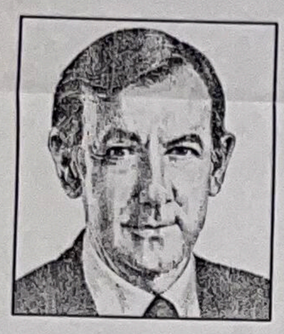
APPLIED INTELLIGENCE

Converting to ISDN: The Reasons Behind the Push



JAMES MARTIN

This is the second of a six-part series on Integrated Services Digital Network (ISDN), a communication technology that will have great strategic importance in the future.

It's no longer practical to think of computing and telecommunications as separate entities. Both are based on the same microprocessor technology and both handle information. Information is input at one end and output at the other, with only the physical transportation mechanism in between. The existing analog telecommunications network has been able to handle this type of traffic because computer output is in digital format. Relatively low-speed data communications (at speeds from 1,200 bits per second to 9.6K bps and up to 19.6K bps) are easily possible via modems over the analog network. However, analog networks are not able to offer the high-speed communication links necessary to support effective communications and video transmission.

Design Changes

The incorporation of digital switching and transmission techniques into telecommunications has begun to alter the foundation upon which networks are designed. Although voice communication is, and will continue to be, the primary means by which information is transmitted, the philosophy of network design is changing. Voice is no longer the dominant feature around which networks are designed; data communications now plays the major role. This is not to say that voice communication is decreasing in importance; it is just that, in a digital network, voice or data no longer become issues. All communications, including digitized voice, are considered to be data.

The key concept of a digital network is that it lays the foundation for creating a ubiquitous, integrated network capable of handling all our communications requirements—from a simple telephone call to the broadcasting of high-definition television.

Economic Factors

The scale of the task involved in converting networks from analog to digital is quite daunting. The telephone network has evolved over the past 100 years. By the mid-1990s, the majority of telecommunications networks in the major industrial countries of the world will be fully digital.

This requires the replacement of all switching and transmission facilities, and the introduction of a wide range of new services in addition to voice (such as high-speed data, video and text communications).

There must be a number of sound economic reasons for network operators to undertake this enormous conversion. Influencing the change from analog to digital communications are three basic economic factors: cost-effectiveness and reliability; expandable infrastructures; and availability of more bandwidth. The first two are discussed below; wider bandwidth is the subject of next week's column.

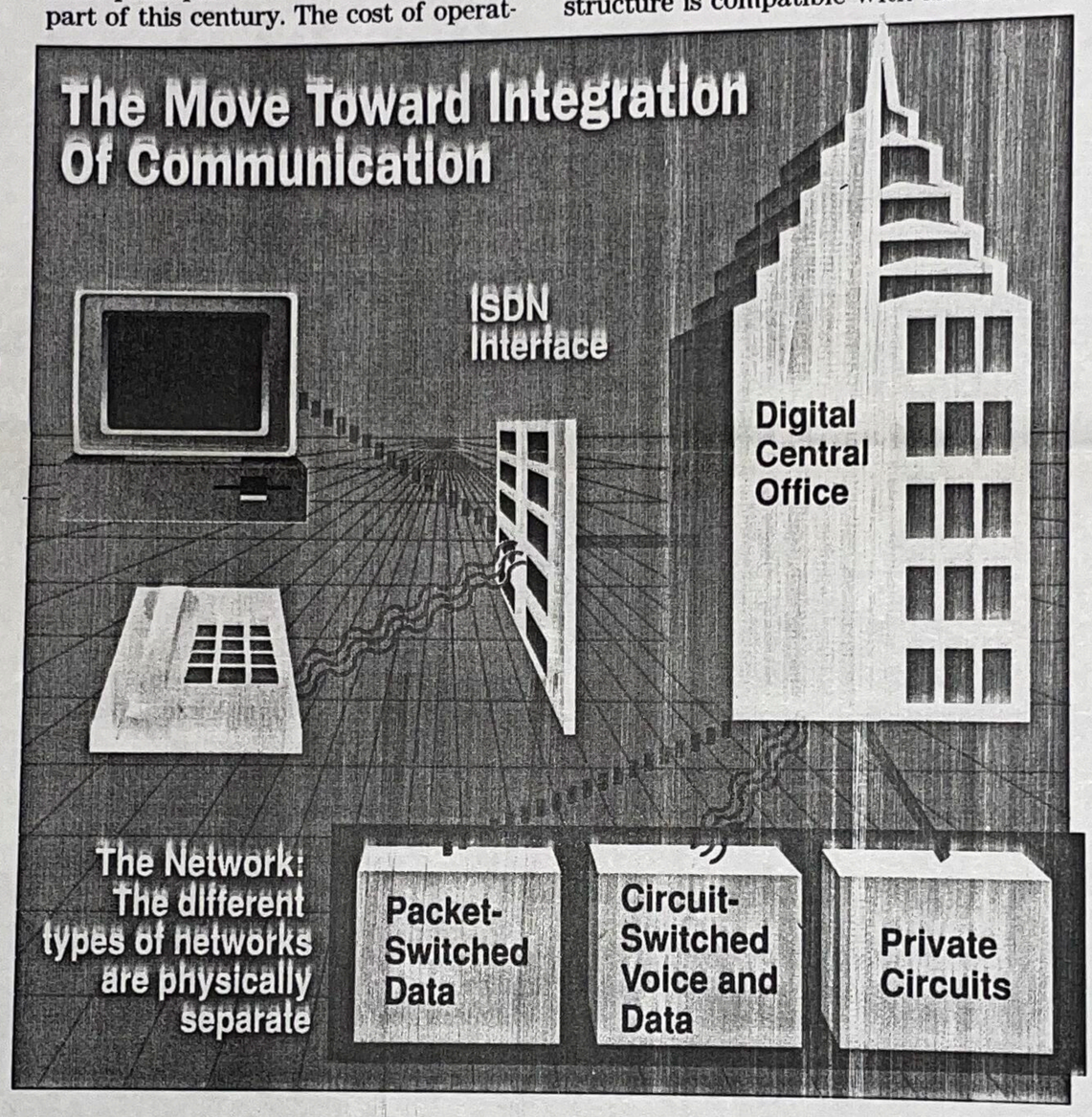
Cost-Effectiveness

PTTs (state-controlled telecommunications facilities), common carriers and network operators of all types, either public or private, have long had problems associated with running and maintaining an analog network; some of the basic principles date back to the early part of this century. The cost of operating and maintaining large analog networks is becoming prohibitive. The older type of mechanical switching systems have many moving parts, are unreliable and require a large number of trained engineers to maintain them. Modern digital switching systems are inherently much more reliable as many of the old moving parts have been replaced with microprocessor-controlled circuitry.

Expandable Infrastructures

A major economic factor governing the introduction of ISDN relates to infrastructure. A communications network is like a central nervous system. It is a vital organ making a unique contribution to the economic and social well-being of a country and its people. While the computer is a relatively "modern" invention, we have become dependent on computers to such an extent that being without them would result in total chaos. Future economic prosperity largely depends upon the continued expansion of telecommunications networks.

Information is one of the world's most valuable traded commodities, and the effective use of information processing and communications technologies is key to improving effectiveness and productivity across all sectors of industry and commerce. In order to ensure that one country's investment in a digital infrastructure is compatible with another's, the application of common, internationally agreed-upon network standards is critical. The creation of and adherence to standards for digital networks by all countries is vital.



Annie Bissett

A digital network lays the foundation for creating an integrated network capable of handling all our communications requirements.

Tariffs

Because both voice and data will be transmitted over the same ISDN network, the network operator will have no means of distinguishing between the two types of traffic. This raises a number of potential problems that have not yet been resolved. One of the most important is the question of tariffs for ISDN. An ordinary circuit-switched voice call is charged on the basis of connect time and distance. Data calls over a packet-switched network are charged on the basis of connect time and the volume of data transmitted.

In most cases, it is more expensive to send data over a voice circuit than over a packet-switched data network. Network operators have to see a return of their large investment in ISDN. How services are tariffed is crucial to the development of ISDN.

Transition to ISDN

A number of major ISDN issues are unresolved—standards for broadband ISDN, circuits for voice traffic that operate at a speeds less than 64K bps, and the operation of international ISDN networks, for example. Many of these issues will be clarified following PTT and operator experience, user experience and additional standards recommendations from CCITT, the international standards-making body.

During the initial stages of ISDN implementation, access to various ISDN circuit- and packet-switched services will be via a single network interface. At this stage, individual traffic types will still be switched separately, as illustrated. Progress toward the integration of both switching and transmission facilities is not generally expected until the mid-1990s with the integration of high-speed circuits and the completion of the transition to digital packet-switched networks.

Throughout the development of ISDN, the level of services, facilities and degree of network integration will depend upon the individual PTT or network operator. The speed at which each operator develops his or her network will depend upon many factors, not the least of which will be financial/investment considerations, quality of an existing plant, as well as user demand and the willingness to pilot new services.

Depending on the individual network operator, ISDN will develop at different speeds and provide different levels of sophistication. In North America, it is likely that operating companies will develop ISDN at different speeds and with different priorities. How and in what way this development takes place will be due in no small part to the pressure exerted on the local operator by the business community. It is the business community that potentially will benefit most during the early stages of ISDN; therefore, it is up to it to ensure that the network operator makes the right planning and implementation decisions based on present and anticipated corporate telecommunications requirements.

Next week, we will look at broadband ISDN channels that operate on very high-capacity optical-fiber circuits. ■

The James Martin Productivity Series, an information service updated quarterly, is available through High Productivity Software Inc., of Marblehead, Mass. (800) 242-1240. For information on seminars, please contact (in the United States and Canada) Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402 (213) 394-8305. In Europe, contact Savant, 2 New St., Carnforth, Lancs., LA5 9BX United Kingdom (0524) 734 505.