



*"Record Protection in
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LONG DISTANCE RECORDS TRANSMISSION
BY ELECTRONICS

Part II
Problems Encountered With Data Transmission

By

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I. Introduction

Time-sharing systems have exacted a certain strain on the common carrier industry in the United States. Time-sharing computers in universities during the early 60s demanded an increase in the manufacture of data modems. Also, the traffic increase in certain telephone exchanges prompted AT&T to undertake several studies as to the long range effects time-sharing systems were to have in the next five to ten years on the switched voice network. Commercial time-sharing systems made even greater demands on the carriers because of the vital part communications play in the commercial system's future. Faster baud rates were asked for as well as a whole range of new ways to attach noncarrier equipment to the networks.

Computer manufacturers also were impacted by the new user demand for adequate interface equipment for data transmission from remote devices to a central computer. A large gap is still noticed in the meeting of the technologies of the carriers and the computer manufacturers.

Since most carriers are federally regulated, a new concern arose within the Federal Government regarding the interdependence of the nation's communication facilities and the emergence of computer networks.

II. Effects of Current Time-Sharing Systems

More and more computer systems are being installed with communication interfaces for transmission of data to terminals and to other computers. Very few of these computers have been designed to meet the communication interfaces adequately. For example, the communication channels available on an IBM System/360 are not transparent to the many speeds of the data transfer available from common carriers. One must segregate the "ports", physically, for Telex, TWX, voice, and graphic data speeds. Thus, the programming and

operation is more complicated and passed on as a burden to the computer user.

Tariffs cause the commercial time-sharing entrepreneur a further burden. Voice/DATA-PHONE calls are much too high for areas within a 100 mile radius of a computer. The time-sharing company must use leased circuits if he wishes to multiplex his remote terminals to reduce costs and thus loses the flexibility of the switched networks. However, by using long-distance leased lines, he can reach remote areas at a reasonable cost by attaching noncarrier multiplexing units and then use the switched networks into the multiplexing unit.

III. New Advances in Communication Technology

Several announcements have been made recently by AT&T concerning equipment that has been developed as a direct consequence of the computer industry.

- (1) *Data Concentrator* - essentially a means by which the time-sharing company can make use of Bell Equipment for accessing remote terminals more economical. Instead of private networks linked via noncarrier multiplexors, the concentrators will allow 16 to 128 input lines and from 16 to 32 output lines with speeds up to 300 baud. Output can be to another concentrator, a computer, or into the DDD network. Busy signals will automatically queue the call and the computer can "busy-out" any port. Costs are further reduced by use of DC power and availability in the 3rd/4th quarter of 1969.
- (2) *Acoustic Couplers* - two models compatible with current 103s with speeds to 300 baud. Cost reduction to about 1/3 of current 103s, full- or half-duplex. Models are the 112 and 113 to be available in 1st quarter 1969.
- (3) *202G* - A compatible model to 202 with speeds of 1200 baud and battery powered; available 2nd quarter of 1969.
- (4) *203* - High speed DATA-PHONE with switched speeds of 3600 and 4800 baud and leased line speeds of 7200 - 9600 - 10800 baud. Data rates are adjustable manually or from the computer and feature a fully automatic equalizer for signal quality control.
- (5) *303/304* - Wideband data sets from 18.75 k bps to 460.8 K bps with and without automatic error correction and with and without programmable bit rate.

These devices would not yet be available if the time-sharing industry were undeveloped. The needs are current but the hardware is still to be delivered next year. New computer generations will undoubtedly require even more concentrated effort by AT&T to develop a wider range of data handling equipment. These computers will *all* have the capability to

connect to one another and to the communication networks of the country. Many new time-sharing companies in the business arena will continue to press for better ways for switching and routing of data messages.

IV. General Considerations

The Federal Government will play an increasingly important role in the interdependence of computers and common carriers. The gap between the two industries' technologies will gradually disappear with the Government watching all parties with interest. A possible outcome of the current inquiry within the FCC may be a liberalization of current carrier policies concerning the mating of computers and the nation's networks, wire and high frequency. Look for users to investigate new ways to use the TV networks for computer data transfers. A serious problem today is concerned with networking and load-sharing of regionally installed computers, master file computers, etc. Government regulation of certain segments of the computer industry seems to be inevitable and the effect on both industries unpredictable.

If it is indeed true that total transmission across the AT&T network will consist of 80% data and 20% voice by 1975, then dramatic changes in the government, computer and carrier sectors and their interdependence can be easily predicted.