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AUTHOR Dizard, Wilson P.
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ABSTRACT

The first phase of the satellite component of a worldwide information grid is over. The real problems are beginning now with the evolution of technology that will beam specialized transmissions from higher-powered satellites into smaller antennae perched on ships, airplanes, and rooftops. This is another matter politically, economically, and culturally because it involves important questions of freedom of information for individuals as well as questions of the sovereignty of nations. A review of the problems four nations face because of broadcast satellites places the issues in perspective, but the review also raises more questions about the future of specialized communications than it provides answers for. (Author/RB)

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Communications Satellites: Looking Down The Road

Wilson P. Dizard

U.S. Information Agency

A paper to be presented at a joint session on international broadcasting sponsored by the International Communication and Radio-TV Divisions, Association for Education in Journalism, San Diego State University, August 18, 1974.

I have been assigned the unenviable task on this panel of setting out some predictions about the future of satellite communications. I am tempted to take refuge in Winston Churchill's view of such matters, which is that one should avoid predictions until after the event has taken place.

This is generally true of projections about the effects of new technologies. It is particularly true in the communications field, involving as it does the most fundamental and most variable of human processes.

The other problem in approaching this subject is that the time span for developing intelligent policies and practices has been dramatically shortened. Our ancestors had four centuries to examine the impact of Gutenberg's press before a competing technology showed up. Several decades separated the development of the telegraph, the telephone and radio - enough time to begin to sort out their implications.

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Today, however, we are limited to a few years in defining the role that a whole series of converging communications technologies - including satellites - should play in our society.

In this paper, I want to suggest some broad areas of concern particularly as they affect satellites, complementing what has been presented by my panel colleagues in such specific areas as the law and technology. I should like to put aside consideration of specific current policy problems in favor of looking at the environment in which we may be operating down the road a bit. In doing so, I hope to avoid the (literally) blue-sky fantasies which have tended to dominate public discussion of this subject up to now.

We can do this best by taking a look at where we are now. And this involves looking at what can only be described as the Intelsat success story - a subject covered by Mr. Karasik and others on the panel.

Perhaps the greatest tribute to Intelsat's effectiveness is that we take it for granted - little more than two years after the permanent arrangements for its operations were completed. There were, to be sure, some very real problems to be resolved before these agreements came into force. But the political, economic and social interests of more than eighty nations converged in the interests of a communications system that benefits everybody. And, speaking of the unpredictability of predictions, who would have suggested two years ago that one of the

most active nations in setting up earth stations linked to Intelsat satellites would be the People's Republic of China - although it is not a member of the consortium?

In any event, the first phase of the satellite communications system is in place. It is, in the telephone company's term, the long-lines service, providing connections over great distances. It is expanding steadily and it will provide increasingly sophisticated services to its customers. Perhaps the most interesting, and underrated, service is the technical innovation known as SPADE, now being installed in earth stations in the Atlantic area. SPADE allows smaller developing nations to have access to the satellite on a demand basis, eliminating the need to lease expensive and underutilized circuits. It is a particularly striking example of how technology can be applied to the realistic needs of developing countries.

In a sense, the Intelsat long-lines services may turn out to have been the easiest part of developing a world-wide satellite-based communications grid. This did not seem so at the time to those of us on the American delegation to the Intelsat conference, negotiating some very difficult issues over a three year period. In retrospect, however, we had some important factors going for us:

----- the technological state-of-the-art, with low-powered satellites and large earth stations, favored the long-lines, point-to-point approach.

-----the system supplemented, and expanded, existing international communications, and inaugurated new links where they hadn't existed before.

----- the system was clearly going to be economically profitable to everyone in the proposed consortium.

----- traffic flow was completely under the control of local national telecommunications entities, so there were no questions of sovereignty.

Now we are entering the period of the development of what might be called "local" satellite services - and it presents a different order of problems. Each of the conditions which favored long-lines communication are changed:

----- instead of low-power satellites linked to relatively few large earth stations we have higher-powered distribution satellites feeding into large numbers of smaller ground stations.

----- instead of satellites supplementing existing commercial services, we will have satellites capable of innovative new services, both commercial and non-commercial.

----- instead of satellite services making a profit for governments and private carriers on commercial services, we will have satellite services that may, if fully utilized, involve high government costs, in both circuit expenses and in software.

----- instead of satellites feeding directly into national telecommunications systems, we have satellite technologies that pose, in the minds of many governments abroad, the prospect of operating outside their control. This is, of course, the basis for the current controversy in the United Nations over so-called direct broadcast satellites.

In a very real sense, it is a new ball game, one that is going to require new procedures. And, at the risk of making Mr. Mitchell's job seem easy, the problem is not with the technology. Hughes, GE, Fairchild and others have already proven their ability to put together satellites years ahead of our ability to organize ourselves politically, economically and socially, to take advantage of their capabilities.

Before asking how we close the gap, we need to ask a more fundamental one - whether we want the gap closed. Our own national temper and experience is to respond and act affirmatively. There are, to be sure, conflicting economic and political pressures in this country on how it is to be done, but the thrust favors expansion of our communications base on a continuing large scale.

In looking at the future of satellites, it would be naive in the extreme to assume that this is true of many other countries. This is most obviously the case in Communist countries where the expansion of communications beyond officially-required needs is regarded primarily

as a threat. We saw this dramatically in June when Soviet authorities literally pulled the plug on satellite transmissions by the U.S. networks when they tried to report on Moscow dissidents during President Nixon's summit visit. A less publicized version, also involving satellites, occurred several months earlier when Soviet scientists were using telephone calls to dictate their technical reports to colleagues in the West. The phone calls were cut off, because the Russians involved happened to be Jewish.

The Communist case is fairly clear cut. These countries are wary of introducing high-capacity, consumer-oriented communications services, particularly those which involve links beyond their own borders which would erode control over the flow of information in and out of their country. We are getting a very practical example of this in the current negotiations that we and our West European allies are conducting with the Soviets and their Eastern European colleagues at the European security talks in Geneva. The firmest Soviet position is reserved for the agenda item which would permit a greater two-way flow of information between the divided halves of Europe.

In the Free World, moreover, not every country is prepared to make a full commitment to an open communications society at the level that the satellites and other advanced technologies now make possible. Whatever their reasons - political, cultural or economic - this is a factor

which must be taken into realistic consideration when we talk about the potential of these communications technologies. However we may regard them as misguided or misplaced, these attitudes inhibit the realistic application of these technologies.

Thus, while there is strong agreement about the desirability of maintaining and expanding the Intelsat system for long-distance communications, there is considerably less agreement on how the new generation of higher-powered satellites capable of specialized services should be handled. This raises questions of political, economic and cultural interests which, by and large, were considerably less important in the case of Intelsat. The problem with these newer proposed satellite applications is that they involve conflicting interests which are, literally, closer to home in each of the countries involved. We have seen this here in our own country with the controversies which delayed, until this year, the introduction of domestic satellite services.

Not all future uses of the satellites are in this category, of course. There are specialized satellite services which are "naturals," both in terms of economics and of services rendered. The most clear-cut example of this is the maritime satellites (Marisat) which will go into commercial operation within the next year, servicing ships at sea. For all of the advances made in shipping - from supertankers on down - in recent years, most ships on the high seas still rely on unreliable Morse code communications at eight words a minute. When the Marisats go

into operation, they will provide a unique service that can only be done by satellites. The same will be true of the proposed Aerosat satellites, servicing airline communications in mid-ocean.

These are, as I have suggested, "naturals" for satellite development. They serve specialized needs, and have a clearly defined economic base. The problem we need to address ourselves is that much wider area of possible satellite services where the political, economic and social requirements have not been clearly defined, much less acted upon. This is the modern-day version of how Thoreau reacted when he was told that the new telegraph line had been extended to Texas. He pondered this technical achievement and then asked the proper question: what did he have to say to Texas? Thoreau's implication was: not very much. We cannot, of course, be quite so sanguine about the need to communicate.

We know that the satellites, and other new technologies, offer us the prospect of providing a new level of channels which can enrich our personal and communal lives, if used properly. Many imaginative proposals have been put forth for providing these channels, many of them well within the present technological capabilities of the new communications machines. Among the blue-sky proposals, my favorite is the one put forward by a Swedish futurist. He proposes that we will each be provided with a portable "walkie-talkie-lookie" communications instrument, and our own personal telephone number. Thus we can dial

up any individual or information bank utilizing satellite and other high-technology links.

You may have, as I do, mixed feelings about the prospects of a walkie-talkie-lookie machine, but there are other prospects which are more realistic. One such proposal, developed by engineers at TRW and doctors at the Yale medical school, is a World Medical Satellite (Medsat). The Medsats, in synchronous orbit, would allow direct communications between physicians in urban hospitals and paramedics in remote regions. The paramedics would use portable communications terminals and make a general diagnosis which they would transmit back to a doctor for further advice. The value of such services in a developing country (in Ethiopia for instance, where there is one doctor for every 100,000 persons) is clearly evident.

In fact, a modified form of this system is already being experimented with in Alaska, utilizing the NASA advanced-technology experimental satellites, connecting remote Eskimo villages with medical centers in Alaska and other states. At another level, there have been a number of international experiments for linking foreign doctors with the computerized medical information bank at the National Library of Medicine in Bethesda, Md. The Library's computers contain abstracts of research published in over two thousand medical journals around the world - clearly a unique resource for any doctor.

Now, obviously these experiments are all to the good, as are the various proposals for implementing them further. But, of course, it is

not as simple as setting up a satellite circuit. The real problems are here on the ground. Training those Ethiopian paramedics, for instance. Providing them with even the most elementary medical equipment. Acquiring and maintaining the portable antennas. Getting the money to pay for all this. And there are wider questions, including ethical ones. A major problem in developing countries, as we all know, is that death control has clearly outpaced birth control, through the application of relatively simple medicine, immunizations and public health measures. A worldwide paramedic service might well widen this gap, increasing pressures on food supply and other resources. Honest men differ on the solution to these conditions, which could be compounded by an unbalanced attention to one aspect of the problem.

This involves considerably more hard thinking than has been evident in most of the glowing proposals put forward about satellite applications up to now. Now that the new generation of specialized-service satellites are beginning to prove themselves technically, the time has come to think of the specific trade-offs - political, economic and social - involved in utilizing their capacities.

One example, familiar to most of you, will suffice. This is the prospect for educational satellite Wilbur Schramm has remarked wryly about the deadweight of the reports - invariably hundreds of pages long - written on this subject. Almost always they are accompanied by a

touching picture of a satellite transmission into a TV set in an Asian village schoolhouse. Almost invariably in these reports the emphasis is on the technique rather than on the content of the programming or on the real-life situations in which this programming is being introduced.

There are different ways of approaching the realities involved. I would like to suggest an agenda of four considerations. They are related to one another, and to other aspects of satellite communications raised by my panel colleagues. Briefly, they are:

1. Integrating new satellite services with existing communications channels. However obvious this may seem, it is a point which tends to be glossed over in many of the proposals made in this area. The point can be dramatized by noting that the present generation of satellites (Western Union's Westar, for instance) can transmit eight million words a second. In most countries around the world, the terrestial communications systems are incapable of handling this kind of traffic. It is almost as if one man were taking down that flood of words with a quill pen.

The problems are not simply technical: they are also economic, political and social. The existing communications networks in most countries are entrenched monopolies, presided over by a government ministry which is usually a model of cautious conservatism. Most of you have lived and travelled abroad, and you each have your collection of atrocity stories about the local telephone systems.

Without exception, these ministries are strong supporters of Intelsat, which provides them with access to commercially profitable,

expanding international services, supplementing existing services. The problem comes when new, untested satellite services are proposed, most of which would require heavy capital expenditures locally without the promise of immediate returns. Like most cautious entrepreneurs, they would prefer to amortize what they have before committing themselves to risky new ventures. The status-quo proponents of staying with the older technologies can always prove that some damage will occur. The advocates of the new technologies can only hold out the prospect of improved services, often based on faith and untested projections.

2. Integration of satellite services with other new technologies. Here again we cannot think of the satellites in isolation. They are only one part of the broad spectrum of converging technologies which are going to influence future communications patterns. You are familiar with the others - high-capacity cable, waveguide, fiber optics, lasers and so forth. Here again we get into trade-offs and other relationships which are going to be crucial in determining the most effective use of these technologies.

It is, of course, a subject which the American telecommunications industry is acutely aware of, since most of these technologies were spawned here. Perhaps the most recent example of studies in this area is the Booz, Hamilton and Allen report for the CATV industry on the possible interface between cable systems and domestic satellites.

Since we are looking at satellites from an international viewpoint here today, it is relevant to note that this problem is a remote one for all but the most industrially advanced countries abroad. Nevertheless, it is one which must be considered in determining the efficient use of specialized communications satellites for these countries.

3. The establishment of social priorities for specialized satellite services. In a sense, of course, this is the basic question for any nation to ask, once it begins considering satellite services beyond the commercial types that are offered by Intelsat, and eventually perhaps by regional and domestic satellites. The specialized services are going to be, by and large, community services such as education, health information, and other government programs. Each country is going to have to decide for itself what its priorities are. In many cases, this decision will involve consultation with neighboring countries when regional services are involved. (We have already seen the beginning of such coordination in Europe, Latin America and among the Arab States.)

Here is where the hard questions must be asked. What are the priorities in terms of services? Who controls the services? Who pays? Who has access? They are questions that were first raised in a meaningful way here in this country almost a decade ago when the Ford Foundation proposed a "people's dividend" public television service for the domestic satellite system. However you rate the specific solution proposed by the Ford experts, they were asking the right questions.

Each country is going to have to work out its own solutions to these problems before meaningful specialized satellite services can get underway.

We have a good case history of the problem here at home. Following the successful launching of the ATS-6 NASA satellite in May, the question was raised whether the back-up satellite (the one which would have been used if the first launching failed) could be used to extend the educational and other experiments being conducted through ATS-6. The National Academy of Engineering's space board recommended this, supported by organizations across the country involved in the experiments. The ranking majority and minority members of the Senate space committee - Senators Moss and Goldwater - support the proposal. However, NASA has reservations about the project. Not only does it involve an additional $45 million to prepare and launch the new satellite, but NASA points out that such a move would put it into the operational, as opposed to the experimental field.

It is an interesting problem, where good men have different opinions. But it points up the very real problem of how to make the shift from the experimental phases we are now in with specialized satellite uses to the operational phases.

Other nations are facing similar problems. The Indian Government, as you know, is participating in a one-year ATS-6 educational experiment, involving transmission to Indian village schools. Assuming that all goes

well with the experiment, the Indians face some important decisions on the long-term role of satellites in their communications-poor country.

This subject was discussed recently in a sobering report issued by the Indian National Committee of Science and Technology on the prospects of an Indian society which, by rigorous population control, is stabilized at 900 million persons within the next 25 years. The report makes the grim projections of the Club of Rome seem optomistic in comparison, but it paints a picture that is credible to those of us who have lived in that part of the world.

One section of the report is relevant to our discussion here. It is the prospect for utilizing satellites as a major component in both child and adult education. The report scenario says:

"Communications satellites impart education, training and entertainment on a mass scale in large open-air auditoriums with special acoustics and optics to reach thousands of people at one time."

There is almost an Orwellian cast to this scene - but it is one that cannot be dismissed lightly by anyone familiar with the problems faced by India and other developing countries.

4. <u>The relationship of technology to cultural inte grity.</u> This is hardly a new subject, but it is one that is given special meaning in relation to communications satellites. I refer, of course, to the problems raised in connection with so-called direct broadcast satellites.

Perhaps the best known fact about this subject are the heavy votes against the American position on this subject several years ago in UNESCO and in the United Nations General Assembly. These votes give an incorrect black-and-white impression of "us" against "them" on this issue. The problem, as discussed by others on the panel, is a complex one on which useful progress has been made since the UN votes.

The black-and-white image pictures the United States as somehow in control of a world satellite which would broadcast "I Love Lucy" directly into present television receivers - a concept that has no reality either in technology, economics or politics. Nevertheless, it would be wrong for us to underestimate the feeling, even among our best friends abroad, that the new high-powered satellites represent a threat to cultural and political interests. Even the London Economist - usually a perceptive analyst of American affairs - saw such a threat in the NASA ATS-6 when it was launched in May. Although the satellite is, by no stretch of the imagination a direct broadcast instrument, The Economist declared that "the Americans are on the way to commanding the eyes of the uncommitted, undeveloped world," and recommended that Europe resume plans to build a similar satellite.

This is a touchy issue, and it is one that must be approached with concern for the attitudes of others as well as for our freedom-of-information traditions which are contrary to the prior-censorship proposals put forward in international forums.

In this brief review, I have obviously raised more questions than suggested answers. In a sense, the easier questions have been asked, and answered, by the Intelsat experience. Intelsat provides a solid base from which to proceede in developing more specialized satellite uses. We have already had a preview of what the satellites can do, through Intelsat, the ATS experiments, the Canadian experience and others. Where, and how, we go from here will depend on our ability to reduce the tremendous technical capabilities of the satellites to economic, political and social reality.

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