

## THE ROLE OF TELECOMMUNICATIONS IN NATIONAL SECURITY

Mr. Benjamin H. Oliver, Jr

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Reviewed by: Col. Ingmire      Date: 8 Mar 63

INDUSTRIAL COLLEGE OF THE ARMED FORCES  
WASHINGTON, D. C.

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18 December 1962

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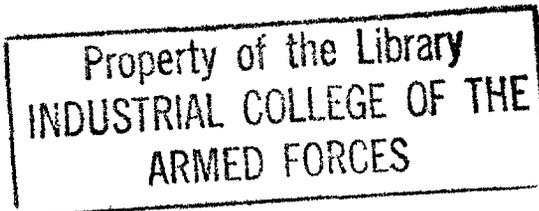
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Reporter--Grace R. O'Toole



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INDUSTRIAL COLLEGE OF THE ARMED FORCES

Washington 25, D. C.

~~THE ROLE OF TELECOMMUNICATIONS IN NATIONAL SECURITY~~

~~18 December 1962~~

GENERAL STOUGHTON: Gentlemen:

The importance of telecommunications to the military commander at all levels certainly does not need any elaboration by me to this audience.

Our speaker this morning has had long service in one of the major communications companies in the Nation and has had a close association with the Armed Forces.

This certainly qualifies him very highly to discuss with us this morning The Role of Telecommunications in National Security.

It is a pleasure to present Mr. Benjamin H. Oliver, Jr., of the American Telephone and Telegraph Company.

Mr. Oliver.

MR. OLIVER: Thank you General, and thank you, gentlemen, for this opportunity of coming here today to be able to talk to you about a subject which I am very interested in, and I take it from the things I have heard that you are as well.

I think it would be difficult to find individuals more aware of the value of good communications than you who are present in this room today. I guess most people have an awareness of the value and the necessity for good communications in connection with their business affairs and their personal lives, but I don't think they have this nearly to the extent that you folks have.

Your military profession has all of its specialized know-how and training directed toward the objective of command and control. However, the exercise of

~~command and control depends upon good communications to bring together the elements of information essential to these decisions. Consequently it is natural that you feel that communications can never be good enough.~~

Let me start out by saying that I agree with you in this judgment. Part of the bill of particulars I was given before making this talk today was a charge to estimate the industry's capability to meet our Nation's needs in peace or in war for an uninterrupted flow of essential communications. Meeting the Nation's needs in peace is a large order, and accomplishing these same objectives during war is a tough job.

Whatever I may say today about what we have done or what we are planning to do should not be taken to mean that we are satisfied with either present accomplishments or future prospects of accomplishments. We never expect to be satisfied with what we are doing any more than you gentlemen will ever be satisfied with the present status of command and control. I think this expresses the Bell System point of view in this regard.

Our Nation's communications needs are continually changing. So an industry capability to meet these needs should keep pace. However, I feel that just keeping pace is not nearly enough. I believe that we in the business of furnishing communications must be so closely attuned to these requirements of our Nation that we can anticipate communication needs before they appear and have the means of supplying such a requirement when it appears on the horizon.

Of course this means that we must establish an adequate liaison with those individuals in government who can help us achieve this objective.

Realistically I appreciate that in all instances this anticipation process does not work out as well as we would like it to and as well as you would like it to. Practical considerations that must be exercised by both parties result in something less than perfect performance in this field. However, for our part we'll never be satisfied with doing anything else except the best possible job in this respect.

You might ask: What strengths are there that we possess that the Nation can draw on to meet its communication needs in peace and during war? The first of these is the size of our network and the rapid rate of growth that it is experiencing and has experienced in recent years.

Let us look at the first viewgraph. This says that we have 67,559,000 circuit miles as of the end of October in this year. This represents a 15 percent increase in the 10 months since January 1. This rate of growth has been rather constant, and it shows all indications of continuing.

Before commenting further on this viewgraph, I'd like to have you look at the next one. This is a very much boiled-down view of the Bell construction budget for the current year and for the next 2 years. The difference between the two columns represents the money spent for such things as rearrangements of our existing plant. In our business we call this standing-still expenditures. The right-hand column is growth plus modernization.

Reducing the figures shown on the chart to approximate expenditures for communication facilities per working day, in the three-year period from 1962 through 1964 inclusive, it amounts to about \$12.25 million each and every day, when one considers the left-hand column.

~~Referring to the right-hand column, the same kind of arithmetic comes up with an average working-day expenditure of about \$10 million. This goes into expenditures that construct new plant and modernize what we have.~~

You could very well ask: ~~What is the significance of these figures or the activity that these figures represent? In what way does construction activity constitute a strength to our Nation's communication needs in peace and in war? The Bell System construction activity does have several beneficial effects in this connection. These effects are somewhat considerable in nature. One effect stems from a major policy decision that was made half a dozen or more years ago. At that time we decided that when it became necessary to reinforce existing communication facilities we would try to do so by making the addition in such a way so as to also secure at least some diversity and some degree of greater protection. We began to go around target areas and to establish bypass routes.~~

~~The next viewgraph showing our backbone routes indicates some substantial progress. Now, this is a complex thing. We are not going to look at it too long. If you look at some of the big cities you see circles around them. The red dots I am going to refer to later. Where we don't have circles we have the ability to patch around and switch from these red dots to something adjacent to them. So this is just to indicate that this has progressed in the years since we made the initial decision. I think the rate of progression is much greater than it has been.~~

~~Another illustration of constructing new plants so as to secure diversity and protection is shown by this viewgraph. When we needed a new transcontinental route connecting the East Coast and the West Coast, we decided to supply this need with~~

~~a protective cable. This viewgraph depicts the construction of a typical manned repeater station. These are about every 100 miles.~~

The next viewgraph shows a typical unmanned station. The new construction route consists of 12 tubes of coaxial cable and is completed on schedule as far as New Bern, Illinois, which is near St. Louis. It will be completed to San Luis Obispo, California, by December 1964, and a leg to SAC Headquarters will be extended from Fairview, Kansas, by November 1963.

~~Still another way protection is built into new buildings is shown by the next two viewgraphs. They show buildings that have fallout protection provided by windowless construction and walls with a minimum of 12 inches of reinforced concrete. This building is nearing completion. In fact, the building itself is completed. The insides are being installed now--the equipment and building equipment data, as well as telephone equipment. This is at Tenth Avenue and 50th Street in New York City.~~

The second is another type. It is typical of the ones I can think of. There is one at Colesville, New Jersey, and another one at Oak Bluff, Nebraska.

You can readily see that if our construction program is large we have ample opportunity to apply diversity and protection techniques. We are doing these things and we are doing them in increasing measure. Keep in mind that 70 percent of our plant did not exist 15 years ago. Our rate of growth and modernization will probably accelerate. Let me assure you that we are going to take good advantage of the protection and diversity that we can get as byproducts from a high rate of construction activity.

~~A fast-growing plant also makes it easier for the Government to get good communications wherever and whenever they might like to have them in peacetime. In and after war an extensive plant should provide more pieces that could be patched together, if need be, to provide essential information.~~

Another way to give you some estimate of our capability to meet the Nation's needs in peace and war is to sketch out for you what happened recently in the Cuban crisis. The Cuban situation brought to this country a condition unique to recent generations of the United States citizens, namely, a military buildup and operation on the shores of our own country. Military forces of all the services--the Army, the Navy, and the Air Force--made themselves ready for whatever circumstances a worsening of the Cuban situation would bring. The marshalling of so many forces from this country and without required a great deal of communications, and required them fast--in days, not weeks. As you know, our military forces are spread all over this country and are connected together by networks, some of them military operated and some of them furnished by the common carriers. The fast-breaking situation in Cuba required a very substantial rearrangement of the communications obtained from common carriers, and it required some additions as well. The Tactical Command around Norfolk required many more connections to places that they normally had no connections with. SAC was dispersing its power, for very obvious reasons, and wished to be in contact with these new locations. Practically every part of the country had some additional communication requirement placed upon it over and above its normal military network arrangement. The existence of an extensive civilian network reaching into many places made the quick setting up of

~~these new requirements possible.~~

If this had to be accomplished by military personnel using standard military equipment, it seems to me that the job would have been very much more difficult, and more time-consuming, since there would be no existing framework on which to build.

There was also some new construction required in connection with the Cuban crisis. It occurred in the southern tip of Florida. Let me place a viewgraph on the screen so that I can better get across what this new construction amounted to and also give you some idea of the time factors involved in doing it.

Before the Cuban crisis we had a cable going from Miami to Key West which passed through Homestead in the course of its travel southwestward. The circuits that existed at that time are shown in white lettering. The Homestead Air Force Base, which is a SAC location, sort of became the headquarters for all the activity that was going on in Southern Florida. Looking north from Homestead to Miami, we can see that the voice circuits were expanded from 393 to 558 in a few days' time. The telegraph circuits jumped from 111 to 171.

Looking south to Key West, the voice circuits increased from 165 to 234, and the telegraph circuits went up from 93 to 119. These added circuits were not spares that were lying around in plant ready to be put in service. These added circuits had to be manhandled in, in the fastest way that we knew how.

We had just finished getting ready for the winter season in Miami, so fortunately the circuits into there from the rest of the country did not require much further attention. However, the military is never satisfied with a single route for their

communications. ~~The diversity and safety of a second route is always wanted.~~  
~~Such a request was not made to us officially. We were not asked to construct~~  
~~diversity, nor was such an order placed to have this done.~~ However, we did con-  
struct a new diversity route because we knew it was the right thing to do. Southern  
Bell, the Western Electric Company, and Long Lines of AT&T joined hands and  
went to work on a microwave route already existing between Miami and Florida  
City. . This route is the one that feeds our tropospheric scatter system that beams  
from Florida City to Havana, Cuba. Additions to this microwave route provided  
348 new circuits between these two points in a matter of a few days by constructing  
a new TDQ channel between these two places. Then, from Florida City south to  
Key West, an off-the-air television pickup installation was converted into a full-  
fledged microwave link between Florida City and Key West.

Gaps had to be closed, building additions made, and tenors and channelizing  
had to be provided. Of course this gave us two ways to get from Miami to Key West,  
a cable way and a microwave way. The whole job, gentlemen, was done in eight  
days.

Of course, diversity was also desirable for the Air Force Base itself at  
Homestead. It took only 2 or 3 days to do this. One hot microwave link was built  
that provided 72 circuits from Florida City to the Base, to supplement the 745  
cable pairs that fed the base from the Homestead central office. That's that round  
dot there, labeled Homestead.

Incidentally, before the crisis the Base was fed with only 145 cable pairs. The  
additional 600 pairs were plowed in two 300-pair cables. It took a couple days' time

to do that. Southern Bell, Western Electric, and Long Lines worked around the clock to accomplish these things. Western Electric hired nine planes, and I have never been able to find out how many trucks to bring in the required equipment. While we were adding to communications in Florida and other places, we were also getting ready to fix up communications to Cuba if this became necessary. We have some cables going there and we have a tropo system, as you know. We own this end and somebody else owns the other end. Men were standing by who knew how to fix underseas cable and associated equipment. Others who were familiar with tropo scatter systems were ready to go if needed. Necessary repair and replacing equipment was located and we were ready to put back into services the cables and tropo systems linking the United States and Cuba if this was required policy. And I haven't made this statement before too many people because I don't think it would have been advisable.

At about the time of the peak tension of the Cuban situation, another pressing communication requirement suddenly developed. The important people, including our President, wanted to talk to certain key individuals in Central and South America. They wanted to do this fast, like we do it in this country, by just picking up the phone. However, things didn't work out this way, for a number of reasons, including the inadequacy of foreign communication systems. After the matter was discussed at the National Security Council meeting, we in the Bell System were asked to come up with a quick fix for the situation. This is what we came up with:

Since we currently have radio telephone circuits to all of the OAS countries, we decided to build our quick fix around these circuits. So we connected

a limited number of important government people to a special switchboard with direct connection to our overseas switchboard. We provided secretarial service for these special customers. In each of the OAS countries there are certain important people who constitute the foreign end of this network, and our specially trained operators know how to get them on the wire or to accept calls from them. We had this net in operation in 3 or 4 days, using the special switchboard referred to and the existing foreign telephone system. Also, we dispatched men to Central and South America to see if we could help these foreign countries improve the connections of these special foreign telephones to the overseas terminations of our network. Incidentally, not many of them wanted us to help. There hasn't been too much fruit from this effort. We are still using in a major part the network as it exists.

The above recital of what happened in the Cuban incident does not carry with it the implication that we feel that we are completely responsive to all the needs that our Nation would place on us in war. It is merely a recital of what took place in order to give you some measure of how seriously we hold our obligations in this regard. Even as we feel pleased about the responsiveness we exhibited in this particular instance, we are asking ourselves if we could be as responsive if the situation were different. We will continually examine what must be done in other places under different conditions.

Now, we haven't always done as well as we would have liked to. At the time of the Utah-Nevada bombings of our microwave sites, and when a building addition to an important communications center in Kansas City fell into its excavation, severing important circuits, our restoration time was far longer than it should

have been. Progress has been made in improving our techniques of restoration and more progress is in the offing. I'd like to touch on this phase of things to some degree because I believe it belongs in any estimate of our capability to meet the Nation's needs in peace or in war for an uninterrupted flow of essential communications.

The problems of restoration involve two quite distinct patterns. One--those things that must be done to return to service single circuits or a small number of circuits individually routed and not contained in a large bundle of communication channels. Two--those things that must be done to restore large bundles of circuits which, incidentally, quite often contain the important government circuits. This is broad-band restoration as we see it.

We are working on techniques to improve both categories of trouble. I am not going to mention the things we are doing to get better performance in the first category, because there are so many different approaches to it. However, it is receiving the attention it should have. It is very important. I will dwell a little on how the second category of trouble is being cared for, because, while the problem is larger, the explaining of what we are doing is simpler.

We have established what we call stator centers, three of them, each with duplicate records--one in New York City, a second in Mount Kisko, New York, and a third in Fort Carson, Colorado. New ones in San Francisco and Montreal have been cut in and are in service, and additional ones are contemplated. These things operate in parallels. Their primary function is to keep their fingers on what happens troublewise over our networks, both in the country and out of it, to

~~see that important government circuits are kept in services with the greatest possible reliability. They handle both categories of trouble--single circuits and broad band--but they have a unique function in handling broad-band restoration and direct what should be done, because they can see the big picture of our network status and so perhaps can take action that local people would not be able to envision.~~

Furthermore, they have access to computers, ~~so that necessary records can be updated with a minimum of delay. When I talk about a minimum of delay I am talking about minutes, not hours, particularly. Sometimes it runs to hours, but generally to minutes.~~

The next ~~viewgraph shows the New York City~~ ~~stator center~~, and the following viewgraphs show what their hypothetical action would be if there was a failure in a pair of coaxial tubes between Harrisburg and Wayne.

Let's assume here that there are four pairs of tubes in this, and that three are in service. The fourth pair is used as a protection channel. Maybe there's a trouble that that protection channel is working on. So we get another trouble. What happens? What happens is this: Those black lines represent radio relay crews, and within a matter of minutes we are on the way-- we shoot for ten minutes--to patching through in this way, as you can see by the yellow lines. If this doesn't work, we have another choice. Here that is. Finally there is a third choice, which is this one (indicating). There is still a further choice that goes around off the map, but we are very apt to find out that somebody else may be using that choice when we leave this map, so maybe it isn't as good as it sounds when I tell it to you.

The important thing to remember here is that all combinations for all sections of our network have been worked out in advance. Furthermore, we rehearse what action we will take by simulating a failure. We go up to the point of doing it, except that we don't actually put the people out of service. But they come up to putting the last patch in and then stop. So they go through all of the operation, and we time them. They go through all of the mechanism that has to be done to restore a trouble, except the last patch is not inserted. The fellow holds off on pushing in the plug.

While all broad-band sections of our network have preplanned restoration pairs, some do not have as many possibilities of restoration as they eventually will have. We're working every day to add to these possibilities. Multiple failures in a number of places throughout the country still bother us and can cause us real trouble. We are also working hard to minimize this inadequacy by providing more stuff to do it with. Our fast-expanding network and our policy of building in diversity and protection as we build new plant will help us in this respect.

To control restoration we are establishing restoration centers, as shown by the following viewgraph--which you saw before. These red dots represent that. They take over and they act as a sub-stator center, if you will, or they act to carry out what the stator center indicates is the right thing to do. I am not going to get into this detail too much. This is their function. They are astride the main intersections of communication pathways throughout the country.

Now, we have an administrative setup which is normal and which has been growing, but we envision one on top of that, an extension of it. My last viewgraph will

~~show you that. In Long Lines we have three areas of operation. They are represented as having headquarters in these red squares. These are on the protected cable route. Then we tie in all the companies. Each one of these companies has its own province of responsibility. We exchange information, correlate it, and work together, and we hope that this arrangement, supplementing what we now have in the way of normal trouble administration, will work better than it has in the past.~~

Once before I mentioned what I am about to say again for emphasis. My comments and the ~~viewgraphs~~ shown here are not intended to impress you with how good our accomplishments are or how good our plans are for the future. No one knows better than we how much remains to be done. My discussion is primarily to assure you that we deeply feel our responsibility in this tremendously important area of communications. We will never be satisfied with the status quo in communications any more than you gentlemen will be satisfied with the status quo in command and control.

Now let us look to the future and what it holds in the way of communications promise. Without a doubt, satellites will be important in our future way of doing things. So much has been written and said about satellite communications recently that I am not going to say any more at this time. Of course, I will be glad to try to answer any questions you may have on this subject, if you would like me to.

A very important development is being made in the manufacture of transistors. We can look forward soon to the ability to make transistors that have an unbelievably long life. This new transistor will just have so many applications that it is hard for me to enumerate these things because there are so many of them. For example,

~~underseas cables can have repeaters at short intervals which will make possible~~  
that they can pass broad band waves. These cables should require very little  
maintenance.

~~Sometime we will be using light as a medium of transmission,~~ in a similar way  
to the manner in which we now use radio frequency waves. Many years ago,  
Maxwell pronounced both light and radio waves--called hertian waves in those days--  
as being one and the same thing. They are electromagnetic in character. We found  
out how to tune radio waves a long, long time ago, but we only recently discovered  
how to tune light waves. Right now we can't readily use light waves as a commun-  
ication channel medium, but we are learning how to, real fast. This will definitely  
be featured in our communications picture in the future.

The real promise is that the light spectrum holds the possibility of 10,000 times  
as many channels as the radio frequency spectrum will permit us to have. When  
you've got something like this in front of you, and the demands for communication  
channels growing as they are, in the years to come, it is just doggone lucky that  
we discovered how to handle light wave frequencies at about this period of our devel-  
opment. I guess when a need is present we always seem to come up with an answer.

The last item in my bill of particulars covering my talk today has to do with the  
emergency powers of the President in the area of telecommunications. This area  
has been clarified some recently. It seems to me that in a fast-changing field such  
as communications, any present-day emergency powers of the President might not  
accomplish tomorrow what the rules intend them to do today. Furthermore, it is  
my true belief that in any real emergency the President is going to get just about

what he wants in this regard. I feel that the ~~communications~~ industry must continually be responsive to the communication needs of the Government. I said it before but I am saying it in this aspect, too. We must keep close liaison with the right individuals to be certain that we are responsive. Such a condition of responsiveness has to include in it an awareness of what the Government needs are during an emergency as well as in normal periods. Knowing both the emergency and the normal communication requirements of the Government, we should be able to plan a system and our operation so that they could transist from normal to emergency with the least dislocation.

This, gentlemen, ~~is what the Bell System~~ is trying to do. I don't think we've arrived at a perfect solution to the problem. However, I hope what I have said here today and what I have showed you will convince you of the sincerity with which we have tackled this job and the diligence with which we are pursuing it.

Thank you very much.

COLONEL McELWEE: Gentlemen, Mr. Oliver is ready for your questions.

QUESTION: Sir, an examination of the vulnerability of and recuperability of the tropo system in America, particularly the area where you are the primary user of this in the Long Lines Division, would seem to reveal that there has not been provided much information on sabotage, the recuperability, or the dispersal that you use to counter sabotage in some areas. I am thinking of the 1961 microwave problem in the Northwest. Second--this is a delicate one and many people really don't talk about it--the number of no-shows or the number of runaways that might

~~exist in any organization after bombs fall somewhere. In essence, then, will your dispersal take care of it, and can you operate from a few key points?~~

MR. OLIVER: I don't think I can answer these things with perfect assurance, but I'll try to do the best I can in answering your question directly. These things we have thought about and we worry about as much as you do. These 3 or 4 slides that I showed were meant to give you in capsule form some of the things that we think we can do to help get around this first difficulty you mentioned. The first difficulty is, if you get a microwave cyclone up, you are in trouble. We found this out at Nevada and Utah. We got them back, but we didn't get them back fast enough. We have to be talking now about speedy action.

We have mapped every section of microwave and every section of coaxial cable, and we've got alternate plans for switching these. We have laid out plans 199, A, B, and C, and 426, A, B, and C, et cetera. These are on file at these restoral centers as well as at the stator centers. We school our people in doing these things.

We hope to get around sabotage by this arrangement. While now we are doing these things manually in part, we are also doing them remotely. From one of those red centers we could operate the next red center by remote control.

We have another vision beyond this. I don't know when we are going to come to this, but we will just as fast as we are able. We are going to have automatic healing take place, sometime. I can say a lot more words than this, but this is what we hope to do. When the trouble comes, we hope to be able to discover it before it is reported and then automatically take whatever action is required to

bring about a rerouting. Now, this is not tomorrow, but this is where we have our sights set in our fundamental thinking. We are planning. I guess the best way to put this is--6 or 7 years ago, when we started this thinking about spending our new construction money to buy more than new routes, there were a few of us who had this idea. But as time goes on the idea is contagious and infectious, and all the planners, all the people who are implementing--and it takes a lot of people to do this; you don't add to your plant \$10 million every working day without having a lot of people involved--are thinking about this. This is spreading, and the concept is becoming clearer in their minds, and we are doing more and more of it.

So I would hope that perhaps this is a curve going up, and it may not be as far away as I have indicated by my words.

Did I answer all your questions? I am not sure I did. I didn't answer about the people. Nobody knows this. You don't know this in battle. You school your soldiers and you get them up there and turn them loose. Well, you know what happens. You've been through it. This is the same position we are in. We hope that we can, by the same device that you use, by schooling, by indoctrination, and by example, be able to do these things.

Then if this fails we hope remote control will take care of it.

QUESTION: Mr. Oliver, I have two questions. First, could you tell us approximately how many or what percentage of that 67 million miles that make up the AT&T plant is leased to the military? Secondly, would you discuss briefly the relationship of your company with the Defense Communication Agency? In particular I have in mind: Did you deal directly with DCA immediately on the Cuban crisis

~~requirements, or did you deal with the Secretary?~~

MR. OLIVER: I think I can answer the second better than I can the first. I don't know the mileage. I know the circuits. This will give you a feel. The mileage may not be in the same relationship. We have long-distance circuits in the magnitude of 100,000. This is a round number. We have military circuits in the magnitude of 15,000. If the mileages were the same for each the relationship would prevail--15 percent. I am not sure what this is.

In the Cuban crisis we dealt with DCA. We dealt with all the services. We set up here in Washington an around-the-clock command post--if you want to call it that--a communications command post. The various services, working in the way that they were accustomed to, through this liaison that I was talking about, that was so important, poured in their requests for service to us, and we were sort of a catalyst to get things going, and to spread this work to the places that had to be taken care of.

At the same time that we were doing this here in Washington, the military in Florida where placing separate orders with Southern Bell, which again came back to our Washington office for correlation. We correlate, in the Long Lines Government Communication Group, not only our long-lines orders but also the orders that are placed in the associated companies. But we don't necessarily make a bottleneck through our group. They can proceed parallel and then be checked on later.

The DCA gave us very broad instructions. They told us to do these things and to do them fast, and to be responsive to what the various services required and to get them in as fast as we knew how.

**QUESTION:** Sir, I am interested in connecting computers by communications, in other words, machines talking to machines. How far are you, or what is the progress in this area?

**MR. OLIVER:** The progress is very substantial and very real. If you don't ask me what the Colonel asked me about the economies of it, I can answer it. I thought I could answer his question, too, but I find out that we have two of our large life insurance companies at odds as to whether it is more economical to do it by centralization or not, so I am going to pass that over.

It's very feasible to connect computers together. In fact, the IBM Company in New York has a large computer installation in the Time and Life Building in New York City. Of course, up near Kingston, they have a manufacturing plant. In addition to that, they have a research laboratory and some other offices in connection with their manufacturing and sales, and what not. They have 7070's, 7080's, and 7090's, but they don't have them at both locations. They have one here and one the other place. They are connected with a broad-band channel which we provide for them, and they talk to each other at the rate, I think, of 15,000 bits per second, with a capacity of 65,000.

Interestingly enough, the last time I looked at it, which was about 4 or 5 months ago they were still at the 15,000 bit links. But this is very feasible. We do it now in a limited way in our own business. These stator centers that I referred to earlier each has a computer, sort of magnetic tape, and they talk to each other and compare what they have on each other's tape, so as to be sure they are up to date.

This is going to be the way of life, I believe, communicationwise, in the future.

~~Machines will talk to machines. I am trying to remember how many miles of data circuits we've got now. I've got it written here if you would be interested. It's a substantial amount. In a couple of years' time we have a data network in being. If my memory serves me, I think it is a half-million dollars in revenue, but that isn't anything like enough. I mean it both ways.~~

QUESTION: Sir, will you explain to us a little bit, please, your tie-in with other telephone companies?

MR. OLIVER: Yes. You are talking about independent telephone companies?

STUDENT: Yes, sir.

MR. OLIVER: There are approximately 3,000 throughout the country. The standards that prevail amongst all of us are reasonably the same. Now, there are minor variations in this, and for me to not admit this to begin with would be wrong. But there has been a great change on their part and in their concept. They recognize--the majority of them do--that they are part of our system--I mean the United States system, not part of the Bell system--and they are willing to meet us and be compatible. They find out that to be compatible is advantageous to them, because they get business that they otherwise would not get. They have accepted this. They are full-fledged business partners.

When we place long-distance calls between companies, very often the customer never knows how many times, or if, he passes through independent telephone company exchanges. The division-of-revenue program that we have set up amongst us seems to work reasonably well. You never expect them to be completely satisfied. I wouldn't, either. But it doesn't cause any real trouble.

**QUESTION:** We know that the Office of Emergency Planning, the Office of Civil Defense, the Department of Labor, and a few other agencies have certain responsibilities for reconstitution after a thermonuclear exchange. I am curious to know whether or not your activities are influenced directly or indirectly, or whether you work directly with those agencies so far as reconstitution of civilian communications in that event are concerned.

**MR. OLIVER:** Yes, we do. In fact, we had some work to do with them in connection with the Cuban crisis. They felt that some work should be done in advance, and we did it for them. This is an area which is not clearly defined as yet. In my closing remarks I tried to indicate that things were shaping up in this area. They are much clearer now than they have been but they are still not crystal clear.

I think they are trying in advance to anticipate all possibilities. This is tough. I think that you've got to be more general. Some of them over there are thinking that a general approach to this problem will be desirable and will work. I believe that government in itself--and the Cuban crisis heightened that feeling--is more informed--when I say "government" I am talking of not only the military but of the State Department and the civil government people in all of the agencies--and the agencies are feeling that they've all got to have a network which is usable to all of them. It isn't sufficient that one agency have a good one and that another agency does not. They figure that if everybody was to have exactly what he wanted the cost would be prohibitive. They are coming to the point of view of some degree of sharing.

I know this is a tender subject, and I am not going to defend it. I am saying that it is being investigated. If you ask me for my personal point of view on this, I think that you can do both of these things--give the military the things that they require and have sharing of a sort, without any impairment of their function. You've got preemption and you've got a lot of other things that can be used at the right time.

I think the OEP and the rest of the people have got to be more specific as time goes on, and they've got to gear in what they are doing with what other people are doing, if we are going to survive a thermonuclear attack. There has got to be better coordination than there is now. It is a lot better than we did have it even six months ago. But it isn't there yet. We need more work on this. We are working with them.

QUESTION: Mr. Oliver, would you give us the status of the Trans-Pacific cable project, and whether or not you still consider it economic in light of the technological advances you discussed in your talk?

MR. OLIVER: Yes, we are going ahead with this. Mr. Duncan is down there and he is in charge of such activities. We would like to know whether we should go to Okinawa or to the Philippines. We've been asking everybody we could think of, including the people over there. It sort of seems that the majority seems to favor the Philippines--which, incidentally, we do, too, because we think that there are more commercial applications there.

By the way, I don't see any reason why the military shouldn't take advantage and the Government shouldn't take advantage of anything of this nature. If there

~~can be a dual use made, which will support the cost and not impair the serviceability~~  
to the Government, I think you can take a free ride on it. If you have other needs carrying the cable or carrying the system, or whatever it is, you can piggy-back on this. All you would have to do would be to pay for the circuit, or to pay for that part of the equipment that is required.

We are going ahead with this Pacific thing, all the way to Japan. Whether it is to be Okinawa or whether it is to be the Philippines isn't for sure, yet. I would think it will be the Philippines, myself. But we still have to touch base with some more people.

QUESTION: My question has to do with the picture of statistical growth of bulk things, like the computer picture. There is another side to this that I'd like your reaction to and your viewpoint--that of cleaning out the bulk through message selectivity, message compression, and carrying the fat off. Are you doing any work or looking forward to those techniques which will reduce the bulk requirements of the actual communication load?

MR. OLIVER: Do you mean in normal times or in times of emergency?

STUDENT: Just looking forward to the exponential growth of bulk in the communication load.

MR. OLIVER: Hell, I think we ought to be smart enough to provide communication/ service so cheap that you can have as many men as you need to do your job. I am serious about this. This is a question of philosophy, almost. In this country the thing that has made us grow has been a philosophy that says, "If somebody thinks they need it and can pay for it, give it to them." I don't mean to be

~~misinterpreted on this. How did we get to be the kind of a nation we are? We got this way by building more and more and increasing our capacity and decreasing our unit cost. This is precisely the way it has been with communications.~~

I would like to tell you some of the things that happened in our own business that are right down this line. I haven't been here too many years, but I have been here 35 years, and I have seen some of these things happen in my time.

The first decision came at about the time I came into the business. We had practically all manual telephones at that moment. People liked this. People said, "This is good service." We had it fairly well developed, we thought in those days. We thought we had a pretty good telephone system. Yet, if we had not gone to automation, had not gone to mechanization, and had not spent the required money on expansion possibilities, we never would have been the size we are. I'll tell you why. I was in the New York Telephone Company at that time. Somebody figured out that about 1955, if we stayed on a manual basis in New York City, we would require as an operator one out of every four women between the ages of 18 and 55 to be an operator. The same thing would obtain in a similar degree all throughout.

So the decision was made to go this way, to automation. Then we came into the long-distance network. Should we automate this? There were people who said, "No, we shouldn't. People are not going to want to talk this much more." But they do. And they did. If we hadn't automated our long-distance network it wouldn't be as great as you see it today.

Now we are on the verge of many more circuits, a tremendous number of them, for data. If we are restrictive in this we may not only hinder the development of

~~our own communication business but we might stifle the growth of related industries who will depend on the exchange of information. We might even stifle some of the things which the military would need in order to bring in intelligence information.~~

So our philosophy has been to learn how to make circuits cheaper and cheaper and cheaper, and we have. Our cost per circuit has been coming down steadily over the years. Our cost for long-distance conversation had decreased in the same proportion.

If you go back over the years you will see that it cost \$12 to \$15 to make a transcontinental call. It is now \$2.25, our maximum charge.

This is what I meant by my comment. I think this is what has happened in America. I think this is what makes America strong. You can get into trouble by going headlong down the road and doing too much. You can also get into trouble by being too restrictive in your thinking. Pardon the philosophy.

QUESTION: A recent article published said that in the Cuban crisis the President had to go at different times to the Russian Embassy to get communications over to Khrushchev. Backing up this article was, of course, the tendency to possibly connect our President of this country with the other members or presidents of other countries, so to speak. What are the plans for the future? Or can you tell us?

MR. OLIVER: This is not a new matter. There was more to this than appeared on the surface. I would rather leave the matter to somebody else. It seems like a normal thing to do. I'll start out by agreeing with you. But, hell, there is a

circuit to Moscow now, if it has to be used. I didn't see Khrushchev offer to call up and talk about things, at the time. Did they, Cliff?

MR. DUNCAN: We are set up to establish this at any time on the present cable circuit and the primary circuit of radio. This is all ready, whenever it is necessary.

MR. OLIVER: There is more to this than meets the eye. I would rather not discuss it.

QUESTION: Mr. Oliver, you made a statement regarding 70 percent of your facility not being in existence 15 years ago, and other statements which indicate, I think, an extremely high rate of modernization. We hear meanwhile representatives of other industries complain that the tax structure does not permit them the proper rate of modernization. Will you explain how you are able to do what others cannot?

MR. OLIVER: We complain, too. Actually, this is a matter of relative things. This United States industry of ours since World War II has provided 75 percent of its new end capacity with retained earnings--profits. That's not a dirty word, either, in my book. Industry for the most part is reasonably responsible in this area--not always. There are people the same as us, and they have feet of clay and they do things they should not do, and so forth, and so on. But the fact remains that in this country of ours since World War II 75 percent of the new capacity to make things has been done with retained earnings. I am sorry--I mean retained earnings plus depreciation returns. I am sorry. I didn't state that properly.

What they are saying is that this isn't enough, this isn't fast enough. We are

~~saying the same thing, too, to an extent. We have even a little bit more difficulty in this area than outside industries do. Outside industries have to watch only the Bureau of Internal Revenue, who tell them what they can't do. We have to be responsive to the IRS but also to the FCC and various regulatory bodies.~~

We have been successful in getting some items of plant reclassified. We are continually working harder to get more and more. But this is a matter that all business men complain about, and they compare themselves to what is happening in Europe and Japan, where depreciation rates are more favorable and they can turn this thing over faster.

~~Maybe we should be doing this faster than we are. We are doing the best we can with the rules that we have to operate under. I don't know what these figures would be for another business. This is a function not only of your depreciation rules but of your rate of growth. You could have good depreciation rules and if you weren't growing you'd get one answer, and if you had good depreciation rules and rapid growth you'd get more plant turnover.~~

Do  
QUESTION: /f<sup>1</sup> foreign manufacturers intend to sell their products to you?

If so, what is your policy?

MR. OLIVER: They not only intend to but do. We use it, if it is what we require to fill the bill.

STUDENT: No security implications?

MR. OLIVER: Yes, we look into that. This is part of the package. You just don't buy anything, no matter whether it is from a foreign manufacturer or a local manufacturer, unless you are sure it's got the reliability you are looking

for. The reliability, of course, carries with it the ability to get parts to be interchanged and to be compatible, and all this.

QUESTION: Would you comment on your look at the future on MAZORS and LAZORS, and their importance in the communication industry?

MR. OLIVER: They are very important. MAZOR, of course, and LAZOR are the same thing, in my terminology. LAZOR is the way we have to express it in the light range. MAZOR is a microwave amplification by stimulating the emission of radiation. I will express it in different terms. You have a vacuum tube that amplifies. It's got a gate on it and it has a local source of power which is usually batteries or rectified power. The weak signal coming in acts on the gate and releases great amounts of power in unison with the little, weak signal. You've got a similar signal of great power. MAZOR does this, except, instead of using local power, it kind of uses the power in atoms. They get the atoms all stimulated up and then they release them in the right sequence with this gate. So you've got an amplifier that has got possibilities far greater than we have ever had before. I hope there is no scientist here listening.

This is the way I look at a MAZOR and a LAZOR. We couldn't have Telstar if it wasn't for something like this. We needed this microwave amplification. This was very necessary. As time goes on we are going to need more of it. Whether you call it a LAZOR or a MAZOR, to me a LAZOR is an optical MAZOR, operating in a different range.

QUESTION: Mr. Oliver, I'd like to carry that earlier question on Florida equipment further and ask you, in your operation relationship with the foreign

governments and foreign companies, have you ever gotten into cooperative R&D with them?

MR. OLIVER: You've got to be cooperative with people if you want to get things done. I guess at times we have had to do anything that was required in order to get a required job done, that was important enough to have this take place. Well, I guess, in this cable program, Cliff, you've done some of this. Cliff Duncan can tell you about this. In the underseas cable field you have done some cooperative R&D.

MR. DUNCAN: I believe this is a good example of this kind of thing. The British Post Office and the Bell System worked independently on the question of underwater repeaters. When we decided to put the cable across the Atlantic there was great debate on which we could use. This went on for several months. The final outcome of this was that we pooled our knowledge, and the present underwater repeater, the second generation of the first that was put in, looked so much like the first that it was difficult to say whose it really was. This is being done with two repeaters. We worked very closely together on this.

MR. OLIVER: I think it is perfectly permissible to do these as long as you don't degrade your own standards of requirements. Sometimes you have to if you want to get along with folks. It's good for us, too, I think. We get different ideas.

QUESTION: Sir, you mentioned the reduction of long-distance rates. It seems to me in my personal experience that my local phone rate is always going up.

MR. OLIVER: We like this.

STUDENT: I'm sure you do. ~~Also I understand that about two-thirds~~ of the telephones of the Bell System are actually residence phones. ~~Businesses~~, it seems to me, are the primary users of long-distance circuits. I don't make many long-distance calls. ~~Aren't you penalizing the individual resident users like myself for this cheaper long-distance phone service, which I don't use very much?~~

MR. OLIVER: I don't think so. I'll try to explain this to the best of my ability. Your phone bill has increased merely because your usage has increased. I'll give you a personal for instance. I was a kid living in Brooklyn in 1910, a youngster. When my mother passed away 15 or 20 years ago, I came across an old phone contract which gave us the ability to make 500 calls a year within the Province of Brooklyn, and also to call Williamsburg. Williamsburg is right between Brooklyn and Queens, for some of you people who know that section. The charge for this was, I think, \$4.50, or \$4.80. This was 1910.

Today in Brooklyn for \$5 and some odd cents, you can call all over New York City with 66 calls. If you don't use them locally you have an optional choice to use them up on Long Island and so forth.

In this metropolitan area around Washington you can call parts of Virginia, parts of the District, of course, and parts of Maryland. While your local telephone bill is greater, I think the real reason is not that the unit cost has increased so much but that the usage has increased. Also, local telephone service is not subject to the same mass-production diminishing cost that long-distance service is. Local service is still a person-to-person arrangement. If you live in the District here and you have access to a million telephones--I am not certain this is right,

but say it's a million telephones—when the next man gets a telephone he not only gets a telephone but he has to have connection to the other million telephones that are here.

Well, you say, "The damn things are ready, the connections. Just ride piggy-back." This goes all right for the first and the second and the third, but there comes a time when all along the line his extra and their extra volumes are calling and it's got to be spread over new circuits between all of these exchanges provided. This is what we call traffic engineering.

So this does not diminish in the same way that long-distance service would. This is a point-to-point, a specific service given to an individual. This has been able to maintain its level of cost. If you look at this thing in constant dollars, it is a pretty favorable relationship--not nearly as favorable as long distance, though. It's because of technological advance. We can make telephone instruments today cheaper than we could when I came into the business, for example, 35 years ago. We can make cable cheaper than we did then. We can make wire cheaper than we did then.

These things are reflected in your local rates, but never as much, because your range of calling people expands, and this tends to offset the cost.

The long-distance side rides entirely free. Your local telephone bill does not depend on your bearing an undue load as far as your long-distance service is concerned. The business people are paying their way. This is something we have to be careful about. If we are not careful about it, the regulatory people are very much in the business of making us see these things according to the customer's point

of view, the consumer's point of view.

We just wish all the regulatory commissions would see the same way all the time. Some regulatory people in one State believe their people should be represented in this fashion, and in another State it is a little different.

There really isn't any extra load that you are bearing--not too much. I've said a lot of words here. I don't know if I have satisfied you. I have tried to explain it to you.

COLONEL McELWEE: Mr. Oliver, thank you very much for a stimulating and informative morning.

MR. OLIVER: Thank you.