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COMPUTERS and TELECOMMUNICATIONS: Issues in Public Policy

MATHISON and WALKER

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To Joyce and June

FOREWORD

The Computer utility industry can be viewed as the most basic tool of the last third of the twentieth century. So commented J.-J. Servan-Schreiber in his recent book, *The American Challenge.* Certainly the components of information networks such as data banks, computer centers, terminal devices, and communication lines exist or are in the process of coming into existence. Whether computers are employed for time-sharing, remote inquiry, or computational services, increasingly the question is not whether remote "computer utility" services will proliferate but, rather, how quickly they will do so.

Attributing these new services to continued changes in technology is a relatively easy task. A more difficult problem is assessing the implications which that technology holds for the computer industry, the communications industry, and the general public. The announcement in 1966 by the Federal Communications Commission of an Inquiry into the interdependence of computers and communications, which at the time of this writing was still in progress, marked a first step in this endeavor. The following year a Presidential task force on communications policy began a broad study also encompassing this subject. The issues at stake in these investigations remain today largely unresolved, and, due to continual advances in technology and the growth of data communications, can be expected to remain with us for the foreseeable future. Ultimate resolution of these important issues will shape the structure of the remote-access computing industry as it matures. The issues focused upon by the FCC can best be summarized as questions:

1. What is the regulatory status of computer/communications services?

2. Are common carrier communications services and tariffs responsive to the requirements of the data processing industry?

3. Can privacy be protected against the increasing phenomenon of concentration and the exchange of data information?

These questions serve as the conceptual framework for the Mathison-Walker Study.

The first issue, the question of the future regulatory status of remote teleprocessing services, turns on the question of market entry. Are such services to be rendered by members of the communications industry? If the answer is yes, a further question follows. Should such services be tariffed or non-tariffed? If the answer is the former, then a third question remains. Does the supplying of tariffed services by regulated carriers imply that entry into this industry is limited to franchised entities only? Clearly, in a universe that posits communications and data processing as polar extremes, the answers to these questions might appear self-evident; data processing would continue to operate in an environment of market rivalry, and communication services would continue to operate under the constraints of regulation. The problem assumes a different order of magnitude with the evolution of services that embrace varying elements of both communications and data processing. It is inevitable that this mix attracts firms from both the computer and the data processsing industries.

Consider for example the common carriers. These regulated entities are moving into data processing as a natural extension of their transmission and switching services. The precise pattern varies. Some carriers are diversifying through the vehicle of a joint venture; others are forming corporate EDP affiliates, separate and apart from their regulated parent. Whatever the strategy, many carriers regard communications/EDP services as the market of the future; and their diversification efforts signal an intent to participate in that market actively.

In like manner, data processing firms are attempting to diversify into communications via the route of computer message switching. Indeed, the grafting of message switching capability to computer-based remote inquiry systems is no longer uncommon. Moreover, some EDP firms are establishing data transmission subsidiaries both to diversify into new fields and to extend the geographic coverage of their computer services into markets hitherto untapped. Again, whatever the approach, firms in the data processing industry regard teleprocessing as their logical domain and next major market, and computer-based message switching as a natural extension of their unique expertise in computer applications.

At first glance, this mutual diversification appears reciprocal. A closer look, however, suggests that regulated entities are finding it easier to move into non-regulated activities than for non-regulated firms to move into communications. Several reasons account for this imbalance. First, regulatory bodies tend to regulate services rather than firms; second, carriers may refuse to lease lines to

firms they regard as poaching on communication services; third, direct entry into common carrier activities must surmount the adjudicatory process, a process noted neither for its efficiency nor its expediency. The asymmetry of market entry may thus pose as the critical variable in shaping the teleprocessing industry in the next decade. Certainly it is apt to condition the environment for computer-based services by the time public policy has sorted out its ends and means.

The second question, concerning the interface between the supplier and the user of communications channels, turns on the content of common carrier communication tariffs, customs, and practices. Many of these practices are long-standing, such as restrictions on the use of "foreign attachments," on the interconnection of private communication facilities to the common carrier network, and on the sharing of common carrier communication lines, as well as the long-standing pricing principles for communication services. The venerable telephone company practice of opposing the attachment of customer-provided devices and communication systems to the telephone network has rested upon the premise that such a policy protects the quality of the system, fosters the innovation of equipment, and identifies responsibility for repair and maintenance. However valid in the past, these practices have been challenged recently by users who seek a broader range of choice in terminal gear and equipment. Other users seek to interconnect private microwave systems to the dial network and, of course, independent equipment manufacturers seek a broader base for market participation. All of this has added pressure to establish technical interface specifications standards that facilitate the attachment of customer-owned equipment and systems to the telephone exchange network. While the FCC's Computer Inquiry addresses itself to this question, the Commission's 1968 *Carterfone* decision has been particularly instrumental in liberalizing carrier equipment practices.

Many regard relaxation of the carriers' line-sharing restrictions of importance equal to liberalization of the foreign attachment and interconnection tariff restrictions. The reason is obvious. Users are experiencing excess capacity in their leased lines and thus are searching for ways to reduce their communication costs. Until recently the carriers have insisted that line sharing is tantamount to selling communications and selling communications is equivalent to engaging in common carrier functions. Currently, sharing restrictions are being subjected to review or modification by both the carriers and the regulatory agencies. Indeed, the FCC's Common Carrier Bureau has suggested that carriers permit the reselling of bulk

leased circuits as a device to check rate discrimination among users. While this suggestion is somewhat unprecedented for the communications industry, third party leasing is not an unfamiliar practice in the computer hardware market.

The pricing of communication lines has not escaped challenge either. Generally the carriers base their charges on the averaging of time, distance, bandwidth, etc. The computer industry, on the other hand, is less interested in circuit miles, but rather emphasizes the quantity of information transmitted. Perhaps discussion of precipitous rate reductions are premature at this time; but as the carriers' investment mix shifts from transmission (some 19% at present) to switching (some 58%) perhaps the promulgation of rates independent of distance is not entirely out of the question.

The question of privacy, the third issue, can be traced to the growing concentration, coalescence and interexchange of data bank information. Whether the Achilles' heel is the computer, the program, the terminal or the communication line, the question of personal privacy may well pose as the most provocative and baffling issue on the policy agenda. Only time will determine how policy addresses itself to the problem of protecting proprietary information. Some have advocated the licensing of programmers. Others have argued for cryptographic devices that raise the cost of eavesdropping on communication lines. Still others have suggested that privacy in information transmission is the responsibility of the common carrier. This request, needless to say, imposes a dual burden on the carrier; it is one thing to provide the bucket, it is quite another to protect the bucket's content.

In sum, the questions of regulatory status, of tariffs, and of privacy, constitute some of the more critical public policy issues in data communications and remote-access computer services. The FCC's Computer Inquiry can be viewed as an attempt to identify these issues. The task ahead, however, is to block out the options open to policy within the broad context of the public interest. This is both the thrust and contribution of Messrs. Mathison and Walker.

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PREFACE

During the last decade the computer and telecommunications industries have begun to converge, each becoming dependent upon the facilities and services of the other, and together giving birth to a promising set of capabilities which are significantly altering the operation and organization of industry, business, and government, and which will ultimately affect the daily life of each of us. Data communications and remote-access computing, still in their infancy, make possible worldwide data networks, conversational time-sharing computer services, centralized fast-response data banks, and a multitude of specialized computer/communication systems. The computer time-sharing services industry alone (often called the "computer utility" industry), which began in the mid 1960's, has grown at the rate of more than 100% per year and, according to a recent study by the Auerbach Corporation, will have revenues exceeding one billion dollars per year by 1973.

Great technological advances in electronic digital computers and in telecommunication systems have led to the rapid growth of data communications and remote-access computing. This growth, however, has outpaced the ability of industrial organizations to adapt to the changes, and to fully exploit the opportunities, and at the same time has outpaced the ability of government policy-making organizations to guide the evolution of this new technology.

A number of specific public policy issues have emerged over the last several years from the convergence of computers and telecommunications, and have forced themselves upon the regulatory agencies and other public institutions charged with protecting the public interest in such matters. Responding to these issues, the Federal Communications Commission began a broad public inquiry in 1966 designed to provide the basis for future policy determinations. At the time of this writing the FCC has completed the data gathering and evaluation phase of its Inquiry, and is entering a second phase focusing in more detail upon certain critical issues. During the same time period, the FCC has also faced and begun to resolve a number of related issues through its normal case-by-case adversary process of hearings and rulings.

In 1967 a Presidential Task Force on Communications Policy was created by President Lyndon Johnson, and charged with undertaking a sweeping study of national institutions, policies, and issues in telecommunications. Prominent among the subjects of interest were those relating to the interrelationship of

computers and communications – those same issues being addressed independently in the FCC Inquiry. The President's Task Force reported its findings in December 1968, providing further insight for those who will attempt to resolve these issues. Viewing the issues from a national legislative standpoint, the U.S. Congress has also become increasingly concerned about the policy implications of the advancing computer and telecommunications technology, and several Congressional committees have begun to take an active role in this portion of the overall public policy arena.

This book focuses upon a number of these important issues awaiting resolution by the Federal Communications Commission and the Congress. We attempt to identify and explain the policy problems and the implications of alternative solutions, providing technical and regulatory background information where necessary. The book is intended for the professional in the computer and telecommunications fields, including management, and legal and technical readers. Graduate students in business administration, computer science, regulatory economics, and law may also find it informative.

The book is an outgrowth of a jointly-authored thesis submitted in June 1968 in partial fulfillment of the requirements for the degree of Master of Science in Management at the Alfred P. Sloan School of Management, Massachusetts Institute of Technology. Additionally, many of the thoughts presented here were developed in conjunction with work done for the Antitrust Division of the U.S. Department of Justice and for the President's Task Force on Communications Policy. Financial support for this study was also provided by Arthur D. Little, Inc.; by Project MAC, an M.I.T. research project sponsored by the Advanced Research Projects Agency, Department of Defense; by the Diebold Group, Inc.; and by the Federal Government Accountants Association.

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CONTENTS