THE DOMESTIC SATELLITE CHARACTERISTICS AND OPPORTUNITIES FOR CABLE TV

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For some of us who were in the Eye Opener Session this morning, you will have to forgive me but this is somewhat repetitious but I think it will be useful for the subsequent discussion and there are many new faces here that weren't with us at eight o'clock. I'm not sure my eyes were open myself. Maybe I didn't see all of you.

Somebody said that he was there with toothpicks to keep his eyes open and somebody else said that would show all the red eyeballs.

The development of the potential of domestic communications satellite systems for enhancing the services of cable television systems faces a number of major obstacles before there is any promise of financial return for us in these services. It's not just a chicken and egg problem but we've got at least a three-cornered problem. We've got interlocking activities which will require substantial commitments of resources before a program service via satellite can be available to cable system subscribers.

First, there will have to be the satellite system which, to be economically viable, will have to be part of a system established to satisfy other communications requirements. In other words, if we are going to use a few transponders for cable program relay, these will have to be carried as part of a bigger system that is serving other needs also.

There will have to be a set of earth stations which serve a number of communications activities or, hopefully, are economically viable as a separate entity so that we can each have an earth station at our headends.

Then there will have to be a program service or services provided to make use of this system.

Each of these three separate parts of the service will involve commitments of hundreds of thousands or a few million dollars before there is any payoff in sight. If we address ourselves to the satellite portion of the system first, we need to look at the current state of affairs with regard to proposals which could lead to a satellite transmission capability to meet our needs. Many look at the successful international communications satellite system operated by Comsat for the international consortium Intelsat and say, "Why can't we use a system like that?"

There are major obstacles to the successful direct conver-

sion of the international system to domestic services. The frequencies used by Intelsat, which were agreed to internationally during the extraordinary administrative radio conference in 1961, are shared with extensive terrestrial microwave systems which necessitates rather stringent limitations on the signal intensities that satellites can lay down on the ground to avoid interference to these existing microwave systems.

The TD-2 system, which is the backbone of the common carrier microwave relay system in this country, operates in these same bands, 4 and 6 GHz.

This is not a great handicap for the international system which is set up primarily to provide a large number of telephone channels and a few television channels between countries where the demands are relatively large. The fact that an Intelsat earth station costs several million dollars to work effectively at these low signal levels does not provide the same obstacle to an effective economic system that would be the case of a domestic system desiring to reach a large number of separate terminals with a few channels.

We've even got troubles in the international area where some of the smaller countries that had a few HF channels, possibly 5 to 20, have put in ground stations that cost 6 or $7 million. Now they are trying to run those same channels through the satellite and they've got much better transmission but the cost per channel is ten times what it was with their HF systems. So they are crying about the cost.

Telesat Canada, which is being built to operate in these same frequency bands, is planning a number of receive-only earth stations which I am told are costing about $200,000 each on a turnkey basis. I think they are buying 35 of them. This is a complete station with a building, a power supply and everything but about 200 k.

These stations are configured to handle one or two television programs and they have been engineered to provide this service at about the minimum cost using these frequencies at the present time, that is, in the 4 and 6 gigahertz bands.

Another problem sometimes develops because it's necessary to locate the stations remote from the location where you need the service. Because of possible interference with the surface microwave systems, you may have to locate the station away from the center where service is desired and use microwave relay on other frequencies to tie the station with the load center.

One of the possibilities of reducing the cost of earth stations and thus reducing the cost of the overall system is to use frequencies in bands where satellite services have priority and where they are not restricted in the amount of signal they can lay down on the surface.

The most promising of these bands for television programming distribution to a large number of receive-only earth stations would be the frequencies in 11, 12, 13, and 14 gigahertz, which were approved recently by the Administrative Radio Conference in 1971 for this service. However, the technology necessary for the use of these frequencies is nowhere near as well developed or as well advanced as that for the use of the lower frequencies and, consequently, more development work must be done and there are greater uncertainties as to the costs of quite a few of the components, the ground station and space segment components as well.

As we know, the Federal Communications Commission has had the question of domestic communications satellites under consideration for a long time. Recommendations were made by the Office of Telecommunications Management five or six years ago, as I recall, that a pilot system be established to develop technical and economic information which could guide the country in the exploitation of domestic satellites. As a result of many actions, many proposals and recommendations by various organizations, the situation has gone through a large number of changes.

However, the Commission on March 24, 1970, issued a report and order which resulted in the filing of eight proposals to establish domestic satellite systems and also in several proposals to build independent ground stations. On March 17, 1972, the Commission issued a Memorandum and Order which, in effect, was just a cover letter on top of a set of recommendations of the Common Carrier Bureau of the Commission. Although this report and order did not present a final decision on the subject, it did take a major step toward a plan for the establishment of domestic communications satellite services.

The Commission then asked for comments to be filed by April 19 and provided for oral argument before the Commission en banque on May 1 and 2. So let's look briefly at these proposals -- what the applicants propose and, to some extent, what the Commission staff proposes to do with these applications.

Systems were proposed by Western Union Telegraph Company; Hughes Aircraft Company, with four telephone operating companies of GT&E Service Corporation affiliated; by Western Telecommunications, Inc.; by RCA Global Communications, Inc. and RCA Alaska Communications, Inc.; by Communications Satellite Corporation and AT&T as a team; by Comsat separately; by Lockheed MCI Satellite Corporation; and by Fairchild Industries, Incorporated.

The applications filed by these several companies provide a range of possible services to CATV system operators and a considerable variation in possible business relationships with users.

A most interesting application, from the standpoint of the CATV system operator, is that of Hughes. Hughes proposes a system to generate programs and distribute them for a fee via satellite to CATV operators. Hughes has presented a fee schedule based on

a fixed charge for each subscriber to a CATV system. Quoted fees have ranged from 25 cents per month per subscriber to $2.00 per month per subscriber, depending on the amount of service the CATV operator got from Hughes, the type of programming, and so on.

Hughes' proposal also would provide long-haul communications relay for GT&E. It contemplates major earth stations in the vicinity of New York and Los Angeles with receive-only earth stations that could be located close to CATV headends.

These stations would use 35-foot diameter non-tracking antennas -- that would be a fixed antenna somewhat similar to this ATS-F experiment -- with feed arrangements which would permit a switch to an alternate satellite when one satellite passes before the sun. In other words, at certain times of the year the satellite will pass across the face of the sun and you get noise from the sun and so you would switch to a second satellite and they would put two satellites in orbit to take care of this operation. This switch would only have to be done on a few days twice a year and it could be computer-controlled from a remote location so that it could be done automatically.

Hughes estimates that these stations would cost approximately $100,000 and if they were used for several services the costs could be apportioned between the several users. On the other hand, such stations could be provided for a CATV headend.

Hughes would provide 12 channels per satellite and guarantee 20 channels for the 8 that they have assured GT&E they would provide and 12 channels for video program distribution.

Several of the other applicants before the Commission proposed various video transmission services as part of their total plan. Some give specific attention to the provision of such services to a widely distributed system of receive-only ground stations. RCA, Western Telecommunications and others considered this possibility.

The Comsat application proposed a multi-purpose service that would include CATV systems. It suggested that two television channels would be needed by CATV. Some of us would have doubts that that is going to be enough. Comsat in this application and in subsequent discussions which we have had with the people have opposed the idea of user-owned earth stations dedicated to one service such as CATV operations.

MCI-Lockheed proposes to provide primarily leased telecommunications services. It would provide service for transmission of CATV programming either on an occasional basis or with a full-time dedicated transponder, one TV channel per transponder. Lockheed proposed to establish 15 transmit/receive earth stations at major metropolitan centers which would be program sources and this application proposed the establishment of receive-only ground

stations which could be used for CATV service and either owned by Lockheed or by the CATV system.

Fairchild Industries proposed to provide 24 channels for wide area TV coverage of the 48 contiguous states.

Western Union proposed to provide ten full-time channels for video services.

The AT&T-Comsat proposal is for a system dedicated primarily to expanding the existing services that AT&T now provides. It would involve three satellites to be put up and operated by Comsat, and five ground stations. It makes no specific provision for CATV program distribution or for distribution to receive-only earth stations. AT&T does propose to provide adequate circuit capacity in the system for program distribution but it would have to be leased to another operator to provide for CATV use.

No one of these applications, with the possible exception of Fairchild Industries, offers hope of a reasonably economical system for distribution of television programs to CATV headends. Fairchild has quoted prices of from $234,000 to about $360,000 per year per channel, and the rest of the applicants have proposed prices from 75 to $125,000 per month.

Most of them contemplate a channel in the present 4-6 gigahertz bands which will require earth stations, which I estimate and others have will cost 75 to $100,000 each. I mentioned the $200,000 price tag associated with the Telesat Canada station.

The FCC Common Carrier Bureau considered the several applications, the fact that many of them propose services to the same customers, that the economics of communication satellite services are still somewhat uncertain, and that a grant of all of the applications might result in a substantial period of time while the several applicants worked out possible combinations. They have to resolve the problems of financing, they will compete for commitments to provide service to customers, and so on.

The total of these applications would provide about 600 transponders in space and each transponder is capable of carrying a television program in one direction, also capable of carrying 500 to 1000 telephone channels in one direction and a much larger number of narrow band data channels. So there is real question as to whether all of these would provide economically viable systems.

So the staff recommended some groupings of systems that could result in the establishment of possibly three systems. The FCC Common Carrier Bureau suggested that their proposal would permit each applicant to use the satellite technology of its choice without having to invest in a complete system, while at the same time each participant would be free to design its system to attract customers and to devise new services and rates.

The staff further concluded that each participant could use its share of the facilities in whatever manner it desired to develop services and rates and so on.

The Bureau also recommended the imposition of a number of restrictions on the various systems. First, with respect to AT&T, because of its strong position in the market for communications services, the Bureau proposed that AT&T be limited at least in the early years to the use of satellites only for non-competitive services such as the interstate message toll traffic and Wide Area Telephone Service.

The FCC, if it adopts the Bureau's recommendations, would also require AT&T to show that leasing facilities from Comsat was not more costly than owning its own facilities.

With respect to Comsat, the Bureau would require it to choose between owning and operating a space segment for AT&T or owning and operating satellite facilities for furnishing service to others than AT&T. The Bureau said that Comsat should not be in the dual position of providing service to AT&T and also providing service in competition with AT&T.

The Bureau recommended that satellite equipment suppliers who have filed applications would be required to establish a separate corporate subsidiary to provide communication service and they also recommended that whatever services are established the opportunity be provided for users to own their own ground stations.

These recommendations have been considered and a large number of filings were submitted prior to the 19th of April. One of the difficulties we are in here is that we had to prepare some of these talks before the 19th of April and certainly before the 1st of May for inclusion in the conference record and so we're somewhat caught up by the march of events.

A point that the Bureau made in its recommendations as published was that, and I will quote this: "Domestic satellite system licensees should not be required by the Commission, as a matter of policy, to furnish free or reduced rate service to public broadcasting or other eductional users, --"

It further stated "that while the Commission may prescribe such preferential rate treatment, it lacked sufficient information to initiate any such rate requirement at this time."

The Commission in requesting comments and setting the date for oral argument before the Commission on the Bureau's recommendations, asked the several parties to treat particularly the following issues.

First -- Whether the Commission should adopt a policy of limited open entry, which is what the Bureau in effect proposes, or, in the alternative, a policy of unrestricted entry.

Second -- Whether the Commission should require Comsat to elect between owning and operating a space segment dedicated to the use of AT&T or owning and operating satellite facilities for the purpose of furnishing services to others besides AT&T.

Third -- Whether AT&T should be limited in its use of satellite facilities to just providing its non-competitive services.

Finally -- Whether the Commission, as a matter of policy, should require licensees of satellite facilities to provide free service to educational entities.

The gist of the written and oral responses to these questions seems to be the concept of combinations; that is, limited open entry proposed by the staff will not fly and rumors have it that the Commission will probably adopt some policy such as that recommended by the Office of Telecommunications Policy, which would provide open competition between the several applicants.

The interests in domestic satellite services for CATV may not be necessarily serviced by a wide-open field immediately because there will be a large number of problems to be solved. Since the stakes are high and the potential for losses from misjudgment will be very substantial, services that CATV systems can afford can only be provided as a small part of a much larger system serving a wide variety of telecommunications customers. With the exception of the systems proposed by AT&T-Comsat and the portion of the Hughes proposal that would serve GT&E, no one of these applicants has any assured market for its services and most of them are aiming at a future somewhat nebulous market for specialized communications services. These services are primarily services for business data transmission and getting a commitment to handle the programs of the three commercial TV networks and promoting a wide range of other private line services.

The Commission, in addition, has recently authorized a number of specialized common carriers to build several wide-ranging networks of microwave stations whose owners are proposing to serve the same general markets. Some of us with a good deal of experience in the communications field believe that these markets have been overestimated. I personally believe that inadequate attention has been given to the critical problem of local interconnection arrangements which tie these interesting long-haul microwave systems, whether they are specialized carrier microwave systems or satellite systems, to the desks or the communications terminals of their ultimate users, and it's going to take a lot of subscribers to pay a reasonable return on the hundreds of millions of dollars which are going to be required to build the specialized microwave systems that are now going forward and to establish one or more, two or three domestic communications satellite systems.

Communications satellites hold major promise for distribution of programs to CATV systems. I think that we can convince

ourselves that technically we know how to do it, economically we know how to do it, if we can get somebody to put up the satellites, but, nevertheless, there are a good many unknowns before we are going to have a viable domestic communications satellite system that will really serve our CATV needs.