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Satellite Communications—A Benefit Realized

There has been concern over what benefits, if any, our multibillion-dollar investment in space might bring. The benefits from some space projects appear quite distant; from others, vague or diffused. But one space application—satellite communications—requires no imagination or foresight; the benefits already realized are measurable in the most meaningful of terms.

The commercial use of satellites for communications already has a ten-year history. In that period there has been rapid progress in technology, in operations, in international arrangements, and in economic profitability. The International Telecommunications Satellite (Intelsat) Organization is now a mature, successful, paying "benefit" of the world's investment in space technology.

Seven to ten years is normally considered a reasonable period for the development of a single generation of a complex technological system. But four generations of commercial satellites have been introduced in a decade, each a major step forward. The first Intelsat spacecraft (known as Early Bird) weighed but 40 kilograms. It was placed in orbit in 1965 with a capacity of 240 telephone circuits to demonstrate the feasibility of geostationary orbits for transatlantic commercial telephone service. The more powerful Intelsat II and III satellites provided a multiple access capability for the use of several earth stations simultaneously and extended service around the world. Then in 1971 the first of the present-generation, 740-kilogram Intelsat IV's was launched, each satellite providing a capacity of 4000 simultaneous telephone circuits.

In 1965 Early Bird provided one link through one satellite across the Atlantic. Now the system supports 380 links girdling the globe with seven satellites in orbit. The full-time leased telephone traffic is 6500 circuits, plus television, data, and facsimile service. The system is used at 115 earth terminals in 65 countries, among them Argentina and Zaire, Egypt and Israel, India and Pakistan, the Soviet Union and China.

Perhaps most remarkable of all are the international arrangements that have allowed Intelsat to attain these operational results. Whereas Apollo-Soyuz showed that two nations can cooperate in space for an important mission at great expense, Intelsat has shown that many nations can do so for over a decade and earn a profit doing it. The 91 member countries, of every racial, political, and religious stripe, jointly own the satellites and provide for their development, launching, and maintenance.

In addition to Intelsat, other commercial systems have come into being. Domestic satellite communications systems are operating in several countries, including Canada, the Soviet Union, and the United States. A maritime system will be established before the year is out, and a system for aeronautical communications later in this decade.

The world's investment in communications satellites and earth stations now exceeds $1 billion, and annual circuit revenues exceed $500 million.

Governmental and industrial research centers in many nations are involved in the development of new technology directly applicable to satellite communications. Digital techniques will be increasingly used for new services, particularly facsimile and computer interconnection; for communications to very small and mobile terminals on islands, building roofs, ships, and aircraft; and to make systems ever more cost effective. For these purposes new frequency bands will be opened, advanced spacecraft materials and structures developed, and solid-state devices pushed to even higher power and performance levels. Generally the same production economies will be applied to satellite networks as have proved fruitful in other areas of the telephone and television transmission industries.

Already the benefits of satellite communications are apparent in the usual statistical indices: in investments made, equipment manufactured, workers employed, revenues earned, profits derived, and services rendered. In its effect upon society the communications satellite is today the most significant benefit of the space program.—BURTON I. EDELSON, *COMSAT Laboratories, Clarksburg, Maryland 20734*