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Education -

Career Path - Ellington AFB Communication Manager (civilian)

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redundant trunking to MSC

INTERVIEW WITH THOMAS W. ULLRICH
May 31, 1968

I was employed by the 446 Troop Carrier Wing at EAFB as a civilian base communications manager when MSC came to Houston and set up its first offices in Gulfgate Shopping Center. (I think there were eight people here in Houston at that time.) I was doing for the Air Force essentially what I am doing for MSC right now, that is managing wire and radio communications. I was offered a job under Marty Byrnes as Chief of Telecommunications. At the time I was interviewed by Charles Bingman, I think the Center had a couple of TWX machines handling message communications with the outside world. The telephone company was dealing with the individual telephone user in MSC and of course that soon led to quite a bit of abuse. People didn't know what they needed and as the telephone company is in the business of selling services, if somebody said they needed a 12 button call director to meet their needs with two people in the office that's what they got. Costs were getting out of hand, and it was pretty apparent that people didn't know what the proper communication mis was for an organization of that size or for a growing organization. They saw they were getting in a little trouble and figured they needed someone with communication background so that is where I came in.

One of the first facilities MSC leased in Houston was the Rich Building on Telephone Road. Ralph Sawyer's Electronics Branch of IESD was located there, and it occupied the biggest part of the Rich Building. In one office there were four 36-button call directors serving only five people--four secretaries and their supervisor. This amounted to 144 station lines available to five people. The rationale was that Mr. Sawyer

needed a station line matched with each of the station lines appearing in the entire building so that any calls could be referred to him. Of course, this was considerably beyond what he actually needed, and was one of the worst examples of bad phone management at the Center.

The Center was growing pretty rapidly as far as personnel were concerned and facilities were being leased all over the city. As a consequence, we immediately ran into a problem in getting all buildings on a single exchange. Initially, each of the facilities had its own switchboard, and we had tie lines between each switchboard. This was quite an expensive arrangement, but at that time we didn't have too many alternatives, as the central switchboard operation we proposed was large and our facilities were widely spaced in the southeast part of the city. We asked for central facility and met our requirements be beefing up their inter-exchange tie lines around the southeast part of the city. We centralized our exchange in the Houston Petroleum Center at Gulf Freeway and Wayside. That took care of the internal, or intra-city NASA dial network. By middle of 1963 we were in reasonably good shape as far as telephone operation and economy was concerned. We were getting more for our dollar and we had much better and more reliable service than previously. However, it soon became very apparent that our long distance costs were going to be astronomical compared to other field agencies of a similar size. We were growing and the nature of the mission created a snow storm of long distance phone calls to every continent on earth. Everyone, I guess had a good slice of the pie from NASA's long distance service in those days. So we equipped ourselves with leased tie lines to those points around the country that were frequently called from NASA Houston--Cape Kennedy, Headquar-

ters-Washington, Marshall Space Flight Center, and our prime contractors, then McDonnell Aircraft and North American Aviation and some of their leading subcontractors. If the trade-off in costs warranted it, private line teletype service was leased from Western Union. Under this agreement we paid for messages on basis of time and distance the same as we did for long distance telephone calls. Wherever we kept a circuit busy say three to four hours of every business day, then it became more economical to lease the circuit and the teletype equipment at both ends and operate our own private line teletype service rather than pay on a per message basis thru TWX or telex.

Surveys have to be constantly taken to determine which is the best way to go because we have a number of options even in long distance calling service. We still maintain tie lines between MSC and areas where there is heavy daily voice traffic. Occasionally, it becomes cheaper to lease tie line service than to use the FTS for example. In late 62 when it first became available, we leased WATS service or wide area telephone service. It gave us an economical path to communities within the state.

We received the FTS proposed serviced from GSA through Office of Tracking and Data Acquisition in Headquarters in late 1962. We were told what would be offered to us and what it would cost us, and had no other choice than to accept or refuse.

There were other areas in which we invested a lot of time and effort in studying possibility and case. Sometimes our recommendations were accepted and sometimes were turned down. An example was mobile radio service for maintenance and operations crews and others who were on the road a large part of the time. We acquired frequencies from Headquarters,

leased or purchased this equipment, set it up, got it operating and saw to it that it performed satisfactorily.

Planning for the move in to the Clear Lake Site was no small task. Everybody wanted to get in on the act and on things like telephones and office equipment, everybody in management felt he had to make an input. This made the job a little harder.

The decision was made to select Southwestern Bell Telephone Company to serve the Clear Lake Site. We had a real peculiar situation here, and I doubt that it will ever happen again, anywhere in the country. The 1600 acres that the Center is built on is divided by a service boundary, which is an agreement between telephone companies as to areas each will serve. In this case, there had been an agreement between Southwestern Bell Telephone Company and the General Telephone Company of the Southwest, which served the area of Dickinson, League City and other communities south of the Center. The boundary agreed to by the two concerns was 1500 ft north of the Webster-Seabrook Road. Mr. Joe Biecher, of the office of Tracking and Data Acquisition in Headquarters contended that the contract would have to be awarded to General Telephone of the Southwest simply because Building 2, the Project Management Building (which would house the Center switchboard), was within the General Telephone service area as agreed upon by General Telephone and Southwestern Bell back in 1940. However, the state of Texas has no laws of exclusive franchise outside of municipalities, and as this was just county property out here and no city that was involved, therefore, it was up for grabs. Bell apprised us that if we wanted them to serve us it could be done without violating any laws of the state. They would just revise the service boundary, which it was able

to do any time it felt like it, as could also the General Telephone Company of the Southwest. (Cities like Houston, Dickinson, League City, and Seabrook can award a contract to a particular company. For example, the City of Houston has given an exclusive city franchise to Southwestern Bell to serve Houston, and no other telephone company can come in without the city fathers agreeing to it. However, out here in the boon docks this didn't hold true.)

We began a procurement action; Mr. Ernie Gillian put out a request for proposal. I furnished the technical specifications which although not really sufficient gave bidders a basis for pricing out a PBX system. Since General Telephone and Bell System have tariffs on everything, they are used to determining costs on any service render. We were asking, however, for special provisions that weren't covered by their tariffs. This gave them sort of a wedge to get in to make proposals other than what we specifically asked for. They maintained that they couldn't meet our RFP per se, but could give us something as good or better, and usually offered several alternatives together with the cost. We received this type of response from both companies. Since I had been working for the Air Force, and had dealt with Southwestern Bell extensively and had been well satisfied with their service, and since Houston is the big district of Southwestern Bell, and they have a very large work force here, Southwestern Bell ranks very high among all Bell subsidiaries. They are in the top 4 or 5 per cent in management and operation, and in addition, this local office of the Southwestern Bell system is rated quite well. Also they were big as opposed to General Telephone, a very small phone company in this area (less than 2500 subscribers). Even then, six years ago, Southwestern Bell had in excess of

52,000 subscribers in their district. I thought it was a pretty obvious choice with everything else being equal. Bell had wanted a little more for some of its provisions, but this seemed to be balanced by the fact that General Telephone also wanted a little more for some of its other provisions. I thought that everything being even it would be wise to select Southwestern Bell. However, there were a number of people that didn't feel this way, and even urged that we select the General Telephone System. In the end, it was left up NASA Headquarters to make the decision. Who at Headquarters made the final decision I don't know, but I suspect it was Brainerd Holmes. He felt very strongly about interface, and he foresaw a number of interface problems in the world-wide tracking network if General Telephone got the contract. He was trying to keep the numbers of servicing contractors to a minimum. Obviously, if one has to go thru eight different company switchboards, chances of getting a good connection are far poorer than for one or two. Holmes came down here and I remember one meeting I attended where Mr. Holmes, Dr. Gilruth, Dave Lang, and a few other people were present, and he made the statement then that we should not get away from the Bell System if we could avoid it. This may have been the primary reason why the procurement people here elected to go with Southwestern Bell. I certainly think we didn't make a mistake. General Telephone is a good company and it is a big company but I think Southwestern Bell was better able to serve our needs.

When the award was announced the decision was based on community of interest and our community of interest was established as Houston and not the area of Webster, League City, or Dickinson. We had quite a bit to gain and not much to lose by going to Southwestern Bell. It meant a free

call access to Houston. We could dial anywhere in the city of Houston at no additional charge whereas if we had gone with General Telephone we would have had a 20 to 30 cent toll call for every call going back into the central zone in Houston. With as many calls as we had going back into Houston, this would have amounted to a sizeable sum of money every month.

There was a flood of discussion and paperwork relative to the selection, and there were some probably improprieties on the part of many people at MSC who were guilty of unintentionally releasing information that was proprietory. This information got back to both bidders. Fortunately, it was never weighted to one side or the other; however, it seemed that both contractors knew what was going on at NASA and what was being said behind closed doors, such as cost discussions.

We had problems in comparing equipment between Bell and General Telephone. It was difficult to know whether the type 52 General Telephone switchboard was comparable to the type 701 Southwestern Bell switchboard, for example. There were also some strong personal feelings involved. People who had moved into the General Telephone service of course would have preferred to have General Telephone service on their desk at the office where they could pick up a phone, dial 9 and talk to Momma as opposed to having to pay a 20 cent toll call. This, of course, was a very minor consideration and perhaps few people gave it much weight in reaching their recommendation. There were also very strong negative feelings on the part of some who considered Bell as a big benevolent monopoly and were slightly hostile. I would say we had some pretty strong dissent on both sides. I was strongly opposed to selecting General Telephone, and other

people were just as vigorously opposed to Southwestern Bell. Many of these people are still here, for example, Hal Erickson, Chief of the Electrical Branch in the Facilities Division backed selection of General Telephone. Erickson, of course, wasn't in communications; he was a facilities man. He had a pretty good understanding what the problems might be or might not be and some things looked very good to him in General Telephone's proposal, while Southwestern Bell's didn't look so good to him. He made his decision early as I did and we both stuck by our guns to the end. After it was said and done we remained the very best of friends. Beicher and I also are very close friends; we are both in the same business and we cooperate fully with one another yet we differed on this issue. Fortunately, there was no axes ground after this was all over. A lot of people were worried about whether anyone was going to get into trouble, and I think there were a few admonishments handed out by Marty Byrnes. I know I was a receipient of one and I think Roy Aldridge was a receipient of another bucause we had not been sufficiently careful in avoiding improprieties. A lot of regulations, rules and policies were bent very badly if not broken, not with any intent to do anything illegal but to get the job done in the best possible manner.

In communications quality and reliability are extremely important. It isn't just how good their equipment is but how quick the company can respond to a service call when a problem arises. Although General Telephone is no small company (they serve Los Angeles, California, for example) here in this area they were nickel and dime operation. Their closest major operation is Corpus Christi, and that is several hundred miles down the coast. If General Telephone had gotten this contract, I am sure they would

have beefed up their operation here to accommodate us, and they would have had to triple their company size over night. I was concerned as to whether or not their response to our needs could be that easily provided. Obviously if General Telephone could have beat Bell's major cost provisions on the monthly service bill, and could have come in with substantially less cost in line costs, there would have been no question, regardless whatever individual likes or dislikes would have been. But this wasn't the case as the offerings by both companies were highly competitive and so everything else being equal, the determining factor, was maintenance, service and potential responsiveness. As far as official NASA position was concerned, it was community of interest.

After the awards were announced and both companies had received their telegrams--Bell's saying that it had been awarded the contract and General Telephone's saying Bell had received the award--the President of General Telephone of the Southwest, Mr. Elmer Danner lodged a protest of the award to the Comptroller General, ad hoc committees were formed and the whole body was resurrected and very carefully picked to pieces. Indiscretions and improprieties committed by both sides ~~was~~ were brought out.

This is the first time and probably the last time that any government agency or private business will be confronted with this type of problem. Here we had a situation where we were moving 3,000 government employees out to a brand new Center with a brand new telephone system along with maybe 1500 contractor people within a space of 60 days, and all would have to be provided service. It was almost impossible to pre-determine just what they were going to require. We knew we would have to have internal dial service, preferable 4 digit dial, and provided for it. There was a

large option in switchboard configuration. Which would best serve our purpose which would be over-service, which would be a nominal service, or which would be under served by equipment? We couldn't determine this until we got out here and got a little experience in a large PBX operation.

In Houston we were locked up with virtually no options. We were given what Bell could provide to our 15 separate interim locations in southeast Houston. On the basis of immediacy, the decision was made, for example, to move into the Franklin Apartment Complex one afternoon and there were people in there tearing up the building and reconfiguring it to an office complex the next Monday. By Friday phones were being installed, and we had to take what was given because of the short lead times involved. Out here, we had 18 months to two years to tell the contractor what we wanted. We asked for the bare bones of a telephone operation capable of serving 4500 people in X number of buildings. New buildings were being built and the utilidor which carries our telephone cable was being expanded and changed in some cases, so we got by with the minimum of service, the minimum of number of station lines, key equipment and central office switching the equipment. We needed a little experience not to be able to make valid long-range projections, but just be able to project a year ahead. To this day it is very difficult to get Center management to indicate what our Center population will be in another six months. The decisions are made in Washington and Capitol Hill relative to our budget which impacts our staffing, new buildings, new construction and new programs--all of which require new telephone communications.

After we moved to the site in February (I think the major move was then made in March), we had a problem in just putting together a telephone

book. The Center was in a state of flux and the total organization structure of the Center was changing almost daily. People were changing titles and locations, and this also meant phone moves. We finally got so bogged down that we had to go to Center management and request a moratorium on phone reinstallation. Once we put a phone in it was to stay there for a minimum of 60 days. We were putting a phone book out, for example, every two weeks and even so the book was obsolete when it came off the press. By the time we got the information compiled from all the organizational elements and got it to Roy Magin's print shop two days later and began to run off 5,000 copies of the thing, it was already 30 percent obsolete--this is an example of how fast changes were going. After about 6 to 9 months, I guess things finally began to assume a more normal rate of change and the support organizations begin to keep up with operations. During this period we had a lot of complaints, particularly over long distance service.

We are never free of problems in the long line voice circuits. The situation is constantly changing, as the missions change. For example, a contract will be let we will say to Bendix facility in Ann Arbor, Michigan. The FTS service we now have and have had over the past four and $\frac{1}{2}$ years was designed to serve all federal agencies not only NASA. The people in GSA that set up the FTS system looked at the size of Ann Arbor and decided that other than a small manufacturing plant, the University of Michigan, and a Veterans Hospital there was no significant evident special requirements for a large number of trunk lines so only gave it six trunks and four voice paths in the FTS system. Suddenly MSC entered into a relatively large contract with the Bendix plant in Ann Arbor and

immediately the number of calls to the plant from MSC jumped from none to 150 a day. This was far more voice traffic than could be handled by the existing circuits so we have had to go through Headquarters, Office of Tracking and Data and ask GSA to increase the circuits to Ann Arbor. This request takes time to be acted on--perhaps six weeks will go by, and ten more circuits will be allocated in Ann Arbor. Then the contract is terminated and the daily calls between MSC and Ann Arbor cease. It is little problems of this type that we are always contending with. FTS has been relatively better than I expected.

When we first got into FTS, we were still in our interim facilities. FTS was costly, circuits overloaded, and it was usually necessary to make four to six attempts to get through. The system was just too small for the prupose it was designed to serve. We were obliged to go out and lease private line service for facsimile, teletype, and voice communications to those distant locations where we had heavy traffic. This was extremely costly. For example, we paid a Bell tariff of approximately a $1.00 per mile per month. So if we leased a line for a thousand miles, it would cost us a $1,000 per month plus the tie line terminal equipment at each end which amounted to another 40 or 50 dollars. We had to be very careful to assure ourselves that this service was not only rendered when we asked for it, but was used. People would come to us and insist that they had to have it--that FTS wasn't doing anything for them and they weren't able to communicate with say McDonnell Aircraft in St. Louis, when they needed to and as a result a shot would likely slip if we didn't get better communications. So we lease private line service in St. Louis. Then we would monitor this service to make sure it is used. In many cases where people

have insisted that they were going to use this line 5 to 6 hours a day transacting business, and we put time measurement devices on the circuits, we would find it was only used for 7 minutes or some such short period. We had to watch these things very carefully. Also, as I mentioned a minute ago, we would make provisions for service to some location and it was used and used heavily until the contract ran out. No one would tell us that the contract was completed and here the service was still being rendered and we are still paying for it but it's not needed any longer. It's a constant problem--attempting to keep up with the proper mix, and the proper long-line mix particularly to keep the service adequate but not over adequate. This is or has been our biggest problem since we have moved out here.

Fortunately, the FTS system has improved immeasurably. Back in summer of 64 it was more a liability than an asset. Then every time someone failed to reach his called party or he was cut off in mid-conversation, due the weaknesses in the system in those days, I got the complaint here. There wasn't much I would do about it except pass it on to the GSA. But FTS has improved, and we can now call anywhere in the United States and changes of getting through are better than one in two. Obviously, if your party is busy you always get a busy signal.

The network is now large enough to absorb the traffic being put into it. It has gone up in cost, however; we initially paid 62¢ a call, I believe, and now is's a $1.00 a call. But it is worth that 38¢ more just in the quality of service that we are receiving. Of course, costs in all areas have gone up. Bell tariffs have increased, the telepack rates or the bulk circuit rental rates have gone up, and GSA is obliged to pass on

these costs in providing FTS service.

As FTS has improved, we naturally diminished our private line service. At one time we were leasing around 140 to 150 circuits around the United States to Mississippi Test Facility, Marshall Space Flight Center, White Sands, to the West Coast, to the Cape, and to Washington. I guess, Grumman Aircraft Long Island is about our farthest reach as far as private line service. We now have less than 30 private line voice circuits under lease from AT&T. This is almost wholly due to the improvement in the FTS service. We once had considerable amount of WATS service, and spent $167,000.00 a year for ten WATS circuits. These were universal type circuits that actually amounted to unlimited access to the Bell toll network for a fixed cost. As long as we used these circuits to a high degree and kept them busy with necessary telephone business over two or three hours every day it was the most economical system. But when the traffic load fell below two hours, they became uneconomical. We were able to call long distance commercially and get as much service for the same price or less. Since the improvement in FTS has become so apparent, people at the Center now are more prone to use FTS than they were in the past and we were able to cancel all of our WATS last December 31.

As far as White Sands is concerned, we are responsible for communication service there. There isn't a communication section per se at the WSTF. Frank Clark who works in Administrative Services as WSTF, is responsible for contacting the local communication companies to provide service but we make the recommendations to the manager of WSTF as to what he needs, and what is available to him. If he has problems he comes to us and we try to resolve them. If we can't, we will try to find somebody who will.

Presently we have two circuits to White Sands and they were available on what we call off-premise dial circuits. In other words, these circuits are tied to the MSC PBX which gives us the opportunity of dialing code--8--and then the WSTF extension. We have sufficient number of calls going to and from MSC and White Sands to warrant a continuous service of this type. As a matter of fact, that is the name of the game for warranting the continuation of any private lines. We have to use it to justify its existence and if our usage rate, generally speaking, drops below a certain level it is cheaper to go FTS, even though it might be a little less convenient to use because we have to dial 11 digits to get an FTS line where if we had tie line service we would only dial five digits. Everything goes back to cost, with one exception. This is where senior personnel, or for example, Mr. Low in the Apollo Program Office, have need for private line service to the prime contractors. Generally, lines of this nature aren't heavily used. But when they are used, it is on an urgent basis. I think we have only two of these--one between Mr. Low and one of the Vice Presidents of Grumman and the other between Low's office and one of the VP's of North American-Rockwell. Now with this access and with this immediate means of communication between high level people, they are able to reach decisions that are time critical to the contract. These, of course, don't justify themselves on the same basis as other voice circuits.

Since we have moved to the permanent site in addition to local and long distance voice network that are available to the MSC employee, we also provide long distance graphic communication, called facsimile, or more commonly known as data fax at NASA. Initially we leased this equipment from the manufacturer, Stewart-Warner. Service consisted of a trans-

mission path (a pair of telephone lines to some distant location) and a data fax machine at both ends. This has increased in sophistication in time to where we are now part of a NASA-wide network where we can dial facsimile stations all over the United States. There are about 160 such stations in the NASA complex, which is known as the Western Union 600 facsimile switching system. This facsimile network provides any person here in the Center with the means of sending charts, graphs, photographs etc to these various points throughout the United States. These facsimile installations are located in most of NASA's prime contractor locations and many of the subcontractor locations supporting the Apollo program. This has been a real boon to the engineers because now, whereas they were formerly dependent on mail service for hard copies, they now have means of getting their data transmitted in a matter of minutes over this facility.

We also have a fairly complex teletype network, which again is part of the MSF teletype system. We are tied together with the other two MSF centers and even have teletype circuits to the western part of the United States and with Goddard Space Flight Center that gives us access to the rest of NASA. We operate this network on the same basis as the military. We have a priority precedence system that tells us how urgent the traffic is, how quickly it must be handled, our limitations as far as the station handling time, and that type of thing. We use the same formats as the DOD, which have been worked out over a number of years.

Our telephone facility here, is our major communications concern, (we have other communications responsibility, but this is as far away our major responsibility). We provide a telephone switchboard facility at MSC second to none in the United States as far as modern equipment is

concerned. The 608-type switchboard for example, makes the telephone operator a lot more effective in handling calls. This particular type board is a cordless switchboard, and the operator can handle about ten times the number of calls an operator of comparable talent can handle on a cord manual switchboard. Our PBX facility here is called Centrex by the Bell Telephone system. It is about four or five years old and most large business firms throughout Houston are now converting to it because of its several advantages. Its main advantage is direct-in dialing, meaning that anyone here in the City or around the country can dial in to an individual telephone in the PBX. In the manual system incoming calls are screened by a telephone operator and referred. MSC is unique I think, in that it is one of the few Centers (maybe there are also a few DOD installations throughout the United States), that have 100 per cent redundant trunking into the Center. We have two paths, either of which can operate as a prime service path to the MSC and out of the Center. If one is cut the other path is automatically switched in and there is no loss of service. There isn't even loss of conversation, for if the break of one path occurs while someone is talking over that path the conversation is automatically switched instantaneously over to the second path. The purpose of this was not to offer high reliability to the MCC. Missions Operations circuits are carried in these same paths back to the Houston telephone exchange.

We have approximately 10,000 people, counting both Civil Service and contractor employees on-site, served by this system. The system here would probably serve a city say of 40,000 people. The MCC has its own telephone hookup separate from the MSC Centrex PBX facility. It does use

the Centrex telephones but, of course, MCC telecommunication link to the outside world are far more sophisticated than those required by a normal voice switching network, which is our administrative telephone system is. The MCC receives an enormous amount of data from world-wide transmission points during missions and mission simulations. This data comes thru the same Houston toll exchange that our administrative voice circuits use on Jefferson Avenue. It then comes out one or the other of the two transmission paths. This is the reason for having two transmission paths--to afford reliability. The MCC has, I would guess on the order of 60,000 voice paths available to it. These voice paths, of course, are not used as such; they are used to carry machine-readable analog and digital data. This data is received here by the computers and conditioned by the computers and put out into some readable form. If the facilities in our Mission Control Center were to be used by industry or resident subscribers, we could say that we have sufficient transmission paths to the Manned Spacecraft Center to serve a city of over 500,000 people, if all of this service was put into say voice and teletype or voice and telegraphic type service.

We have free dial service from the Site to nearby communities in the General Telephone exchange that is not available over the local Bell system. We have two circuits to League City-Dickinson and two circuits to LaPorte, Texas. These are relatively inexpensive services that are a convenience to our people. The total lease cost on these, I believe, is $480.00 per month. The cost can be justified on the basis that it enables us to have an immediate means of reaching our top management people in time of emergency.