April 1, 1985

Approved Jayne Aylward
Date

MINUTES OF THE HOUSE COMMITTEE ON COMMUNICATION, COMPUTERS AND TECHNOLOGY

The meeting was called to order by Representative Jayne Aylward at
Chairperson

3:30 ~~a.m.~~/p.m. on March 28, 1985 in room 522-S of the Capitol.

All members were present except:
Representative Erne (excused)
Representative Roper (excused)
Representative Sifer (excused)

Committee staff present:
Ray Hauke, Research Department
Scott Rothe, Research Department
Jean Mellinger, Secretary to the Committee

Conferees appearing before the committee:
Dr. Russell Getter, Department of Information and Communication Systems

Chairman Jayne Aylward opened the meeting.

Dr. Getter spoke on Distributed Data Processing. He first offered to give the committee a demonstration of a phone mail system some time they chose. He continued with his presentation (Attachment 1) and said they plan to move ahead with the establishment of a digital communication system for state government operations with core network projects. Characteristics are that it will be end to end digital; the state will own the wiring and cabling; the state will own the hand sets and terminal equipment; all other services will be leased; integrated voice data and slow motion video kind of system; six major nodes, Topeka Capitol Complex, Lawrence, Kansas City, Manhattan, Wichita, and Hays.

Representative Friedeman asked concerning international standards and international protocol. Andrew Scharf explained that protocol is a rule you follow and standard is a guideline that allows them to pick the proper protocols so they can communicate with each other.

Representative Dean asked if the software was not available if you would have to write it and about documentation. Mr. Getter answered that if it was unavailable you would have to write the software and that documentation should be there in time and resources necessary to adequately document the software.

Representative Chronister asked if there was duplication between the 600 terminals in FAMIS and 120 terminals in child support enforcement which are both in SRS. Mr. Getter wasn't sure but said he would find out.

Representative Dean asked if electronic mail saves postage or saves time and was told the arguments state it saves both.

Dr. Getter introduced Andrew Scharf who described in picture the backbone network that they hoped to plan for the state which could handle any kind of communications they envisioned for the next several years.

Representative Friedeman said in talking about the video, Mr. Scharf said they would disconnect it and asked if that was because they couldn't carry enough signals and was told that it was because they don't presently have the ability to switch it electronically. He asked if they were talking about fiber-optics and was told any combination of fiber-optics, microwave, or copper depending upon where they are and how far they are going.

Chairman Aylward asked if the new computer that the Department of Revenue got from K-State would be adequate if reappraisal passes. Dr. Getter said it wasn't intended to do all of Revenue's data processing. She asked if in a distributed data processing system they will be able to use the computers out there as backup for the mainframe and was told essentially they would.

Representative Friedeman asked if the state planned to use the fiber-optic cable put down by other companies and was told the state did plan to use

Unless specifically noted, the individual remarks recorded herein have not been transcribed verbatim. Individual remarks as reported herein have not been submitted to the individuals appearing before the committee for editing or corrections.

other carriers commercially available.

Dr. Getter announced that a candidate for deputy director of telecommunications was coming in to be interviewed and invited the members of the committee to meet him sometime during the following day.

Dr. Getter introduced Dale Johnson, head of the Technical Support Section of DISC.

Representative Dean moved that the minutes of the meetings of March 18 and 19 be approved. Representative Sallee seconded the motion. The motion carried.

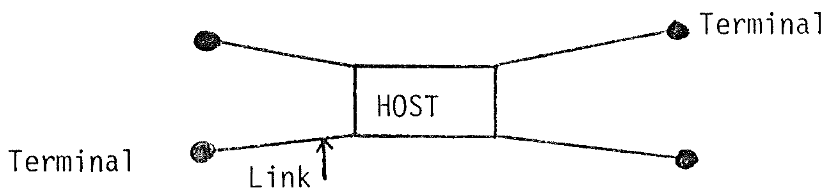
The meeting adjourned at 5:00 p.m.

The next meeting of the committee will be held at 3:30 p.m. on Monday, April 1, 1985.

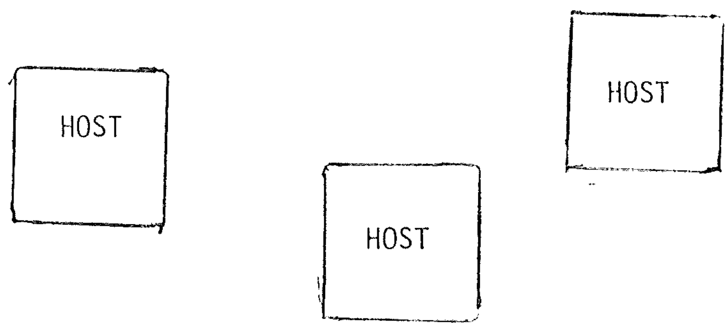
COMMUNICATIONS, COMPUTERS AND TECHNOLOGY COMMITTEE
March 28, 1985

I. Definitions

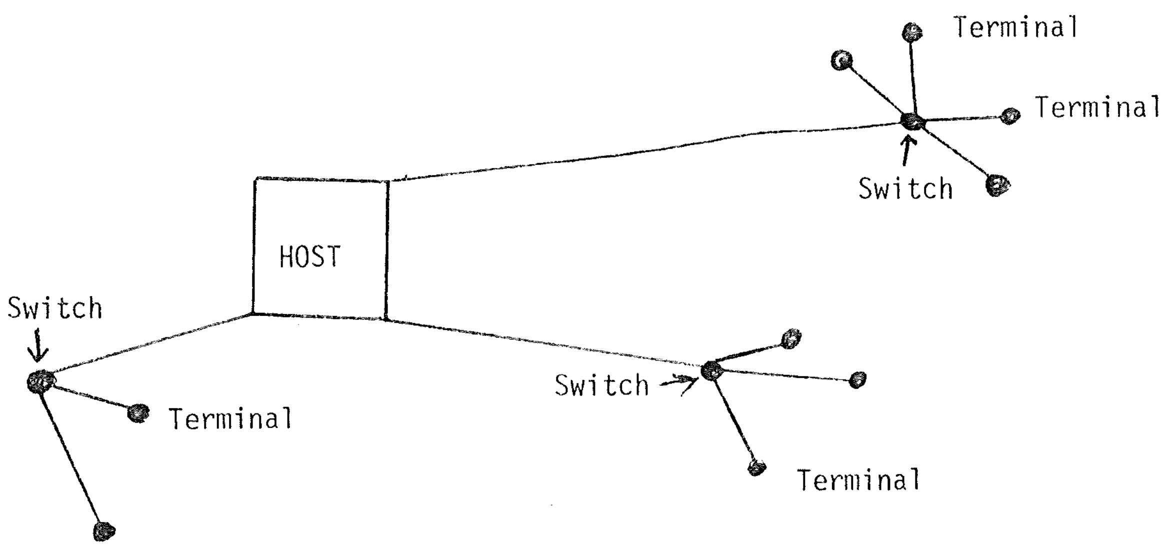
A. Centralized -- processing done by one staff on a single host



B. Decentralized -- processing done on more than one host.



C. Decentralized -- interconnected processing, limited switching.

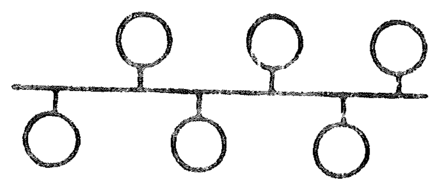


(attachment 1)
3/28/85

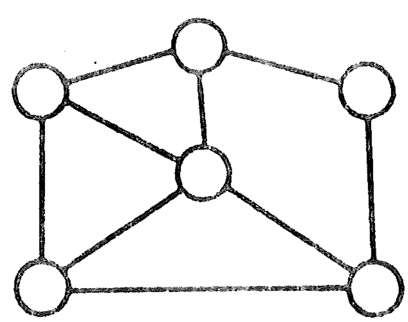
D. Definitions of Distributed Network Processing

1. Where data are stored and processed at a number of locations.
2. Where data stored in one location can be transmitted to another location for processing.
   a. Electronically
   b. By tape transfer
3. Where the user of a single terminal device (a CRT or a micro-computer) can access data at any number of locations and have those data processed at the same or other locations.
4. Where all end user devices (e.g.) terminals, micros, printers, facsimile machines) are connected to a communications network servicing several mainframe centers, and where software and applications programs are uniquely assigned to each center.
5. Where all hardware, software and applications programs are fully compatible and work is distributed among the various locations according to processor workloads. End user equipment is also fully compatible with mainframes in the network.

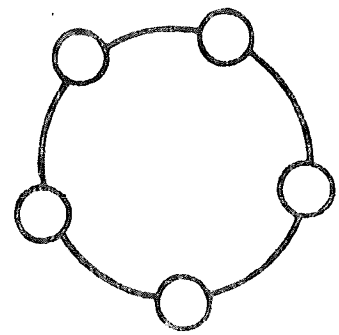
E. Kinds of Network Configurations:



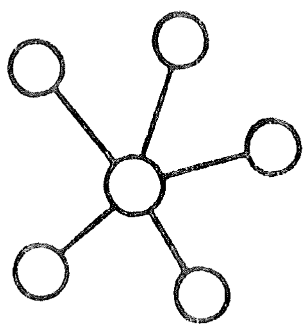
Bus - A network where all nodes are connected to a common transmission path. Comparable to an open star.



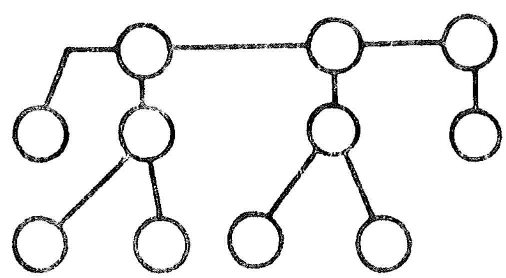
Mesh - A network with multiple links between all nodes. A description of a single link will not disrupt communications to any users of the system.



Ring - A network where all nodes are connected to each other in a ring fashion. A failure of a link between nodes disables the entire network.



Star - A simple form of networking that employs a single central switching computer. A failure of the central site disables the entire network.

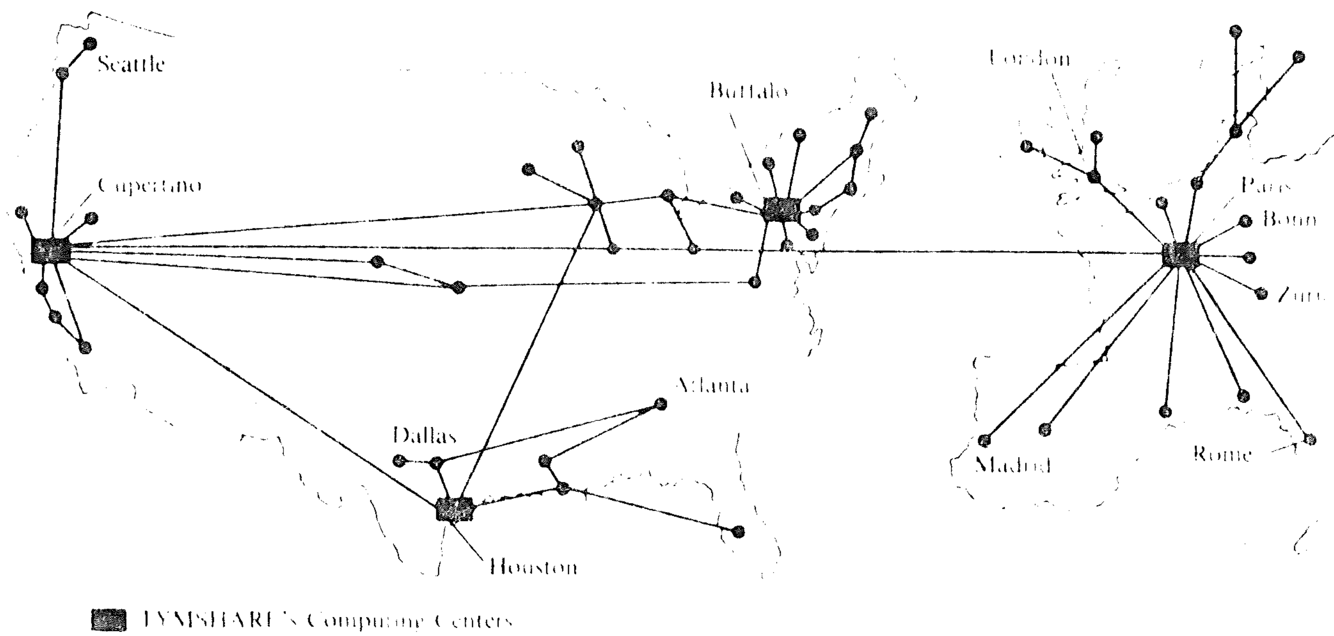


Tree - A switching or data addressing structure designed to communicate by a hierarchial order.

II. Examples of Existing Networks

A. Commercial

1. Tymnet



TYMNET - Tymnet is a public packet switching data network. The service permits computers in one city to communicate with equipment in some other city.

2. Cybernet

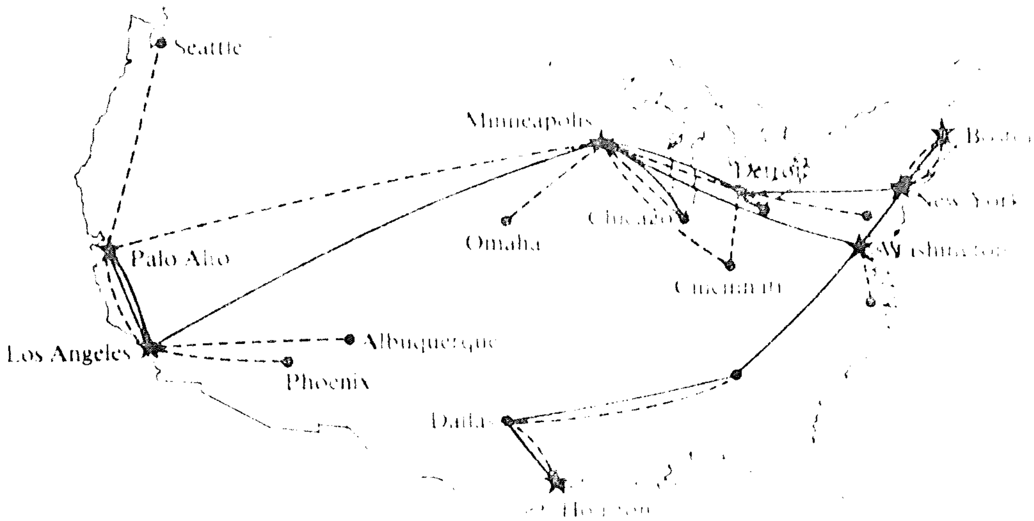
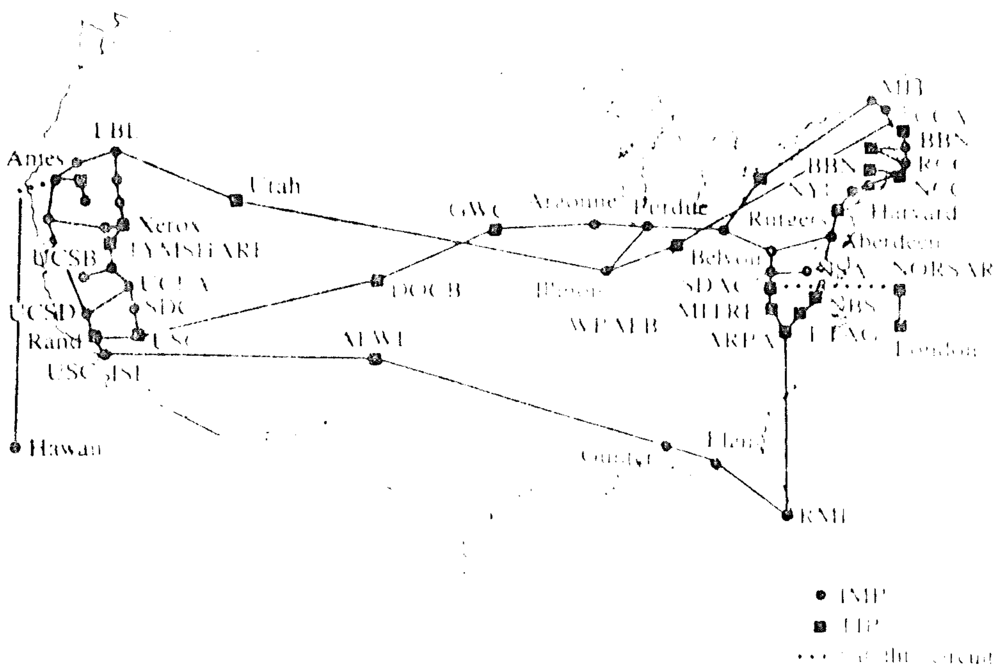


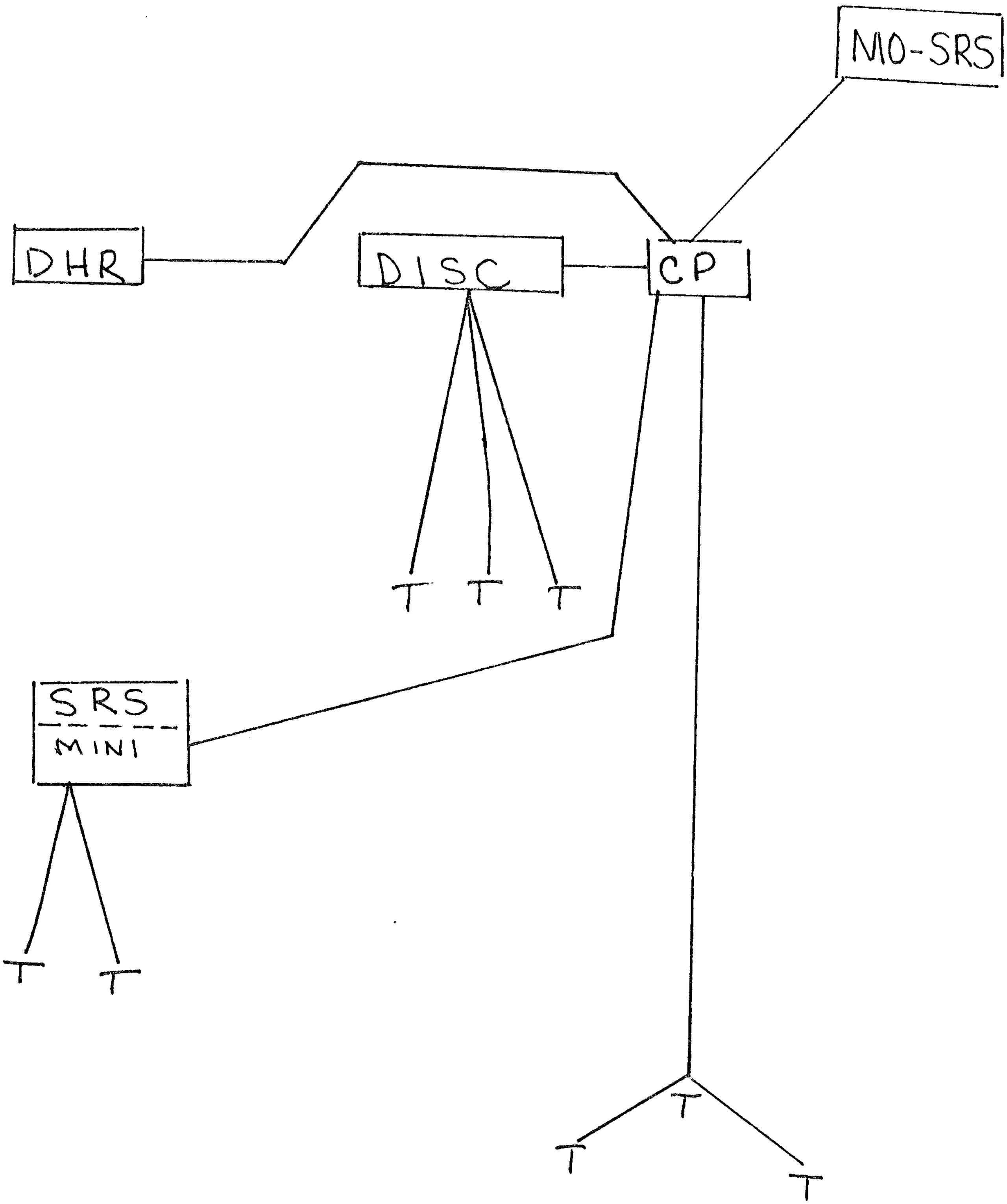
Figure 8.4. The CYBERNET network

CYBERNET - Control Data's network that offers protocol and speed conversion to users similar to Tymnet.



ARPAnet - Department of Defense network that provides high speed distributed processing capabilities to support military applications.

B. Backbone of Existing State Network:



C. Some Existing Networks in Kansas

1. DISC to DHR (mainframe to mainframe)

2. MO - SRS to KS - SRS (mainframe to mainframe)

3. SRS to DISC (mini --DG-- to mainframe but not reverse)

4. D of C to DISC (mini --36-- to mainframe and reverse)

5. D of T to DISC (mini --PLEXIS-- to mainframe)

6. Law Enforcement Network (terminals to mainframe)

   a. ASTRA (Automated Statewide Telecommunications and Record Access)
      HP
      KBI
      Courts
      D of T
      U. S. Marshalls
      Military Police (Leavenworth and Fort Riley)
      D of C
   b. NCIC

7. D of R to DISC (small mainframe to large mainframe)

8. D of HE to DISC (mini's --Harris-- to mainframe)

9. D of C to D of C (Centers to Topeka)

III. Seven Layers of a Network Architecture.

1. Physical - connection to network.

   A. Dedicated circuits

   B. Circuit Switched

      1. Voice
      2. Data

   C. Packet Switched - Data

      1. Local area networks
      2. Node to node

2. Data Link - error free transmission through network

3. Network - information in proper format

4. Transport - buffer between top and bottom layer

5. Session - organizes and synchronizes dialogue.

6. Presentation - structures information for users.

7. Application - defines task (file transfer, database inquiry).

IV. Basic Decisions

A. Network management

B. Database standards

C. Database distribution

D. Database integration

E. Command languages

F. File transfer capabilities

G. Software options and investment level

H. Message handling facilities

I. Rules for distribution of processing

J. Extent of hardware and software duplication

K. How many networks?

L. Back-up and recovery

V. Guidelines for Distributed Network Planning and Management

A. Develop in-house expertise -- rapidly changing technology.

B. Go slow.

C. Carefully review vendor "solutions."

D. Plan carefully.

E. Select and apply international standards.

F. Select and apply international protocols.

G. Pay attention to details.

H. Focus on state-as-a-whole.

I. Develop "big picture" plans.

J. Develop open lines of communication.

K. Invest in staff training.

L. Ground plans in pilot experiences to avoid big mistakes.

M. Evaluate each application or proposal.

   1. On its own merits.
   2. For its impact on the overall network.

N. Purchase commercially available software.

O. Question seriously applications requiring new software development.

P. Require a systems design for all new applications.

Q. Plan in an evolutionary way.

R. Define the problem before the solution.

S. Develop cost effective policies.

T. Encourage

   1. Legislative oversight
   2. Administrative review
   3. Private sector review

U. Evaluate vendors' financial health.

V. Invest resources in long-term value.

W. Beware of technological "fixes."

X. Consider all the distinct options.

Y. Be practical.

Z. Envision the future and apply constraints.

VI. New Applications, Potentially.

A. Electronic mail

B. Voice Mail

C. Facsimile machines - document transfer

D. Two-way video

E. Child support enforcement - 120 terminals

F. Automated eligibility (FAMIS) - 600 terminals

G. Property reappraisal

H. Vehicle identification

I. Integrated financial management

J. Integrated office automation

K. Personnel - payroll?

READING:

Green, Paul E., editor. 1983. Computer Network Architectures and Protocols. Plenum Press, New York.

Katzan, Jr., Harry. 1978. Distributed Data Processing. Petrocelli Books, Inc., New York.

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Walker, Alfred J. 1982. HRIS Development. Van Nostrand Reinhold Company, New York.

Weil, Ulric. 1982. Information Systems in the 80's. Prentice Hall, Englewood Cliffs, New Jersey.

Kansas
DEPARTMENT OF REVENUE
State Office Building
TOPEKA, KANSAS 66625

March 26, 1985

Dr. Russell Getter
Department of Administration
Division of Information Systems
and Communications
124-South, State Office Building
Topeka, Ks. 66612-1503

Dear Dr. Getter:

This is to advise you that this Department concurs with your concept of Agency processors and the installation of a 4341 Model 2 in the Department of Revenue.

We have established a team consisting of Staff from our Department and DISC to manage this project. The Department agrees with the proposal that the DISC Technical Staff will maintain the operating software and the Revenue Staff will operate the facility.

It is our desire to cooperate in any way possible to improve Revenue processing and we believe this method has great potential to assist Revenue with its processing needs. We look forward to the opportunity to take advantage of new technology provided and eleminate the hugh logistical problems we would otherwise encounter when DISC moves to the old Santa Fe building. Be assured of our full support in making the project a success to both Revenue and DISC.

Thank you for your recognization of and the steps you have taken to assist this Department with its large Data Processing needs.

Sincerely,

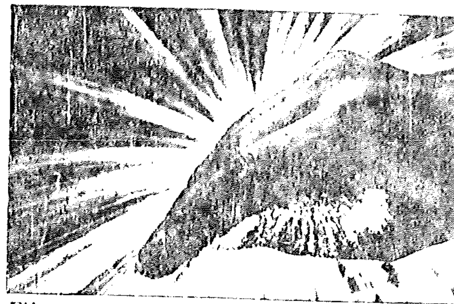
Harley T. Duncan
Secretary of Revenue

HTD:rjf

cc: Gary Russell
T. A. Foust

The Revolution In Digitech

Digital technologies are transforming cars, appliances and telephones—and providing exotic new services.



Fiber-optic strands: Sound from light

When the phone rings at Lynn Mills's house in Harrisburg, Pa., a small digital screen lights up and displays the phone number of the incoming call. Mills checks the screen to see who's calling before she decides whether to answer. In some cases she has already made up her mind—and programmed the phone to automatically refuse the call. Instead of getting through, the unfortunate caller gets a crisp recording that says, "We're sorry. The party you are attempting to reach has activated their Call Block service, indicating they do not wish to receive this call. Therefore your call cannot be completed at this time." Mills, who is taking part in a Bell Telephone Co. of Pennsylvania experiment in advanced telephone technologies, does not use the service to snub her family or friends.

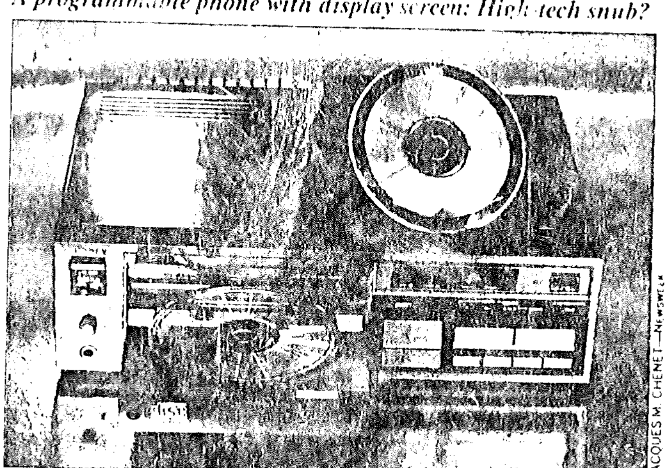
The Harrisburg experiment is part of a major technological change transforming the telephone network. For decades the giant machines that direct phone calls to their destinations were cumbersome assemblies of electromechanical switches, but now they are being replaced by powerful digital computers built of tiny semiconductor chips and controlled by software. Moreover, ever since the days of Alexander Graham Bell, telephone conversations have been transmitted in so-called analog form: the sound waves are represented as rapidly surging waves of electricity. But now, too, the local and long-distance network is being converted to transmit voice and other information in the digital code—a series of ones and zeros—used by computers.

Sneakers: The phone system's shift from analog to digital technologies is part of a much broader revolution: powerful and inexpensive microelectronics is driving much of the machine world to digital technologies. Personal computers have brought powerful digital computers to desk tops and homes. Automobile engines and emissions devices are supervised by computer chips, electronic fuel injection is replacing the mechanical carburetor, microprocessors are the brains in sophisticated antiskid braking systems—and auto dashboards are sprouting digital readouts and even small computer screens. Digital brains control the precise movements of a robot's hand. In the world of hi-fi music, the digital compact disc is rivaling the familiar phonograph record, an analog technology. Digital television is making its debut. The clock and watch industry has been radically transformed by digitech, and appliances like dishwashers and clothes washers and dryers, once timed by electric or spring-wound clocks, are now timed by tiny digital electronic chips. Even the humble running shoe is going digital: Adidas is bringing out a shoe with an on-board computer chip so joggers can keep track of their stride, speed and calorie consumption.

A programmable phone with display screen: High-tech snub?

Ghost Busters: In the world of telecommunications, the shift to digital is creating major new markets. While voice phone calls remain the largest market, experts expect that data—computer-to-computer—communications will grow much faster, becoming a $13 billion a year market by 1990. Teleconferences using advanced voice, data and video technologies—a small market today—will become a $3 billion business by the end of the decade. The rush to cash in on these potentially lucrative markets is setting off a stampede: AT&T, MCI and other carriers have announced plans to lay enough new fiber-optic cable—a key digital-communications technology—to increase the nation's long-distance capacity several-fold by the end of the 1980s. Established telecommunications firms are not the only ones with fiber-optic fever. Fibertrak, a joint venture of the Santa Fe Southern Pacific and Norfolk Southern railroads, plans to lay 8,100 miles of fiber-optic cable along railroad rights of way. "It's almost like an Oklahoma land rush," says Irwin Welber, vice president for transmission systems at AT&T Bell Laboratories.

The conversion to digital brings many changes. Digital TV sets, for example, will make possible a range of new features. After the analog broadcast signal is digitized, it can be processed to filter out annoying ghost images or oth[illegible]



JACQUES M. CHENET—NEWSWEEK

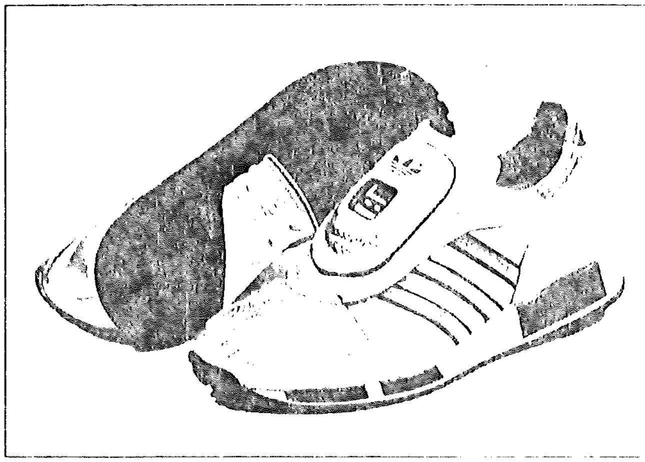
Compact-disc player: Laser light drives the music box er ption problems. The digitized signal can also be displayed on the screen in a way that gives the appearance of a sharper, higher-resolution picture. Digital television sets now on the market in Japan have multiple-viewing areas so that viewers can watch one program while monitoring another that appears in a corner of the screen. And, if you hook up a printer to your set, you can order up a paper image of anything on the screen.

By their very nature, digital technologies are versatile: many different kinds of information can be digitized. At the moment, for example, digital compact-laser-disc players are used to play back music. But instead of representing music, the information encoded on the disc could represent digitized pictures or computer data. In fact, Sony and other manufacturers are bringing out modified compact-disc players, dubbed CD-ROM (for compact disc read-only memory), to be used with personal computers to play back information, for example, from a giant database stored on a disc.

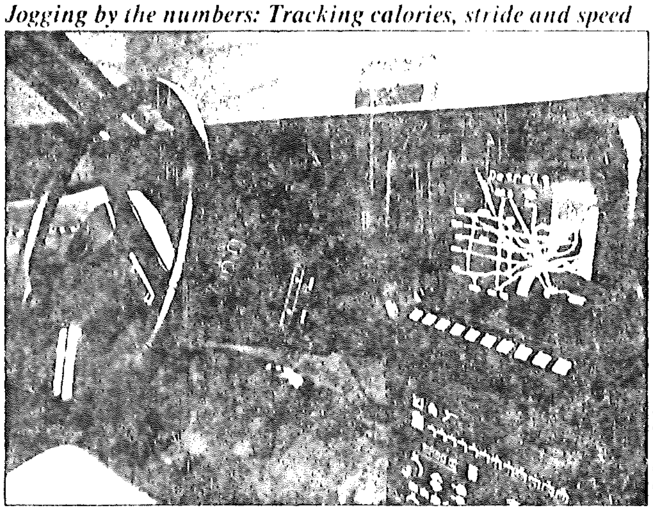
Hackers: The shift to digital will bring similar versatility to the telephone network. The customers who are taking part in advanced-telephone-technologies experiments in Orlando, Fla., and Harrisburg, Pa., can program their digital phones in a variety of ways—to have only certain calls forwarded to another number, for example, or to have the phone ring with a distinct tone when the incoming call is from certain numbers. And if they receive a threatening or obscene phone call, they can tap three keys and the calling number will be forwarded to the phone company's nuisance bureau so that the caller may be prosecuted. The same technology, were it to be used throughout the system, could be used to trace calls from hackers who use the phone system to try to break into computers illegally.

Digital systems have several advantages beyond this versatility. Digital signals, representing streams of numbers, are less subject to static and distortion—and because of ever-cheaper microelectronics, the costs are lower. "The network is going digital because that is the economic way to provide today's basic services," says AT&T's Welber. But with voice increasingly carried by digital circuits, he says, "then you've laid the foundation for the most exotic services."

Fiber optics is the key to this new potential in telecommunications. The technology uses tiny lasers to send pulses of light—representing digital bits of information—over a thin strand of ultrapure glass. The newest light-wave cables that AT&T is installing will, by 1988, be able to transmit data at 1.7 gigabits per second, enough to transmit the entire contents of the Encyclopaedia Britannica in two seconds or to carry 169,344 simultaneous telephone conversations, all on a glass strand that looks like a very thin fishing line. Besides providing enormous capacity, fiber optics is also a more secure form of communications; the glass, unlike copper wire, does not give off radio-frequency emissions that can be intercepted. At the moment, fiber optics is being used primarily for long distance, but some new office towers are being "wired" with fiber optics to link personal computers, telephones and other equipment.



Jogging by the numbers: Tracking calories, stride and speed



Ford's Continental Concept 100 car: Space-age road map

Satellites offer another horizon in digital communications. Next month Satellite Business Systems, a joint venture of IBM and Aetna Life & Casualty Co., will begin offering a high-speed digital service that will allow users to bypass the phone system. Customers will lease a line to an SBS earth station, and whenever they want to transmit high-speed digital data, they will dial up a satellite circuit; that way they pay for the more costly satellite time only when they actually use it.

Greater Control: So far the digital technologies transforming the communications system—integrated circuits, computers and fiber optics—have been used mostly for traditional tasks. But the change also makes it possible for telephone networks to be organized in new ways. AT&T, the Bell operating companies and a number of foreign telephone systems, for example, have embraced an international telecommunications standard called integrated services digital networks (ISDN), which permits digital voice, data and video to be carried on the same circuit. The first ISDN tests will begin in the United States next year. For a stockbroker or insurance agent, the system could be configured so an incoming digital call would trigger a computer to retrieve the customer's financial profile; the profile would appear on a broker's computer screen just as the phone begins to ring from that customer's call. The ISDN standard will also give subscribers much greater control over their own communications. During the day, for example, a company could use the digital "pipe" with many separate channels to carry voice conversations, while at night it would be used as one big conduit to transfer data from one big computer to another.

Wide Band: Beyond ISDN, AT&T and other carriers envision the network evolving to even higher-speed, more flexible digital transmission. Currently, computer data is sent over the networks using a technology known as "packet-switching." The information is broken into discrete packets of data, each with an identifying "header" and destination, then the packets are sent over whatever routes are available and reassembled by computer at the other end. The present method is too slow for voice or video communications, but in January AT&T patented a new, much faster form of wide-band packet-switching that can carry millions of packets per second. Wide-band packet-switching can interweave voice, data and video on a single channel, with each packet headed for its own distinct destination. Among other services, the technology may revive an old idea: picture phones.

At the moment the telephone network is still only partly digital; the signals may be converted from analog to digital and back a number of times during transmission. But as more of the network is converted to digital, its very nature will change. "What we are really doing," says Arnold Heiber, market manager for advanced network planning at AT&T Network Systems, "is transforming the network into a highly distributed computer for doing applications in any combination of voice, data and image." In effect, the venerable phone network will become a gigantic computer system, offering a host of exotic services beyond the small human voice.

WILLIAM D. MARBACH with WILLIAM J. COOK in Washington