telephone Services Made Possible By Digital Switching Technology**

These advanced services are available to an increasing percentage of business and residential telephone subscribers. Administrative and privacy concerns, however, have held up "switching on" the service even in some areas wired for it.

**CALL TRACE**

Subscribers hit "star"-57, a code to put a trace on the most recent call.

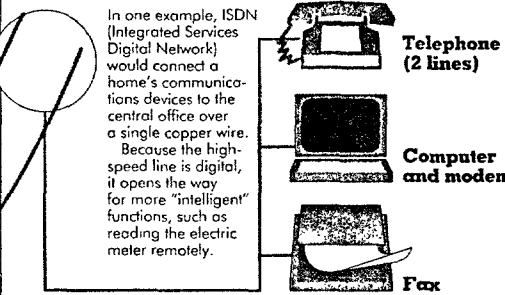
**CALL BLOCK**

Another "star" code blocks any more calls from the last number that called.

**CALLER ID**

With an \$80 phone attachment, a subscriber sees the number of an incoming call displayed on a screen.

**TELECOMMUNICATIONS IN THE HOME**



vices, says Walcoff, some features such as Call Trace can be used without prearrangement.

Already, the number of obscene and crank phone calls are down nearly 50 percent in Hudson County. "It has had a chilling effect on people who may have thought about making crank phone calls," says Mr. Johnson. "People know that their calls can be identified, so many would-be harassing phone callers are afraid to make those calls now."

In the six-month period ending April 30, the phone company received only 236 requests to trace telephone calls, representing a 49 percent decline from the same six-month period two years earlier, according to a phone company's June 1989 report to the Board of Public Utilities.

In 1988, an independent New Jersey study found that more than half of all telephone subscribers receive annoying or threatening telephone calls, whether or not they have unpublished telephone numbers.

Some citizens' groups, however, have questioned the deployment of the new technologies, saying they invade the privacy of people making telephone calls, by revealing their number. Oftentimes, says Colleen O'Connor, director of public education for the American Civil Liberties Union in New York, there are legitimate

reasons to keep such numbers secret:

"An example might be if a woman is calling her kids from a battered-woman shelter, and calls her home, and her husband is able to find out where she is," says Ms. O'Connor.

At recent hearings before the Public Utility Commission in Harrisburg, Pa., operators of confidential hot lines said that people in need of help might not call if they suspected that their telephone numbers might be displayed on the hot line's telephone number.

"I think that it is the end of unlisted numbers as we know it," says Bob Smith, editor of the Privacy Journal. But, he says, "in a way it enhances privacy by probably putting an end to anonymous harassing phone calls."

**B**ECAUSE of the as-yet unresolved privacy concerns, some regional telephone companies have decided not to offer caller identification features as part of their new service offering.

"[W]e are still examining the issues surrounding that, and it is not part of the first deployment," says Ann Sizopoulos, a spokeswoman for Ameritech Services, which serves states in the northern Midwest.

Businesses in the US are beginning to make use of the ability to

automatically identify the number of a caller as part of a more sophisticated computerized service called Integrated Services Digital Network (ISDN), now in limited use but likely to expand.

"If you call an 800 number to order something from a catalog, or inquire about your credit card balance, or if you happen to subscribe to certain computer databases, it is quite possible that the company that you are calling subscribes to ISDN . . . and is using the capability to capture the number that you are calling from," says Daisy Ottman, a media relations manager at AT&T in N.J.

A company that sells products through local representatives can use a customer's telephone number to automatically direct the caller to the nearest dealer in their area, says Ms. Ottman.

Credit-card companies can use a customer's telephone number to automatically display his or her customer history on a computer screen when the operator answers the telephone call.

Companies can also preserve a caller's telephone number in a computer's memory bank and use it for telephone solicitation, cautions Mr. Smith. The number can be recorded even if the telephone call is left unanswered.

Demand for ISDN has been "remarkable," says Ottman.

"The service became available on July 4 of 1988." Today, she says, "we have more than 300 customers who have either implemented the service or are in line for implementing the service."

But ISDN's real advantage is speed. A 100-page contract, which might take 28 minutes to transmit with a conventional fax system, can be sent in less than 30 seconds using ISDN.

ISDN uses the same pair of copper wires that run from the telephone company's central office to the home or office, but with ISDN the wires become a high-speed interface directly into the telephone company's computers. Down the wire passes a digital stream of 1's and 0's, which must be decoded by special ISDN telephones back into speech with a process that resembles the way music is played off a digital compact disc.

"The analog network is like a dirt road. The digital network is like a super highway," says Nick Morley, a Boston-based writer who covers ISDN for trade journals.

ISDN service is available in only a few cities, although trials and private ISDN exchanges are being set up nationwide.

In March, the Lockheed Missiles & Space Co. in Sunnyvale, Calif., used an ISDN system to transmit phone conversations,

JOHN VAN PELT STAFF



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video for security cameras, as well as allowing desktop computers to access information stored on mainframes at opposite ends of the plant.

Within the next two years, students at the University of Michigan in Ann Arbor will be able to use ISDN to connect their home computers with the school's high-speed computer network, says Dory Leifer, a research programmer at the university.

**I**TRULY believe that the small businesses and residential [offices] will benefit the most [from ISDN]," says Richard Lush, director of ISDN marketing at Codex, which manufactures telecommunications systems. Mr. Lush says ISDN gives the small-scale telecommunications user "the things that a large company has," such as access to high-speed, digital networks, without expensive equipment costs.

"That's not to say that the big industrial people aren't going to benefit," he adds.

Telephone analysts expect ISDN to cost no more than twice as much as conventional telephone service. The special ISDN telephones cost \$500 or more, but prices are expected to drop as popularity increases.

Nevertheless, the digital features must still be turned on, which is often delayed as much by regulatory factors as by the technology, according to Joe Gustafson, director for ISDN product development at NYNEX.

"It's unfortunate that it's not available to the residence market," says Ron Hoffman, a communications specialist at the Massachusetts Institute of Technology in Cambridge.

Hoffman says he is looking forward to the day he can connect his computer at home to his computer at MIT at ISDN-speeds.

Although MIT installed an ISDN telephone system in 1988, New England Telephone does not plan to offer residential ISDN service until 1991.

One of the last steps in computerizing the telephone system will be to replace the copper wire itself with glass, fiber-optic cables. These super-thin cables can carry a thousand times as much information.

Fiber optics are already used for the majority of long-distance telephone calls in the United States.

In some cities, fiber connects major office buildings directly to telephone company switches.

Experimental trials presently taking place around the country are examining the feasibility of pulling the glass fibers directly to subscriber's homes.

**A**FEW weeks ago, Brian Shaw signed a contract to play basketball in Italy for a million dollars a year.

The news was a jolt in Boston, where Shaw was a promising - though not exceptional - young player for the hometown Celtics. The implications, though, were much broader.

Whether the move was in Shaw's best interests, is open to question. That his agent made a killing is beyond dispute: \$100,000 off the top and a nice percentage of the rest, the Boston press reported.

Acquisitive sports agents are not the most pressing problem that besets the land. But they point to one that is rising on the list: the way people can reap enormous rewards for doing things that are wasteful, if not downright destructive.

The corporate takeover wars, for example, that are bringing turmoil and disruption to American industry. The driving force behind these is often an investment banker who stands to get a percentage of the deal.

Likewise, the ridiculous awards in "patrimony" suits and other exotic new legal maneuvers. These have less to do with actual harms suffered by plaintiffs, than with the way their lawyers get a percentage.

Messed-up incentives are even a problem in advertising. Tony Schwartz, the maverick adman, wrote last year that the "advertising business generally rewards failure and punishes success."

"Since the ad agencies are paid a percentage of their media billing, there is no in-

centive to produce more efficient advertising that might reduce costs."

The list goes on and on. If the challenge facing socialist countries is to provide incentives to produce, market-driven countries like the United States face a more advanced dilemma: how to channel economic energies in socially useful directions.

Even the Wall Street Journal, that bastion of free-market fundamentalism, has acknowledged this somewhat. In England, Margaret Thatcher has proposed "deregulating" lawyers by letting them charge contingency fees, like US lawyers. A Journal editorial writer observed that the way to promote prosperity is not to set profit-maximizing lawyers loose upon the land.

A large ship turns a little at a time, and so with economic incentives. There have been changes in recent years that point to much larger possibilities.

In the business realm, some corporations are now paying ad agencies in part according to results at the cash register. Efficient advertising is not always to be desired - cigarette and alcohol ads, for example. But the principle of pay-for-performance should obtain more broadly. Stockbrokers, for example, get commissions simply for making trades. Shouldn't their pay be based, at least in part, on how those trades pan out?

The bigger challenge is to encourage behavior that goes beyond economics. In col-

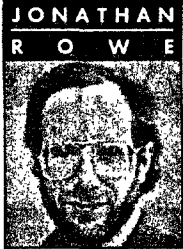
lege sports, Mississippi State at schools have started paying their bonuses based on the number of athletes who graduate. Why not apply this principle widely? If the nation paid a bonus of \$10,000 to every impoverished teen who graduated from high school and didn't use drugs, the effect in the ghettos would be dramatic. We could dispense with the ghettos of social workers and their costs as well.

Some politicians claim to care so they can qualify for a pension. Sam Smith, the Progressive Revue suggests "reverse vesting" so that only those who qualify after a certain tenure with benefits diminish a certain tenure.

The tax laws are wrong-headed. Accelerated depreciation encourages owners to sell once the write-offs are used up. It should reward owners for investing in the long haul. If mortgages were paid for a while, then rents actually could be reduced.

Virtue will not always be conveyed probably shouldn't be. When we imagine a free-market utopia with incentives for every right action, that's indulging in fantasy.

Yet the broad stream of humor does flow, at present, down the self-interest. So we need to think of ways to make this channel more benign.



JONATHAN ROWE

### COMMENTARY

## How Good and Gain Can Meet

### BOOKS

## Techno-Thriller Echoes Headline News

By Guy Halverson

**I**T was almost inevitable that the Iran-contra scandal would spawn literary imitations, such as "Clear and Present Danger." This whiz-bang, blood-and-thunder, techno-thriller is Tom Clancy's latest novel of international intrigue. It will probably be an enormous success.

Many of the questions raised by Clancy are right out of today's headlines: Is it possible to resolve pressing national security issues, given the divided nature of the US governmental system, with its checks and balances? Can the US, in fact, resolve international problems on its own? Can the global drug trade be curbed without somehow taking the battle to the overseas citadels of the drug lords? What happens if an overseas covert operation goes awry? (Remember the Bay of Pigs?) Who "polices" the police, such as the US Navy, the CIA, and the FBI?

Clancy, unfortunately, doesn't provide as many answers as questions. In his scenario of extra-constitutional (and thus, illegal) inci-

dents, covert operations are undertaken by grade-A, Hollywood-type heavies. But the history of the past several decades suggests that the clear and present danger to the US political system is that such

**CLEAR AND PRESENT DANGER**  
by Tom Clancy  
New York: G. P. Putnam's Sons  
656 pp., \$21.95

operations usually come not from "heavies," but from "good guys" (that is, many of the very folks elected to high office by the public.)

Still, quibbles aside, this is foremost an action yarn. Clancy's fans will not be disappointed, although newcomers to this genre might be put off by all the violence. But there are other problems.

It's not that "Clear and Present Danger" - all 544 pages - is a bad novel, or intemperate, or even unexciting. In terms of stark drama, the book explodes with high-tech-oriented adventure. The problem is that Clancy's formula-driven approach of playing off the Iran-contra scandal - and, in a sense, Watergate before that - tends to

trivialize history and unwittingly misread many of the lessons that must be learned to avoid such incidents in the future.

Clancy's topic is not explicitly Iran, or the contras, although the book is full of contra look-alikes in the form of nasty Colombian drug lords and misguided American military personnel.

Rather, Clancy examines the complexities of the international narcotics trade, particularly the Colombian connection as it affects the US. What if, Clancy asks, a clandestine White House operation (complete with intricate money-laundering) were launched to invade Colombia, kill off drug dealers, and, in the process, win public points for the president? But at the same time, what if a CIA agent with scruples (the intrepid Jack Ryan) were to find out about the illegal operation and attempt to make it "constitutional," as well as to save a number of American military personnel facing possible death abroad?

What Clancy fans seem to love most - and what drives his critics to distraction - is the author's fascination with high technology. If there is now such a subcategory of fiction as the "techno-thriller," it

is no doubt more becoming than any other this approach, characterization take a back seat to jargon. For a generation of computers and act home video games, such occupation with technic understandable.

In the midst of a quence involving a t suddenly learn that t laser-guided bomb ha teed' accuracy of und ters, but that was u conditions . . . Two one in the nose and o were triggered by a co within a microsecond stant when the seeker the fiberglass top of

Or again: "Each I through the cassette I took note of the inc and treated it as a nu (A) to 26 (Z), and the number on the tape well you get the idea.

Mercifully, when moguls get around tc epic, such details will ting-room floor.

■ Guy Halverson is on staff.