Satellite business systems—Innovative services for business communications

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INTRODUCTION

It is a pleasure to participate in the National Computer Conference, and to represent SBS in this session on International Computer Communications. The topic is a most timely one for SBS, even though we are a domestic carrier, because during our extensive market investigations the desire of potential customers to improve their ability to connect their domestic and foreign data transmission capabilities has been expressed quite strongly. SBS believes its proposed offering will provide customers a significantly improved digital network capability within the United States, and SBS is supportive of industry efforts such as this which recognize these expressed concerns of users and which seek to promote an improved environment for uniform international networks. But before I discuss the specific topic of today’s meeting, I would like to give you some background on SBS and describe its plans and recent activities.

SBS proposes to offer innovative, high data rate, private switched communications networks for industrial and governmental users. These networks will be designed primarily for organizations requiring large communications networks that have heavy and dynamic traffic loads, and will provide integrated digital transmission of voice, data, and image traffic among geographically dispersed locations—much as a private branch exchange (PBX) provides switched communications within a single facility. Importantly, it is this same class of user which is more likely to be multinational in scope and to have far-reaching requirements for various types of international communications. Thus, SBS' market emphasis is closely allied with the matters of interest here today.

As you are probably aware, the SBS system will operate at higher frequencies (12/14 GHz) than present terrestrial and satellite carriers to minimize frequency interference with other systems. This will permit more geographical flexibility in the location of earth stations than is possible at the lower frequencies. These earth stations, which will incorporate specially-developed modulation and access equipment, will be located on the customer’s premises, thereby minimizing the cost of access from customer nonearth-station locations to the nearest earth station customer location.

Satellite Business Systems is a partnership of COMSAT General Business Communications, Inc., Information Satellite Corporation, and Aetna Satellite Communications, Inc. These partners are, respectively, wholly-owned subsidiaries of COMSAT General Corporation, International Business Machines Corporation, and Aetna Life & Casualty Company.

SBS filed applications with the Federal Communications Commission in December 1975 and obtained approval for operation in February 1977. Major system developments and procurements are now under way, and we look forward to implementation. SBS expects to begin providing services with its operational system in early 1981. Prior to that time, SBS will be engaged in an intensive pre-operational program using leased satellite and terrestrial transmission capacity to connect a number of IBM locations; this activity is designed to evaluate the service approach and communications techniques planned in the operational system. The first phase of this effort, now successfully completed, involved experimental traffic tests between SBS earth stations at Poughkeepsie, New York and Los Gatos, California. Phase II has been under way since early this year and consists of a common carrier service, offered under terms of a tariff on file with the FCC, among these two locations and a third SBS earth station installed in Raleigh, North Carolina. An important objective of the Phase II program is to provide a stable environment into which components of the SBS operational system can be introduced and field trials conducted.

Another activity designed to demonstrate and better understand the usefulness of enhanced communications in the business environment was the PROJECT PRELUDE experiment which was recently completed. SBS was authorized by the FCC and NASA to use the Communications Technology Satellite, owned jointly by NASA and the Canadian Department of Communications, and transportable earth stations to conduct an innovative business communications experiment with newly-developed terminal equipment and business machines. The experiments were conducted successively at three pairs of business locations at the host companies—Rockwell International, Texaco, and Montgomery Ward. These companies were selected because they represented a cross section of the user community, and
helped to assure that representative data were collected. Experimental transmission of high speed data, high speed facsimile, and voice and televized communications took place and the results were reported in the spring to both NASA and the FCC. In general, these experiments solidified our belief that these emerging applications will indeed satisfy unmet communications demands and become widespread in future networks.

**SBS UNIQUE CHARACTERISTICS**

Now let me describe briefly the uniqueness of the services that SBS plans by contrasting them with present communications. Satellite services are generally provided through very large earth stations located at some distance from urban centers because of their size, and to avoid interfering with terrestrial microwave facilities. Some small earth stations have been introduced but only in a limited way, again to avoid interfering with existing systems. The services currently offered by both terrestrial and satellite systems are primarily of an analog, full-time, point-to-point nature, and the switched services currently available are for voice and low-speed data.

In contrast to this environment, SBS will offer innovative, high data rate, private switched communications networks. These networks will provide integrated digital transmission of voice, data and image traffic among geographically dispersed locations, with full switching capability from one location to another.

Network is a key word in understanding SBS's uniqueness. It implies that there is connectivity among all of the locations at any time. This particular feature is perhaps the primary factor in SBS's system design. SBS will provide a customer complete connectivity among all his earth stations with sufficient transmission capacity to meet normal operating requirements; additional capacity will be available, on demand, to meet incremental requirements. This service approach, offered through small earth stations located on the customer’s premises, results in a single multi-application network capable of handling virtually all of a customer's internal communications.

Locating earth stations on the customer’s premises also provides a high level of security. This, combined with the use of time division, multiple access (TDMA), will make it impractical to intercept or decipher communications. The modulation and access equipment, burst modem, and radio frequency equipment of the earth station operate in a controlled access environment. Further, privacy equipment (such as cryptographic encoders) can be adapted for use as required.

**SYSTEM COMPONENTS AND MANAGEMENT**

To provide these dynamic, switched high data rate digital transmission services to the locations of an enterprise, SBS will install at each customer's traffic concentration points earth stations, owned and operated by SBS, through which he will obtain access to his network. The stations will use antennas five or seven meters (16 or 23 feet) in diameter and will include innovative modulation and access equipment to accomplish switching and multiplexing and to control the assignment of satellite capacity among the earth stations serving each customer. A variety of access ports is provided in each earth station for analog signals and for a broad spectrum of digital rates, based on the amount and types of traffic requirements of that particular station.

The system that SBS intends to implement initially will include three satellites—two in orbit (one spare), and one ground spare. As part of the SBS service, the customer will be able to obtain satellite transmission capacity for his private network on a full-period dedicated basis, and on an on-demand basis for overflow situations. The customer’s total leased satellite transmission capacity will be dynamically allocated to meet his traffic demands (both as to routing and type—voice, data or image) based on priority assignments he establishes.

Within each customer’s network, the SBS service will include a network management facility. This “window” into the customer's communications network will enable him to monitor network status and performance, change traffic handling priorities, order changes in service and collect usage statistics for internal accounting purposes.

A separate management facility will be used internally by SBS to monitor satellite and earth station performance, assist customers in designing networks to satisfy their requirements, distribute the customer networks efficiently among the satellite’s transponders, and support system maintenance.

The proposed SBS system will best serve organizations requiring large communications networks with heavy and dynamic traffic loads. To install earth stations at all of a customer’s remote sites, including those where the traffic would not justify an earth station, is not the intent. Rather, the objective is to provide an optimum system for each customer in which SBS ties together his traffic concentration points, while smaller offices—each connected by terrestrial services to the nearest earth station—are also brought closer to the center of the organization.

SBS has strived since its inception to look beyond the present needs of potential customers and to address, and hopefully provide for, their future requirements. The PROJECT PRELUDE experiments discussed previously touched on this future perspective by assessing new satellite applications in actual company operating environments. Additionally, SBS recognizes the absolute necessity for advanced terminal equipment to be available in the marketplace when SBS becomes operational. To assist in this, SBS has held a series of vendor conferences to advise about SBS system plans and capabilities, provide interface and service information, and to encourage these companies to intensify their development of advanced communications products. A conference for facsimile equipment manufacturers was held in December 1976 and a second conference for television equipment vendors was held in November 1977. A data
transmission equipment vendors’ conference is planned for the near future.

ADVANCED APPLICATION POTENTIAL

It is clear that the SBS offering must provide capability for traditional voice and low speed data networks, but it is in the area of the emerging advanced applications that SBS sees the greatest future potential. SBS has conducted a number of in-depth case studies of the future communications requirements of individual potential customers and I would like to summarize for you briefly some of the findings. The advanced applications requirements we have identified and structured our proposed offering to serve would seem to be just as applicable in an international context as they are domestically. It should be emphasized that the leased services which SBS proposes to offer are for 24 hours, seven days per week. It is expected that this capacity, used during the day for conventional voice and low speed data communications, will allow for buffering of domestic batches of high speed data and facsimile for off hours shipment. And based on our investigations, an international requirement exists for this same kind of capability, taking advantage of off hours and time zone differences.

High-speed data communications

One clearly expressed requirement is for high-speed digital transmission, and SBS will offer data communications users a fully-switched network capability among a customer’s earth station locations. Data rates include all standard speeds and range up to 6.3 megabits per second. This means that the data base or file that now takes an hour to transmit at typical, high-speed 50 kilobit service will be transmitted in one minute. Or a one-billion-byte file (8 billion bits) which now has to be distributed by truck could be transmitted to multiple locations in half an hour. Distributed processing to meet operational requirements will be facilitated by these high speeds, with the side benefits of load leveling among data processing facilities, redundancy of files for security in case of fire or accidents, and redundancy of processing capacity in case of machine outages.

The high data rate networks will provide direct communication links between computers, with no distance restrictions or penalties. As a result, a large data base can be managed at a central computing facility, retaining the simplifications associated with a single control point, but with the capability to distribute parts, or all, of the data base to remote locations. This capability will add new dimensions to the management of data base systems and yield some improved management tools. These data networks will enhance real-time central management of raw materials, purchases, inventories, production schedules, distribution, cost and pricing analyses, credit checks and postings, customer orders, competitor activities, etc. Many of these considerations are just as critical from an international perspective as from a domestic one.

Facsimile communications

SBS market investigations have shown that the availability of high-speed facsimile transmission capability can be expected to open up entirely new opportunities in document distribution from hard copy or memory as well as correspondence and first-class mail alternatives. To meet this requirement, the SBS offering will include the capability for digital facsimile transmission through a customer’s SBS network at speeds two to 20 times faster than through current systems.

Teleconferencing

A very important finding in the case studies and other efforts undertaken by SBS is the desire expressed by all levels of management for a teleconferencing capability. The expense, inconvenience, and time associated with frequent travel offer an excellent reason for holding many types of meetings using satellite conferencing, and these factors become even more significant when international travel is addressed. SBS’ offering of variable bandwidth on demand will accelerate teleconferencing applications as a cost-effective alternative to a large portion of business travel, and the same capacity that permits high-speed data rates and large voice traffic volume will be available for teleconferencing among multiple locations at very little incremental cost. Teleconferencing applications will range from slow-scan to full-motion color, with the customer deciding which he wishes to use.

INTERNATIONAL ENVIRONMENT

The same user needs that SBS perceives for domestic networks would seem to apply equally well for international applications. Certainly different service costs would be involved and the intensity of usage may not be as great as that for a domestic network, but the advantages to business operations of improved management and control through improved communications would be just as important. The benefit of being able to load level computer operations and take advantage of differences in prime shift hours is equally in evidence whether the computer centers are on the east and west coasts of the United States or in the United States and a European location.

This audience is particularly familiar with the shift within the United States and other countries toward an information-based society, and the ability to communicate or access that information effectively is becoming increasingly important. Many things are now under way or planned which are likely to spur improved improvements in international data communications. The efforts of COMSAT, the international carriers and foreign administrations in offering digital and
packet-switched services are a good example. Further, the plans of Intelsat and the European Space Agency to implement 12/14 GHz satellite systems in the 1980’s, most likely with digital transmission, promise a future common carrier environment more conducive to the types of computer communications of interest to this group.

It may be helpful to discuss for a moment the existing industry structure. AT&T has the monopoly for dial-up voice and data services and represents about 60 percent of this $1 billion market. The International Record Carriers (IRC’s)—RCA Global communications, ITT World Communications, Western Union International (not affiliated with Western Union), and TRT Telecommunications, account for the remainder. The IRC’s provide dial-up and leased telegram/telex message services and some private line voice and data. Each of these carriers deals individually with the appropriate foreign communications agency for the terminating portion of the circuit, and either underwater cable or satellite (provided by COMSAT as a carrier’s carrier wholesaler) facilities are used for transmission. The Federal Communications Commission has designated five “gateway cities”—New York, Washington, New Orleans, Miami, and San Francisco, and all international communications must be routed through these locations.

Presently, a customer with intermittent international communications requirements will automatically go by AT&T when he makes a dial-up voice or data call or will use Western Union for the domestic part of his record message, with the international segment apportioned by a pre-determined settlements formula to one of the IRC’s. For leased private line voice and data circuits, the customer will deal directly with one of the IRC’s (or in some cases, AT&T). The IRC’s may “accept” the customer’s communications anywhere in the U.S. although they are prohibited from providing services in the normal sense outside the gateway cities. The IRC will then lease the U.S. portion of the circuit from one of the domestic carriers and route it through the nearest gateway offices to the appropriate cablehead or satellite earth station for transmission overseas. In addition to the domestic and international circuit charges, the customer pays for the “backhaul” of the service from the gateway city to the nearest cable head or earth station, e.g., a circuit from Chicago to London might be routed to Washington and then backhauled to the Etam, West Virginia earth station for subsequent transmission.

SBS has generated a great deal of interest in the user community, and questions are frequently asked about how the company plans to interconnect its services internationally. Because we are licensed by the FCC as a domestic carrier, we are restricted from providing service to foreign locations and must rely on the appropriate carriers serving those points. Additionally, SBS has chosen initially to provide services to the 48 continental United States and will not serve Alaska, Hawaii, or Puerto Rico. Nor may we interconnect directly with COMSAT for service because, under present regulations, COMSAT is a “carrier’s carrier” and, as such, may deal only with licensed international carriers.

We will, however, keep the customer’s needs uppermost in our planning and work cooperatively with international carriers to achieve simpler and more direct connections for the customer’s higher speed international data communications. The type of interconnect between an SBS customer’s domestic network services and his international locations—including Canada and Mexico—will naturally depend on the type (voice, data) and nature (speed, volume) of the communications and on an evaluation of costs compared with other alternatives. However, under present regulations, the customer may interconnect with the international carrier at his SBS earth station closest to that carrier’s gateway office, or he may use facilities totally outside the SBS system, just as he does today, if that is appropriate.

There are some obvious limitations in this approach. Now let me describe briefly the type of service environment SBS would like to see for interconnecting its customers’ networks for international services. It will be over two years before SBS is operational and the international environment may be quite different then. While there is no circuit-switched higher speed digital service available, the need for such a service would seem to be clear. Many of the future applications identified by SBS require periodic, bulk data movement, and this holds true for interconnecting with international locations.

The FCC is presently investigating the public benefits in expanding the number of gateway cities in which international carriers may operate and, should a decision to expand result, it may prove to be best technically and economically for SBS to locate earth stations, conceivably its own or those leased to customers, in close proximity to the international earth stations and interconnect directly with the international carriers. This would avoid the expense and lower speed implications associated with backhaul and would permit a much simpler and higher quality international transmission.

The double-hop situation which will be encountered using a combination of domestic and international satellites may pose an initial problem for some users, but our conversations with potential customers indicate that this is far from insurmountable. Indeed, several have either adapted, or are planning, advanced data link protocols which minimize the effect of transmission delay and take advantage of the effective transmission capacity of satellites.

Additionally, SBS would welcome the implementation by foreign carriers of a customer premises earth station service concept in their own countries, along with a wider availability of high quality local distribution facilities. From our perspective, these are needed before uniform high-speed digital international networks are achieved.

SBS would hope that foreign regulatory bodies would prove to be just as responsive to clearly demonstrated customer demands as has the FCC and foster an environment that enables a customer to assemble a uniform communications network capability where there is little operational difference between his domestic and foreign locations.

SBS’s efforts to date have focused on the domestic private-line communications requirements of a very specific
customer set—large, geographically-dispersed companies—and we believe that the unique service approach described earlier provides these organizations an innovative network capability for meeting forthcoming communications needs. It is SBS’s hope that implementation of this service within the United States will stimulate the international community with whom our customers must interconnect to move to provide compatible facilities and services. And SBS will continue to study the future requirements of the marketplace and make its findings known publicly. It is only through this open exchange of information that the potential international user will benefit.