BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

In the Matter of Determination of the cost of basic local telecommunications service, pursuant to Section Section 364.025, Florida Statutes.	:	DOCKET NO. 980696-TP

VOLUME 4

Pages 522 through 592

PROCEEDINGS: HEARING

BEFORE: CHAIRMAN JULIA L. JOHNSON
COMMISSIONER J. TERRY DEASON
COMMISSIONER SUSAN F. CLARK
COMMISSIONER JOE GARCIA
COMMISSIONER E. LEON JACOBS, JR.

DATE: Monday, October 12, 1998

TIME: Commenced at 9:40 a.m.

PLACE: Betty Easley Conference Center
Room 148
4075 Esplanade Way
Tallahassee, Florida

REPORTED BY: MARY ALLEN NEEL, RPR

APPEARANCES: (As heretofore noted.)

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P R O C E E D I N G S

(Transcript follows in sequence from Volume 3.)

DR. STAIHR: To summarize, just to kind of let you know what's going on, other states, North and South Carolina, Indiana, Montana, Nebraska, and Puerto Rico, have submitted the BCPM as the right way to calculate costs. Most recently in Missouri just a week and a half ago, the Staff said, "We think it's the right one to use."

We understand that some of the assumptions built into the model may not be the most appropriate assumptions for Florida. They may be; they may not be. Okay? We're all right. We're willing to work with it and incorporate what assumptions are the right ones.

And finally, if you would like any information that I haven't talked about today, we do have a Web site, www.bcpm2 -- I don't know -- the reason it's 2 is, somebody had bcpm. I don't know who, but somebody did, so it's bcpm2.com. And you can click on there, and the model is on there. You can run the model from there, and information about it.

And what's what I have for you all this morning.

COMMISSIONER CLARK: You are going to be a witness later; right?

DR. STAIHR: Yes.

COMMISSIONER: And then we can ask you questions about this.

DR. STAIHR: Or now.

COMMISSIONER CLARK: I'll just wait.

DR. STAIHR: Okay. Thank you.

CHAIRMAN JOHNSON: Thank you.

MR. COX: Staff has no questions at this time. I think we can go ahead and proceed to the --

CHAIRMAN JOHNSON: To the next witness.

MR. COX: -- next witness. This will be the Hatfield witness. We may need a couple of minutes for him to prepare. It might be appropriate to take a five-minute break for him to prepare.

CHAIRMAN JOHNSON: We're going to take a ten-minute break.

(Short recess.)

CHAIRMAN JOHNSON: We're going to go back on the record. If everyone could settle in, we're going to go back on the record.

PRESENTATION BY DON J. WOOD

MR. WOOD: Is this volume going to be okay?

Good morning, Commissioners. My name is Don Wood. I'm here on behalf of AT&T and MCI, and I'm going to be describing to you at least the high points of what you may hear variously referred to by the old name, Hatfield model, or by the new name, HAI model. And in fact, I readily confess, I may be the one who slips into the old nomenclature from time the time just out of habit.

You are going to get all the details that you can stand probably this week on the technical details of these models. Just to give you the quick technical rundown at the beginning, this model is based on Excel spreadsheets. It has a separate work file for what we call the different modules of the model for distribution plant, feeder plant, switching and interoffice, signaling, and then finally, the application of expenses to the investments that have been developed.

We did this in Excel even though it takes a little longer for the model to run that way, because it gives you complete visibility into what's going on. You can look at the inputs. You can look into the actual functioning worksheets, see the inputs, see the calculations that are taking place. If you don't want to look in the computer files, attached to my testimony is a list of the formulas used in the model and a list of the inputs used in the model and a description of those.

There are literally tens of thousands of inputs that you can potentially change. The 1,600 or so that you would be most likely to be interested in in changing are in -- are what we call user-definable inputs, and they're in pulldown menus in the user interface. Changing those values is as simple as pointing, clicking, typing in the new number, and running the model again. We understand you may want to play with it a little bit, find out how these inputs might change the results, and it's set up to actually let you store and run 999 of these different "what if" scenarios if you are so inclined to do that.

But before we get to the technical details, one of the things that I think distinguishes models and one of the things that I think makes this model unique, it's not the technical how it does it, but before that, the conceptually what it does, because what this model does is different and unique, and I think in a very important way.

For any cost model, for any cost study, there are certain key things that you have to be able to do correctly in order to have a chance at getting the cost calculation to come out correctly. I want to focus up front on what I think a few of those key in -- not just inputs, but key tasks are that a model has to be able to perform correctly.

Now, up front, what we're trying to accomplish -- this language on the bullet points is going to look familiar to you, because it comes directly from the Florida Statute. But I broke it out into three different pieces, because they're all three different pieces we need to talk about.

Certainly we're trying to determine forward-looking costs. For universal service, we're not trying to measure embedded costs. If you go to embedded plant, embedded inputs, you would get a cost that is too high, and you would have a fund for universal service that is correspondingly too high. You want to take advantage I think in this process of the fact that technology in this industry is changing, has changed recently and will continue to change in ways that allow companies to serve customers more efficiently either through new equipment or new uses and deployment of that equipment.

Second, we certainly want to use the most recent commercially available technology and equipment. And I actually underlined "commercially available" here in my notes, because I want to emphasize there's not speculation here. We're not guessing about new technologies that might come down the road. These are things that can be purchased. Anything that's used in this model can actually be purchased in the marketplace today, and in fact is being deployed by local exchange companies.

The key here is, you need to get the correct technology for the application, but you've also got to deploy that technology in the model correctly. And this is a key distinction that I'll come back to in my presentation. It's not just the equipment you choose. It's how you place that equipment in the network that determines whether you've determined an efficient means of providing service or an inefficient means.

Certainly you want to use generally acceptable design and placement principles. The process used through this model is based on well accepted, well established engineering principles. Quite frankly, a lot of the people involved are former Bell System engineers or BellCore engineers. Those people have had a very high level of involvement in this process.

What you try to do here, and this is I

think one of the keys, we try up front in this process, the process that's unique here, to create a set of information. And what we want to do as closely as we can is create the set of information that a telephone engineer, an outside plant engineer, for example, would use and want to use if they were actually going to go out and design telephone plant to serve an area. These are cost models. They're not engineering models per se, so you wouldn't use them to make a case-by-case engineering analysis. But any process, any model that uses this process ought to start with the information that an engineer would want to have available to them and then work forward from that information, and that's what we try to do here.

I think there's general agreement that ultimately the task of these models is to provide an answer to the question, what would be the cost of an efficient carrier to serve a given -- to provide basic local exchange service and serve a given geographic area.

Now, that area we study may be as large as the area served by a particular local exchange company. It may be a specific central office within that service territory, and in fact, it can be much smaller than that, to very small geographic units that are served by that area. You can calculate on each level and present results at each level.

If that's what we're trying to do, where do we start? Well, first of all I want to say where we certainly cannot start. We cannot start this process of a forward-looking cost calculation by looking at embedded network characteristics. And in fact, I'll be, you know, quite up-front about this. This model does not attempt to duplicate the embedded network as it exists today.

We can't start with the books of accounts of companies. They have a lot of historical information. Some of it dates back to very different forms of regulation. What we're trying to do is look at a pure forward-looking basis, both in terms of the network that's designed and in terms of the key inputs to the model. We're not looking at what various carriers have done and whether or not that's appropriate. What we're looking at is what carriers should do going forward in Florida.

And if we don't start from where we've been, where do we start? And where we start is with Florida. We start with Florida characteristics. We need to know the locations of residence and business customers, because that's, after all, who's going to be served.

All of these customers are located at the level of accuracy to the census block at a minimum. But for most of these, and 70% of them in Florida, we can locate them much more accurately than that, not just to the level that Census Bureau says, which is in the census block boundary. We can actually locate them specifically in that boundary, in that census block in terms of their actual location.

Customer demographics that are specific to Florida, and not just specific to Florida, but specific to the small, discrete areas that we're talking about studying. If you have information about the age and income of customers, a lot of times you then can very accurately predict the likelihood that they have a telephone and the likelihood that perhaps a residence customer is going to buy a second line or some additional features.

For business customers, if you have the information about not only the size of the business in terms of number of employees, but the type of business, the Standard Industrial Classification codes, the so-called SIC codes, those are also very good predictors of how many lines this type of business would have. And all this information is collected for these very small, discrete areas within the state.

We need detailed geographic characteristics. The cost of putting plant in place is very much a function of where you are. This model looks at various things, soil type, depth to water table, which is very important in Florida, the slope of the terrain, which is relatively less important here.

Just to give you an example, this model tracks and classifies 258 different kinds of dirt. The model knows that, for instance, the area around the Commission here is fine sand typically, but if you go around the road a little bit to other parts of Tallahassee, you can get some fine, sandy loam, and if you go far enough around toward Florida State, you can get some mucky, very fine, sandy loam.

Why do all this? Well, you do this because the cost of placing facilities, putting a pole in the ground, for example, or digging a trench, for example, is very much a function of what these geographic characteristics are. And you need to track these carefully and on a discrete basis so that, depending on where you are, you'll know what it costs to put plant in place.

And finally, we use central office locations. And you will note that I put a star here, because this is the exception to the forward-looking rule. If a company were to come into Florida today and provide service completely without respect to where any facilities were today, they would almost certainly put their switches in a different place than those switches are today. They would very likely use fewer of them than are in place today.

The FCC has required that we use existing locations. As a practical matter, I think that's pretty sound, because from a modeling perspective, it gives us a place to start. If we didn't assume those existing locations, but were to try then to place switches in a more efficient place, we would have to go through that process first.

Neither of these models attempts to do that. Both of them start with existing location. Understand, though, when we do that, that that is a compromise and that what is calculated out of a model that starts from that assumption is a higher cost than the pure efficient cost of providing service, because it's constrained by that single embedded characteristic.

Why is customer location important? You

will hear a lot about customer location in the course of the week. We need to know where the customers are, and we need to know accurately where the customers are, because we've got to do two things in a telephone network. We've got to connect the end users to the local switch, and we do that with the so-called local loop. And then we've got to connect those local switches to each other through what we call interoffice facilities and also with out-of-band signaling facilities. And if we don't have an accurate location for the customer and the switch, then we can't accurately place these facilities. I'm going to describe in detail how we do the customer location. The switch location comes from the Local Exchange Routing Guide provided by BellCore.

There are two things we're trying to accomplish when we look at customer location, and the first is pretty obvious. We want to figure out the distance and to find the relationship between where the customer is and where the local switch is so that we can connect them.

But there's a second more important, in my mind at least, reason that we need to track customer location. And this is one that hasn't been talked about very much typically, and that is, we need to know where customers are not just in relation to the switch, but in relation to each other, because ultimately that's how telephone networks are built. They're not built to individual customers. They are built to groups of customers. And if you're going to go through this process, you need to have a very clear understanding where there are groups, actual groups, not -- you know, your process shouldn't artificially create a group where one doesn't exist. Your process shouldn't artificially split apart a group. It should capture as accurately as possible actual groups of customers, because that is how a telephone network has to be designed. And I've got some examples of that.

Suppose we have -- this is a very simple example. We've got some customers in their houses out here on the right, and we've got the central office over here on the left, and that's simply where the local switch is. And we want to connect those customers to the network.

Now, the simplest way to do that is to run a line to each one. And in fact, very early telephone networks used this deployment strategy. It is certainly not the most cost-effective. It certainly leads to lots and lots of wires on lots and lots of poles, but it is one way to connect these people.

But there is a better way, and new technology as it has evolved has provided that better way, and that is to serve those customers not as individuals, but as the group that they actually are. And what you do in the older technology, the large line here is the feeder. It would typically be copper, and we would run out to what's called the serving area interface, the small square on the right, try to locate that in the middle of that group of customers as close as possible, and then you run a separate line to the individual customers. That gives you the distinction between feeder plant on the left and distribution plant on the right.

Now, as new technology has come about, it has made this even more efficient, this design, because we've gone to a fiber feeder in most scenarios with what's called digital loop carrier. It's a very efficient way to provide service to a group of customers if you know where those customers are and if you know where the group is. But it's a very expensive system to place in terms of up-front cost, so you want to put it in the right place, and you certainly want to put the right number of them out there. You don't want to put too many.

And what I've described on the next slide is in fact an example of how this might go wrong. If you don't have a very clear idea of where that actual group of customers is, if you go through a process to identify them that arbitrarily splits them up in some way, you end up building two of these feeder systems, these digital loop carrier systems, so you have the cost times two, plus you operate both of them at less than optimal capacity, and potentially very much less than optimal capacity. So you've dramatically increased your cost over what an efficient arrangement would be.

And the reason that your cost is higher is because your network deployment is not efficient. The reason you made the network deployment mistake is because you lacked a clear understanding of the customer group that appeared on the right-hand side, and that I think is the key underlying this entire process. When I describe to you the thing you have to get right to get the cost right, it's understanding that arrangement on the right-hand side of the page that is that key criteria.

And in fact, specifically what we are trying to identify is to find where those actual groups of end users exists. We're trying to find out the size of those groups, is this a group of 20 people or is this a group of 200 or 2,000, and also the location of that group with respect to the central office, because after all, that piece of location is also important. We have to connect the central office to the customers, and we'll need to understand the distance in order to be able to do that.

Again, the underlying key here is to get this process right. To deploy the plant correctly, a cost model has got to be able to locate these actual groups of customers. It's got to do it without artificially putting people together that actually don't live near each other, and it has got to be able to do it without splitting people apart that actually do live close to each other.

Well, how do you find a customer group? You may recall earlier versions of the Hatfield model, which used a CBG-based approach, assumed those to be square and essentially overlaid those. It's comparable to a grid approach. And what a grid approach does is, it takes those actual customer locations and attempts to define who's close to whom by overlaying the grid. And that doesn't show up very well, and I apologize. I think the next slide in your packet is actually just the grid, which, because it's on paper, you're not going to be able to overlay.

But what we found early on in the process we did use is that while many times it was right because our grids were census block groups and those tended to capture groups of people, the boundaries were a problem. And in fact, we had several problems where a group of customers, the same group, would be treated differently depending on where the boundary happened to fall.

In this example, it's the same group of four houses each time, but when you overlay a grid, depending on where the grid falls, you get some very different answers. One answer is the upper left-hand corner, which is, oh, we have a group of four customers. Another answer over on the right is, oh, we have two groups of two customers. The other answer down at the bottom is, oh, we have four groups of one customer each.

Well, each of those things, each of those conclusions, if you believed one of those to be true, would affect how you then deployed your facilities. And if you had a situation where you're deploying to four groups of one customer, you would place a very different set of facilities than one group of four, and it might lead you to put too many facilities in place and operate them at a very low level of utilization.

What are the alternatives? And this is actually what we've been working on since you saw this model last.

COMMISSIONER GARCIA: Let me ask you, how common was that an occurrence?

MR. WOOD: It happens -- I've only looked at it on a sample basis. You know, I only --

COMMISSIONER GARCIA: Right.

MR. WOOD: -- pulled specific examples. It's quite frequent that you have -- the problem, part of it is because those census block boundaries --

COMMISSIONER GARCIA: Give me an idea. 25%, 10%, 20%?

MR. WOOD: Oh, much, much higher, much higher. Because the census block boundaries tend to be roadways, people tend to live on both sides of the road, and oftentimes it's that group from both sides of road that you're trying to capture, but you're automatically severing them by following the roadway, so you split them into two pieces instead of one. And that happens actually a much higher percentage of the time. And that's why we tried, frankly, to move away from that process, because it was splitting clusters up, clusters of people.

What this model does that I think is unique is that it has a separate clustering algorithm. And what it does is, it starts from any location, any customer location.

And I like to describe it this way. If you were to go out to the center of your lot and look around 150 feet in every direction, if you see another house, note that. Go to that next house, look around 150 feet in each direction again. If you see other houses, note those. And essentially you have the process that's graphically illustrated here where you look around each location. If you see a nearby location, you move to it and repeat the process.

It turns out it doesn't matter where in this cluster you start. You end up with the same result, and that is, you find people that are literally physically located near each other. And that's what this process does. It takes a 150-foot look around the actual location, and then it comes back and repeats the process with a 300-foot look around the customer location.

Now, there are a couple of constraints we apply on this process for engineering reasons. One is that we try to keep the area that we're studying in terms of the cluster down to about 1,800 lines, because the cluster very often is going to become the serving area to which we're going to deploy the plant. And the digital loop carrier systems that I was describing before that's often the most efficient way to go from the central office to the group come in a standard size of 2,016 lines for a typical unit. The engineers like to run that at about 90% capacity. Ninety percent of 2,016 comes out to about 1,800 lines. So we're looking to keep the cluster sizes to that level.

We're also looking to constrain them because at least the FCC definition of basic services includes the provision of advanced services. ADSL is the new thing out. It's the super fast Internet connections. That's available on copper facilities only up to about 18,000 feet. And if you have a longer copper facility than that, the service isn't good and the -- the quality isn't good, and the service doesn't work.

So the clustering process itself will combine more than 1,800 lines if there are more than 1,800 people physically located near each other, and it will create a cluster size that would have a facility that's greater than 18,000 feet. But what we then do when we look at that cluster and start creating our service areas for deploying plant, we split it up so that we don't have loops that are any longer than 18,000 and we don't have any more than 1,800 people. That splits that group into a case -- it actually finds a case, on the slide that I had before where we have two systems going to it, to where it's actually efficient to have the two systems instead of the one. That's the only exception.

This process stepped through actually I think creates the key piece of information that I described before that engineers need. Outside plant engineers start at the central office. They build facilities to groups of customers. This process gives them a very good idea where those groups of customers are and lets them design their plant accordingly.

So how do we know where all these people are? Well, the truth is, we know where most of them are. For a residence, the vendor, if you will, that we've gone to is Metromail. Metromail is actually in the business of creating address lists for sale to direct mail marketers.

A lot of people want to know, well, how do I know if I'm in Metromail. Well, if you get junk mail, if you've ever ordered out of a catalog, you're in Metromail.

They have, at last count, over 98 million, almost 100 million customer address records for residence customers. That includes over 90% of the total housing units in the country. They pull this information from white pages, they look at voter and automobile registration, they look at real estate transactions, they look at the warranty card that you fill out and send back with the new TV. They look at all those sources of information.

Should they have it? I don't know. Do they have it? Yes, for most people they do. They also update this file 65 times a year, so this information stays current.

And quite frankly, this is business that Metromail is in. They have no vested interest in cost models. They don't much care how you resolve this proceeding. They are in the business of having as many address and phone records for residential customers as possible and having those as accurate as possible. That's what they sell.

Now, for business customers, it's a similar process. We go to Dunn & Bradstreet. They have about 11 million business records which, if you match that then up to the census data, that's over 90% of the total businesses. They have postal addresses, telephone numbers, employee counts, and SIC codes, SIC codes. And again, that's often important because it tells you about the type of business that they're in, as well as the number of people they have, and both of those are important predictors of how many telephone lines they're going to use.

They compile data from government and trade organizations. They get data from financial institutions, and they conduct surveys. They actually called me on a survey a few months ago. They update this essentially continuously about every business that they have records on. And again, they have a high degree of accuracy on their addresses and their telephone numbers, because that's the information they collect for their business, and that's what they sell.

Once we have an address and a telephone number, then we go through the process of matching that information to latitude and longitude. Once you know that a customer is at a certain address, you need to find out where on the planet that certain address exists. This is what's called the geocoding process. You'll hear quite a bit about it. This is -- I want to tell you right up front, this is not yet universal. You can't do it everywhere.

Seventy percent of the end users in Florida can be geocoded. The success rate is pretty high. Now, that's -- I'm sorry. The 70% is residential. It's actually up to about 80 or 85% for business. Those address records tend to be better because a lot of times those companies will get overnight deliveries and that sort of thing, and they require a more specific address, which allows more success with geocoding.

The success rate is up to 85% in the areas where successful geocoding is the most important in order to correctly design the outside plant. But it does vary. In the very highest density and very lowest density areas, the success rate tends to be lower. And it can be as low as 34%, depending on the area that you're looking at in Florida.

Well, what we do with people that we don't know exactly where they are? Well, all the locations of all the customers are specific to the census block level. We're to that degree of accuracy up front. Then within that census block, we can locate the actual locations of 70%, depending on the area, a few more, a few less. The rest of them are distributed evenly around the outside of that census block. How come? Well, because the outside of that census block is most often a road, and people are likely to live on that roadway.

Now, isn't it possible that they could live on an interior road and we just don't know where they are? Yes, absolutely possible. We've looked at that process. We have presented to the FCC some information when they asked on what would happen to the model results if you took the locations of everybody you knew where they were, but if you didn't know exactly, if you only knew it to the level of the census block, if you placed them not just on the exterior road, but also on the interior roads.

It turns out the answer -- when we ran the data for Florida, the total number of miles called route miles of facilities goes down and the cost goes down. So what we are very confident that we have here is a conservatively high estimate by placing those customers on that outer boundary.

It is certainly possible to place them not only on that road, but on interior roads, again, for those that we don't know specifically where they are. That process has been conducted and the results have been provided. It is an option available to you. It's an option available here based on the information. But it is not the first choice of the model, which provides the more conservative higher value.

The last point I definitely want to make, and it's off the bottom of the screen. Universal service is an idea that's going to be around for a while. We certainly hope so. This modeling process is going to be around for a while. When you look at your choice of models, consider the fact that while geocoding is certainly important, it's also becoming more successful. A lot of the specific places that can't be geocoded are like post office boxes, rural route numbers.

I think one of the most exciting new technologies that has come on is global positioning systems, the GPS systems. A hand-held GPS now is under a couple hundred dollars. There's a big push for a lot of 911 systems to go to GPS locations, because right now in enhanced 911, if you're in a town or a city and you call in, the operator's screen comes up with your address. For a rural area, if your address is a post office box or a rural route, they don't have that information, and it's a much longer process to then find you on a map and go through that. If they have your GPS coordinates, those can be immediately mapped. And in fact, the hand-held devices have maps on board that will put the actual

GPS location on a map on the screen on the hand-held unit, and again for less than a couple hundred dollars.

There's a big push to put that technology in the hands of the public safety folks, even down to the level of in each police car and each fire truck. As that technology comes on board and those systems are implemented in the next couple of years -- and a lot of them are on that time frame -- we will have a much larger number of geocodeable addresses that right now are not because they are a post office box or a rural route number.

So I urge you to take a long-term view in this regard.

CHAIRMAN JOHNSON: Let me ask you a question on --

MR. WOOD: Yes.

CHAIRMAN JOHNSON: On the information that you've provided thus far. You said you have -- for housing units, I guess residential housing units, you have 90% of all of the housing units in the nation, you have information on 90% of them.

MR. WOOD: Metromail does, that's right.

CHAIRMAN JOHNSON: Metromail.

MR. WOOD: Right.

CHAIRMAN JOHNSON: And you all have access to Metromail.

MR. WOOD: That's right.

CHAIRMAN JOHNSON: And Dunn & Bradstreet for about 90% of the businesses.

MR. WOOD: That's right.

CHAIRMAN JOHNSON: But are you stating that as it relates to Florida, since Florida is -- well, maybe I don't understand. It says currently 70% of Florida end users can be geocoded. Does that mean -- is that because of that 90% higher group, that 10% that you don't have reside in Florida?

MR. WOOD: It's actually -- actually, that's good question. It's a two-step process. First of all, you've got to have the address information, and we've only got 90% of those. And actually, I think for Florida, it's about comparable to that.

Now, the next thing you've got to be able to do is take that address and translate it into latitude and longitude. And if it's an address like 123 North Maple Street, the information is available to do that. If it's an address like Rural Route 6, then that doesn't help you very much. So you would have an address, but not a geocodeable address.

So the percentage -- the 70% are the number of addresses that we can actually locate, latitude and longitude. And that's a function of the fact that we didn't have everybody's address, and some of those addresses we do have don't really give you the information to pinpoint on a map where the customer is.

CHAIRMAN JOHNSON: Okay.

MR. WOOD: So it's two of those things. There's really nothing unique about Florida. The number for Florida is fairly typical, the 70%.

CHAIRMAN JOHNSON: What about your second bullet point? I didn't understand that one either. Success rate is relatively high, up to 85%, in the area in which successful geocoding is most important for accurate --

MR. WOOD: Yes.

CHAIRMAN JOHNSON: What does that mean? How do you determine an area that's most important for accurate determination of costs, and how do you differentiate -- or why is it successful in 85%, and why can it be as low as 34%? What causes that?

MR. WOOD: The primary thing that causes it is where you are. In the highest density areas, there are a lot of addresses, apartment building type addresses which are not as accurately geocodeable.

And in the very lowest density where you have rural routes or where you have post office primarily, there is a lower percentage that's geocodeable.

Now, the good news is that the reason we need -- the primary reason we need to know exactly where a customer is is to know whether they're in a group of customers or whether they're off by themselves. It's these areas in between the very most dense and the very least dense where that's really most essential to this problem, because that's where you have groups of customers.

In the very high density areas -- and when I say high density, I mean more than 10,000 lines per square mile. That's a very dense downtown area. That's a downtown Miami type area. If you then just place plant -- basically you know you've got to put plant throughout that whole area, because there are people throughout that whole area. So it's less important to put each one in a specific place. You're going to have to cover the whole area no matter what.

In the very lowest density areas -- and I've got a slide that will illustrate this I think in a few minutes. You have some groups of customers, and typically the people we're able to locate are the ones who live at the crossroads in the little small town in a rural area. And then you've got people that are spread way out across the countryside. And the way we serve those is not as a group, but we recognize the fact that they are basically one- or two-at-a-timers in terms of building facilities. And we build what's called road cable out to them one at a time if necessary, two or three at a time if necessary. And in this model we're building road cable to cover -- you know, we know they're in a certain census block, and we're basically building road cable to cover them even if they're all the way out at the boundary. So to the extent they're closer in, we've not only passed them with the cable; we've overshot by a little bit.

So I'm less concerned in those areas about the clustering, because in those areas, we really are building plant -- in the earlier slide, we're really building it almost one at a time to everybody, whereas in an area of typical density, not the very lowest and not the very highest, we're trying to do two things. We're trying to build to groups where there are groups, and then to those individuals one or two at a time where they exist. There's two different ways to deploy the plant that way.

That's the most typical scenario. That happens across a wide range of densities, not the very highest, not the very lowest. And that's why we need the information most critically in those areas. And I've got a slide I think that will help a little bit in a few minutes that shows you graphically how we put this cable out to those one- and two-at-a-time folks in the rural areas.

COMMISSIONER DEASON: I have a question.

MR. WOOD: Yes, sir.

COMMISSIONER DEASON: I'm trying to understand the sequence that you follow. I assume the first thing you do is, you use census data to determine the number of housing units or households.

MR. WOOD: In a given census block, that's correct.

COMMISSIONER DEASON: Okay. In a given census block. And then you use Metromail to get addresses for those units if it's residence, and you use Dunn & Bradstreet for addresses if it's a business?

MR. WOOD: Exactly.

COMMISSIONER DEASON: But you're only going to get on average 90% addresses for residence customers. Ten percent of the customers that have been identified in the census data you don't have an address for.

MR. WOOD: That's correct. We know they're in that census block somewhere, but we can't pinpoint exactly where they are.

COMMISSIONER DEASON: And there's no assumption about whether they have telephone service currently or not. It's just that there's a housing unit there, and you're assuming that you have an obligation to provide services, to provide telephone service.

MR. WOOD: We provide service to all occupied households. Now, we can also provide additional to that, and there's a true-up mechanism here. And this is not unique to this model. You've already heard it described once today, quite frankly. You can have -- we have what's called the National Access Line Model that goes through and looks at the number of people that are supposed to be in the census block. That gives you the number of households, but some may not subscribe. Some may get two lines. We track the data to predict as accurately as we can who subscribes and who subscribes to multiple lines, because we'll need to design those in.

The same thing for business. We know it's a business. Well, do they have -- you know, is it a telemarketing type business that's going to have, you know, 500 lines, or is it a feed and seed that's going to have two lines or one line? We track that information.

But if you have information from the local exchange company about the number of residence and business lines served out of that wire center, we can have this process -- instead of using our line model that gives our best guess based on those characteristics, we can true up to the LEC actual number of lines served out of that office if we have the information to do that, and you just plug it straight in the model. That's something we've tried to do. It's a capability that has been proven other places. But we're not the local exchange company, so we don't have that data. They do.

But you can run it either way. And that's true about both models. You can use the line model as the best predictor, or you can true up to the line counts for the wire center.

COMMISSIONER DEASON: Well, if you true up to the line counts, do you have access then to information on location?

MR. WOOD: That's a question I asked early on, don't the local companies -- if they know who the subscribers are, don't they know where they are? And the answer turns out to be no. They have a way to contact the person through an address. They can send them a bill. But oftentimes that bill goes to a post office box or rural route, and we're back in the same position in terms of the physical location. They don't have that information. We don't have that information directly. That's why we go through this process.

COMMISSIONER GARCIA: How can the information not exist? I mean, obviously they have phone.

MR. WOOD: That's right. And --

COMMISSIONER GARCIA: How could the local companies not know where their -- obviously, some kind of easement rights must have been ceded to get that phone somewhere.

MR. WOOD: Right.

COMMISSIONER GARCIA: So there has to be somewhere that -- some engineering report that includes that information.

MR. WOOD: It's my understanding -- because I looked at this. I asked the very same question. They know to a very high degree of accuracy where they have run a cable. They know to a very high degree of accuracy how to send a bill to a customer, which is to an address.

What they do not have is information that can tell you, okay, that customer is at this certain latitude and longitude. They have to go and find them on the map just the way we would have to go and do it. So it's -- obviously, if that information were to exist, that would be the logical starting point for this whole process, and quite frankly, you wouldn't have this debate between the two models.

Unfortunately, because it's not there, we're starting in different places to build up to what both sides think is the relevant information that you need to design a network. But certainly that would be a logical starting point if it were there.

COMMISSIONER DEASON: Well, for residence customers, how do you determine the -- you're not going to have addresses on average for 10% of the residence households.

MR. WOOD: That's right.

COMMISSIONER DEASON: How do you compensate for that?

MR. WOOD: Well, we know that those people are there, and we don't want to design a network that's 10% short of the right number of people. So that's the process that we then go to and say, well, we know they're in a certain census block, and we know that census block is most likely bounded by a road, and we're going to place them on that outer boundary. What that does is, it disperses the --

COMMISSIONER DEASON: How do you know a census block is going to be bounded by a road? When you say bounded, what do you mean?

MR. WOOD: I mean they're -- very typically, the way the Census Bureau actually draws these when they create them is that they bound them either with roadways or natural features, like a lake or a river. You may have a boundary.

What we've tried to do is to go through a process, okay, we know everybody who's in that census block. Next step, can we locate them specifically within it. Well, for 70% or so we can. We locate those. Then we've got to deal with the fact that we've got 30% more that we know we've got to provide service to, and we know we've got to build plant to them, but we don't know exactly where they are.

What's the most conservative way to do that? Well, the most conservative way to do that is to spread them out around the boundary.

COMMISSIONER DEASON: When you say conservative, you mean generating the highest cost?

MR. WOOD: That's right, because if we put them on the outer boundary, we've got to build longer cables. And by spreading them out, we get what's called maximal dispersion. That means that they're spread out as much as possible.

Well, all things equal, it's mucn less expensive to serve people that are tightly packed together than they are if they're spread out, and the more you spread them out, the more it costs to serve them. So by putting them on this outer boundary, we've basically taken the position that we don't know exactly where they are, but we want to treat them in a way that will, if anything, overstate the cost. We don't want to understate the cost. And that's the treatment of those people.

Now, again, it is possible not to just put them on the outside, but to distribute them also along the interior roadways. That was something that we were asked to do, and the model has been run with Florida data for that, and that gets -- it in fact verifies our original assumption, and that is that it takes less cable to serve those people if you do it that way than if you put them all on the outside, so you can save money by doing that.

COMMISSIONER DEASON: And you do that for customers, first of all, that you don't have an address for, and then those that you have an address but you cannot geocode?

MR. WOOD: That's right. And together those two things make up the 70% of residential and about 15% of business.

CHAIRMAN JOHNSON: Was the thing -- and I don't mean to compare models, but the BCPM, the road segment analysis, is that what the FCC asked you all to do? Is that what they were doing?

MR. WOOD: For customers we couldn't locate. I mean, I don't want to tread over that line into comparing either, but both models start at the census block level. They both know who's -- you know, they've got an accurate count for there. The question then, quite frankly, that you've got to wrestle with this week is, which process do you think is more appropriate for locating customers in that census block? We locate actual locations for as many as we can, and for the remainder we have to put them somewhere, and we spread those. But we could have used for the remainder the process that the BCPM folks use. And in fact, the filing at the FCC, the company that the BCPM sponsors actually buy that information from provided a data file that we then used to conduct that analysis.

CHAIRMAN JOHNSON: Okay.

MR. WOOD: What we don't want to do is resort to distributing people on roadways if we know where they are. That's really a -- you know, that's a last resort for us rather than a first choice for us.

CHAIRMAN JOHNSON: That's what I understood. I just wanted to be clear that when you go -- to the extent that you can't find every one, the second process that you would -- or that the FCC asked you to provide them information on was the road segment, but that was after you found as many as you could, you would overlay for the 30% that you couldn't find doing that road segment algorithm.

MR. WOOD: That's right. That's exactly right. We then spread them on not only the roads that go around the census block, but the roads that go through the census block, based on the information actually provided by the company that the BCPM sponsors obtain that information from.

CHAIRMAN JOHNSON: And BCPM begins with the road segment algorithm analysis?

MR. WOOD: That's my understanding, yes, ma'am.

COMMISSIONER JACOBS: Do you impose some

kind of criteria to alleviate that boundary problem that you spoke of earlier where the road might separate a cluster?

MR. WOOD: Well, that's what we do. When we do our clustering -- and I've got some slides that will kind of graphically show this. The reason we do the clustering the way we do is to get around that problem. We don't look at the fact that -- we don't let the fact that there's a road there change our clustering, when we look out and see that there is in fact a house across the street that if you were building telephone plant, you would build it to my house and your house, even though they were on the other side of the road.

That I think is a key distinction. And quite frankly, the reason we've really worked on this clustering process is that a road doesn't stop you from providing telephone plant to the other side. In fact, plant often goes across the road. And if you've got a cluster of customers that happens to have the road running through it, you need to treat that cluster as a group and not split them apart, because if you do split them apart, you're providing a duplicate set of facilities to each one, and that's where we think the cost gets overstated.

COMMISSIONER JACOBS: So you're not organizing your plan along grid boundaries. You're really trying to serve the cluster.

MR. WOOD: That's exactly right. And again, I don't want to tread into the area of comparing and contrasting, but what we previously did was something akin to a gridding process, and it had that problem. And I think that's a problem with gridding in general. What we've moved to then is the actual groups of customers.

And I've got a graphical example just to step you through the process. Well, actually, this slide is material that we've really covered. We're looking for actual groups in the clustering, and we do have the two engineering constraints, the 18 kilofeet and the 1,800 lines. Those will not -- I mean, if there is actually a group that's bigger than that, we will identify that group, but then when we go to create the customer service area and design the plant to it, we will split the group up and serve it in two pieces, because those constraints require you to do that.

Now, we find two things actually. We find what we call main clusters, which is at least five people, and then we find what we call outliers, and that can be anywhere from one to four people. Oftentimes it's just one location. Those are the people that we have to build a specific cable out to them and serve them one at a time, which is more expensive, but that's the way to serve those folks.

And to go to the example, let's say we've got a central office, which is the square on the left. That's where the switch is. And we've got all these folks over here on the right spread out in this particular pattern that we need to provide service to.

Well, if an outside plant engineer were going to design a network to serve those people, the first thing he would want to know is where are those people and which ones are closer together, because he's going to design his plant accordingly. And in fact, that's exactly what we try to do. And for this first set of people, those are the people that we can geocode. Those are the people we can locate exactly where they are through this process.

But as we've talked about, there are some folks that we can't catch during that process, and we have to distribute them somewhere. And what we've done here is draw in the census block boundary, which is the irregular shape. And there are two houses that are slightly a different color that don't show up very well here, but those are surrogate points. Those are people that we know they're in this census block somewhere, but we don't know exactly where, and we want to put them in a position that will allow us to estimate the cost of serving them in a way that's conservative.

CHAIRMAN JOHNSON: Let me ask you a question.

MR. WOOD: Yes, ma'am.

CHAIRMAN JOHNSON: And this is kind of a general question that perhaps Mr. -- I don't know how to pronounce his last name, Brian that did the BCPM -- can also describe when he gets on the stand. But when you're doing your analysis and you find, say, an outlier, or you have an address and it's a customer that's way out somewhere, generally, at least at the Florida Commission, to the extent that they're way out and their costs are abnormally high, the customer will have to make some contribution to that cost to get the line out to them.

MR. WOOD: Right.

CHAIRMAN JOHNSON: When you find that in this instance, does your analysis take any of that into consideration, or would the full cost be borne by the company?

MR. WOOD: The answer is yes and no. It depends on the situation.

When we talk about the customer location and building facilities to that location, what we're talking about is what we call the feeder and distribution parts of the local loop. That gets you to the street in front of the customer's house, if you will, where there's a telephone pole. Or perhaps in your neighborhoods where they bury the facilities, it's a pedestal, it's a little gray cabinet about this high (indicating). And then from that facility to the interface device on the side of your house, you have what's called a drop wire.

A lot of times a customer location that has special construction charges applied is because they are well off the roadway, which means that drop is very long. If this customer were to have like more than 150 feet or 200 feet of drop wire, we would not include that. We would expect that that would be a situation where a special construction charge would or should apply.

CHAIRMAN JOHNSON: So your analysis would drop that.

MR. WOOD: It would not include -- we would take wire to, say, 150 feet, but if the customer were back in the woods further still --

CHAIRMAN JOHNSON: I follow you.

MR. WOOD: -- it's up to them to pick it up from there.

Now, if it's a case where it's not the house off the street, but the fact that -- the house is right on the road, but the road is way the heck out nowhere near anybody, we do include that cost in the model. So if it's a case where the customer is on the road, but they're just way out in the countryside, we do include a cost to build all the way to them. If it's a case where they just happen to be the one guy who's way off the road, we'll go 150, 200 feet, and then it's up to them to pick it up from there.

So that's why I wanted to draw a distinction. It depends on whether it's the location on the road that's far away or whether it's the house off the road.

COMMISSIONER DEASON: How do you define a road? Is it public access to that, whether it's graded or paved, or is it -- how do you define a road?

MR. WOOD: Well, we actually define the customer location, and we don't -- let me see how to explain this in the right way. We define the customer location at the point at which distribution plant ends and the drop begins. So we don't really define -- I mean, they could be well off the beaten path, but we will take distribution cable to the point at which you leave the road to head toward their house. And we include all of that in this model.

It's the case where once you leave the road to get to their house, you've got to go a long way, you know, one of these mile-long driveways, that we would expect a special construction charge arrangement to apply, and we would give them the average off the road for the part of the state they live in. I mean, obviously, we give them a longer average because they're in a less dense area. But once you go from that, then it would not be included.

COMMISSIONER DEASON: Well, someone that lives in the middle of nowhere, but it's the end of a road that's public access, it's graded by the county or whatever, is that considered someone you would run a line to?

MR. WOOD: Yes. We would take distribution cable to that point on that road, even if they were the very end of the line, so we would include that cost.

And I've seen a couple of examples in

states out west where there would be a special construction charge that would apply in that scenario, although predominantly I've seen them applied to areas where people are way off the road.

In that case, we would overbuild slightly, and our cost would be a little higher than it should be. But that's the distinction.

COMMISSIONER DEASON: Your clustering crosses -- the line you have drawn, is that the boundary of the census block?

MR. WOOD: That's right.

COMMISSIONER DEASON: So your clustering goes across -- it crosses those boundaries.

MR. WOOD: Absolutely. And the reason again is -- in earlier versions of the model, we used those census block and census block group, which is the collection of the boundaries, as boundaries. And what we kept finding is that customer clusters where they actually exist exist on both sides of that boundary. So in terms of designing your plant and identifying your customers, you shouldn't use those as boundaries, and we don't. We've moved completely away from that. The only reason that is there is to place those customers that we couldn't locate specifically within that census block.

And in fact, that's what this slide is intended to illustrate. It's going through the process I described before, the looking out 150 feet to see if you see anybody, going to the next place and looking again, then out to 300 feet. And over on the left, the kind of tall diamond there is the area that's covered by doing that. Down here in the bottom is a triangle that roughly covers these folks that are together.

Over here on the right are the type of people we were talking about a few minutes ago. They're the ones that live -- they don't live close enough to anybody else to consider them together in terms of placing plant to them, so you have to build a separate facility out to them.

And what we do is, when we locate those -- and we call them outlier clusters, one to four customers. We also not only locate where the cluster is, but we locate where the nearest main cluster is, these larger areas, because what we're going to do is, we're going to build a very big facility out to the nearest main cluster, and then from there, we're going to run a separate wire out to these outlier folks.

COMMISSIONER DEASON: Before you leave that slide, I have another question. The two blue houses, I assume those are the ones that you could not geocode.

MR. WOOD: That's right.

COMMISSIONER DEASON: And you're making an assumption about their location.

MR. WOOD: Yes. We are making what we believe is the most conservative assumption possible in terms of high cost, and that is, we're placing them on the boundary.

COMMISSIONER DEASON: Well, one of those is within an cluster. And my question is, if you could geocode the other houses in that cluster, you know, one would ask, well, why couldn't you geocode that one, because apparently that's a suburb or something. It seems like you would have a higher probability that those that you could not geocode are going to be the outliers, it seems. What is your response that to that?

MR. WOOD: The often are. And to clarify on this slide a little bit, what we've taken -- things are not exactly to scale here. You're right. They're most likely outlier clusters or outlier single individual locations. And in fact, that's how they're almost always treated or very often treated.

What we've got here is a CB that's shrunk down to a pretty small size on this slide, and we've got some main cluster areas that look very large in comparison. In reality, the scale would be different and the distribution of those outliers would be different. I mean, it's not impossible that they exist within otherwise a cluster of geocodeable locations. Sometimes they do. But if you just evenly distribute them around, the chance that they are well outside of a cluster is very high. The chance that they would fall inside of a cluster is very low, just because the total amount of that perimeter of that CB that happens to have a cluster sitting on top of it, while it looks fairly high on this slide, in reality is very small.

But, yes, it is a possibility that they occur within or outside of an actual main cluster.

COMMISSIONER DEASON: So you do it on a random basis of the area that -- on the boundary, so given the scale of things, there's a higher probability that they would be considered an outlier; is that correct?

MR. WOOD: That's right. We evenly distribute them out there. And you're right. There's a pretty good chance that some of the folks that are actually in a cluster are going to be treated as outliers this way. There is a possibility, although I think a much smaller one, that someone who's actually an outlier is going to be treated as part of cluster just because of where they fall.

You know, if we did this thing correctly to scale, I think it's very clear, the chance of the first thing happening is very high, and the chance of second one happening is fairly low. And when we start talking about thousands of locations, I'm pretty comfortable with this approach.

The next step is one you're going to hear a lot about again. Given the current state of computer technology and having a model that runs in a finite amount of time, this is a necessity. It's either a big deal or not a big deal, depending on who you listen to.

On the previous slide we actually drew in -- over here on the left where we've got too many clusters, we drew in an area that is in fact the actual shape of those clusters. Now, computers don't like irregular shapes very much. They would much rather have a regular shape. What we are doing is taking -- for those main clusters, we are creating a rectangle, a regular polygon, that has the same size, the same -- what we call aspect ratio, the ratio of length to width. If it's a long and skinny cluster, we get a long and skinny rectangle. If it's a short and fat, we get something close to a square, and the location of that original cluster. All of those things are preserved. But what we do is, we create at this point the customer service area based on that cluster, and we create a customer service area based on these rectangles that overlay the actual clusters.

This is a requirement in any model that you look at, this type of regulation of the shapes. But if you compare models -- and I'm staying away from that here, but if you do that, you will see different processes of doing this. And I think there are ways to do this correctly, and I think there are ways to do this incorrectly.

Clearly, if you change the size of the area being studied, it would be incorrect. If you were to move that area from where the customers actually are to somewhere else entirely, that would not be correct. But to go through this process to keep the size, the relative shape in terms of the length to width ratio, and the location in the same place, you can create a customer service area based on these shapes, and that's exactly what we do.

COMMISSIONER DEASON: Excuse me. Before

you leave that, the rectangle at the bottom, are you indicating that is the same length, has the same general shape or proportion as the other rectangles on that --

MR. WOOD: No, no. I'm sorry. If you go back to the slide previous that has those shapes, the triangle and the diamond, what these rectangles represent is an area that covers the same geographic -- the same area as the triangle at the bottom and the rectangle at the bottom of the page, just to compare those.

This rectangle at the bottom has the same area as the triangle on the previous slide. It's located on the same place. And if you were to measure the ratio of length to width of the triangle, you would have the same ratio of length to width on the square. And it's not perfect on these slides, but that's the way it's conducted in the model, because otherwise, the computer would have to deal with -- I mean, on this page it's a simple diamond and triangle, but if you start drawing lines around actual customer locations, it's a very complex shape.

What we want to preserve is the fact that this is a cluster. It's a cluster of a given size, it's a cluster in a given place, and it's a cluster with a general shape in terms of being, you know, long and narrow, short and fat. All of those things we need to preserve, because that's going to determine how we put facilities in that area to serve those customers. So what's preserved here are those key features.

COMMISSIONER DEASON: Well, what about those two homes in the south that are outside that rectangle?

MR. WOOD: Those are -- if they're drawn correctly, they're at least touching that rectangle. What we've got is facilities that cover in some cases beyond where they need to if you were to compare that rectangle back to the triangle on the previous page, and in some cases go to nearly to where they need to. The assumption is, and it's the assumption in both models, that you can take that regular shape, develop plant based on that regular shape, and have the right amount of facilities there to serve those customers.

And that's exactly what we do with this information, is to create distribution plant based on those areas. For the main clusters -- it's hard to see on the overhead. It's a clearer on the printed slides. We have a backbone cable and some branch cables running off of that to go to each customer lot. We have then from -- and this is hard to see. From those main clusters to these outlier folks that we need to serve, we have a facility that goes out from the nearest cluster to the outlier. And then sometimes we chain these together. We go from this person, then to the next. And that's the so-called road cable. It's a separate copper facility that goes out to serve those people.

Coming back toward the central office, you'll see a main feeder line, and then also some subfeeder lines which go from the main feeder to the point that is the centroid, if you will, of that rectangle, which is where we place that interface, which is where the feeder facility stops and those distribution cables then emanate to serve that area.

That is how the --

COMMISSIONER CLARK: Let me ask a question on that. On the feeder cables, though, you would not -- the locations you're serving would not be so far away from the centroid that it's too far for feeder cable to provide quality service.

MR. WOOD: That's right. We actually test that specifically. That's a good question.

COMMISSIONER CLARK: Okay. All right.

MR. WOOD: In order to determine what kind of feeder facility this would be, and this being starting with this main feeder, and also extending to the subfeeder, we look at the distance from the central office first, because there's a crossover point from copper to fiber. We look at the total life cycle cost of a copper alternative in terms of what it costs to put it into place, what it costs to maintain it over time, and for fiber, the complete life cycle cost, to compare the two to see which is more efficient.

We also look at the fact that services like ADSL, the new enhanced services, are limited to an 18,000 foot run on copper, and then the service begins to degrade to the point that it's not useful.

So what we do is -- you can change the 18,000 feet. It's a user-definable input. But what the model does is, it tests from these end points at the customer locations all the way back to the central office to see if that exceeds the 18,000 feet. If it does, we can't use a copper feeder, because that would exceed that threshold. So then in those examples, this would automatically be a fiber feeder. And then we would measure from the point here and here where that fiber becomes copper the total distance to make sure that that doesn't exceed that threshold boundary where service would start to degrade.

So we actually test service quality back -- from the customer back toward the office in both of those respects to make sure that we've got the right facilities in place so that this is not only high quality local plain old telephone service, but also quality enhanced services like ADSL.

COMMISSIONER CLARK: It seemed to me that in some of the testimony there was criticism of the decibel levels. Is that -- will you touch on that when you actually testify?

MR. WOOD: I can do it either time. There's certainly a debate, and it's not unique to Florida, about whether this maximum copper span is 18,000 feet or 12,000 feet. If you're concerned about that, you can change the user-definable input from 18 to 12 to have this test done on 12,000 feet.

COMMISSIONER CLARK: So you can correct your model if you're concerned about the issue; right?

MR. WOOD: If you felt it needed correcting. Now, you've got an engineering debate on whether it's 12 or whether it's 18.

COMMISSIONER CLARK: Okay.

MR. WOOD: I'm not an engineer. I do a have a press release from BellSouth that says we're providing ADSL, and it's available up to 18,000 feet, so that convinced me that 18 is the right number. But that is an engineering debate that you need to look at, certainly, and you will hear about.

Also a couple of things to note on feeder, feeder steering. What you see here is a feeder route that pretty much goes straight out east-west, subfeeders that go out north-south. There is a capability in the model if you want to steer that feeder at a different angle toward a cluster of customers, you can do that. It's a simple case of going in and clicking on an input field to turn it on.

I would caution you, though, that sometimes going directly at these kind of angles is not lower cost than going north-south, east-west. In fact, there are some examples that we have in our rebuttal testimony that show where that might not be the case. But it is a capability that is in the model, and it's an option for you if you want to have the capability of seeing what the costs would be if these feeder routes go straight out north-south, east-west, or if you were to direct them toward -- at a different angle toward a group of customers. The capability is there either way.

The same type of capability exists for the distribution plant in these areas. Sometimes it's placed on poles; sometimes it's buried in the ground; sometimes on very rare occasions it could be conduit. There are assumptions about how much is on poles and how much would be buried based on the density of the area. You would have a different mix in a very high density or low density place in the state.

But the model also has the capability, if you turn it on -- and again, it's just a case of clicking on it -- to let the model go in and look for each one of those distribution routes, look at the soil types, all the characteristics that go along with that, and find out whether it would be more efficient to put it on a pole or bury it in the ground, and adjust that mix of structure, if you will, accordingly. That's another dynamic modeling feature. It's a capability that's there if you want to use it.

So the initial assumptions about how often a cable is on pole and how often it's buried is not something that's locked in. It's something that you can allow the model to compare the alternatives and pick the cheaper one if you would like to do it that way.

And that essentially describes how we do loop facilities. I agree with Mr. Staihr, that is by far and away the bulk of the cost that you'll be dealing with on basic local service. There are other costs, and I'll touch on those very briefly.

One is switching. We actually go in and size each switch in each central office based on the line counts and the traffic information for that office. There are at least theoretically two ways to exhaust the capacity of a switch. One is the total number of lines it can serve, and one is its central processor that processes calls and processes features. As a practical matter, switch exhaust is almost always on lines rather than features, but we do test both ways to make sure that we have the right size switch. And if we get close to the threshold for either one of those parameters, we place two switches in that central office.

You may specify host, remote, and stand-alone switches. Some switches are in fact stand-alone. They have no direct connection other than interoffice facilities to other switches. But sometimes you have host-remote relationships, where you have a host switch that has full capability and a remote switch that is less expensive, smaller, and does not have full capabilities, but is tied directly to that host switch.

The model will allow you to identify for each office location the type of switch that occurs there, and it will not only then size appropriately and provide the right switching investment, it will also change the interoffice facilities that connect those switches, so that if you've got a host-remote type relationship between those two switches, it will place the appropriate facilities for those two switches to talk to each other, because they have to do that more often than two stand-alone switches.

COMMISSIONER JACOBS: That's going to happen more -- that's going to more likely happen when you have a major cluster connected to an outlier?

MR. WOOD: It's most often going to happen when you have that proportion of customers, but on a much larger scale, where you've got a small town or a fairly good size town, like a 30,000 or 40,000 person town that would have a full size switch, and then a much smaller town, say, 10,000, 5,000 people nearby. Rather than trying to run a bunch of loops out to the small town, which would be more expensive, or placing a full size switch, which would be more expensive, you place this remote switch, remote switching unit.

They're relatively inexpensive compared to the full capability.

But you provide the facilities between the two to make sure that they can talk to each other a lot, because they're going to have to, because a lot of the features type intelligence that's in a full switch won't be in that remote, so they will need a different type of facility, and the model considers that. When you designate, it will size the switch according to the investment of what type it is, full size, remote, stand-alone. It will also change the facilities between the two.

Again, the locations come from the Local Exchange Routing Guide. If you were to super optimize the whole network, you would not use these current switch locations. But we think it's a practical starting point, and the FCC agreed, and that's why they put it in their requirements.

For interoffice facilities, we connect these switches with full Sonet capability, which I understand you've been interested in in Florida for several years.

We also provide at least 100% redundancy on all those facilities, so if there was a fiber cut because of this ring architecture, there would not be a service outage. There would be an alternative path, a full size alternative path between those switches. It's at least 100%. Sometimes there's more than 100% redundancy for that capability.

Another thing that's unique about this model is that it explicitly costs signaling facilities. In the old days the signaling that went on was carried with the call on the same facilities. Now we've gone to what's called out-of-band signaling, which is a separate set of transmission facilities that connect the switches, and also some stand alone computers that both control traffic and have large databases in them to allow certain features to be provided.

This model again is unique in that it starts with all the locations of those computers, all those signaling locations from the Local Exchange Routing Guide, sizes those appropriately, and connects those with facilities. This is not an add-on from a different model. This model does it.

And again with signaling, it's engineered to provide at least 100% redundancy, so if there's a fiber cut or an outage of facilities, there's always an alternative path, and service is not discontinued.

Inputs to the model, there are several

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categories. Again, as I described, there are tens of thousands you can change, about 1,600 that you probably might want to look at possible changes to. Those are the ones that are in the pulldown menus. They are highly specific to the geographic characteristics and the demographic characteristics of Florida, down to within each -- these census block levels and the census block group level, the soil types and the like, all that information that you need at that level of disaggregation, all the demographic information in order to accurately predict whether people have a telephone at all or whether they subscribe to two lines or ten. You need information about those customers again at that very disaggregated level. All of that information is here.

We look specifically -- a lot of investments you see put into cost studies on what's referred to as an EF&I basis, engineering, furnished and installed. What that means is, what's being capitalized is not just the cost of buying the equipment. It's the cost of designing a place for it in the network and putting it into place. All those costs are then capitalized and depreciated over the life of the asset.

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For each one of three assets, there's a material cost and a labor cost combined together. We separate those out, look just at the labor piece, adjust that to a Florida-specific value, and then combine them back together in order in order to determine the total amount that's going to be depreciated.

This is a ... bottoms-up, if you will, costing process. It starts with Florida characteristics, but ... does not start with the characteristics of the incumbent local companies in terms of their network or their books of account or their historic costs. We try to come up with a process that is accurate for Florida, but doesn't require you to make an assumption about whether what those companies have done is in fact what they should be doing in the future. We tried to separate that whole question from the process.

And finally, in terms of outputs, what I'm describing here are just the universal service outputs. As you know, the model, because it's the same network that provides unbundled elements and the like, it will also provide costs on that basis.

Costs are developed, as the previous slide shows, down at the level of these clusters of customers, and we have individual, unique information at that level. Now, you can combine those up at different levels. You can combine them up to the census block group, you can combine them up to one of nine density zones based on the number of lines per square mile, down to less than five lines per square mile at the very low end, more than 10,000 lines per square mile at the high end. You can look at the costs at a density zone basis.

What I think is most useful for universal service purposes, however, is to look at them at the level of the wire center or the central office. And what we've provided in, I believe it's my Exhibit 5, is an office by office listing for each of the incumbent companies, and really three different costs: first of all, the cost of providing basic local service in that office based on average traffic characteristics, average calling patterns. And then we've split that out into residence and business, because residence calling patterns are different than business calling patterns, and they reflect a different cost. So we've got two additional columns there, one basic local service specific to residential calling patterns, and then basic local service specific to business calling patterns.

All of these costs are -- we include all the elements of local exchange service as defined in 364.02. We went back and checked, and in fact, when we originally provided the information to you, we h omitted white pages listings, and we went back and added those in to conform to that definition.

I was also asked in the information that we provided to you in this case to add in access and intraLATA toll costs by AT&T and MCI, and they will have the appropriate witnesses to describe to you why those costs would be relevant. But we did add those in.

In terms of additional information, obviously, you'll get another shot at me here in the next couple of days. But in terms of what we provided with the testimony, we've got the model documentation which describes really this process. We've got attached to that a complete listing of the inputs and a description of what they are, a list of all the key formulas in the model so that if you -- I mean, you can go to the spreadsheet and see them, but if you don't want to do that you can see a listing.

We also is have what's call the inputs portfolio, which is a description of the 1,600 or so user-definable inputs and a description of what the input is, where the values were obtained, and that sort of thing.

We also include a user guide which is a -- at least a how-to document that describes how to use the model.

That concludes what I have prepared, but obviously, if you have any other questions, I'll be happy to do that.

CHAIRMAN JOHNSON: Thank you. Any other questions, Commissioners?

Staff?

MR. COX: Staff has no questions at this time.

CHAIRMAN JOHNSON: Thank you for your presentation.

MR. WOOD: Thank you, Madam Chairman.

CHAIRMAN JOHNSON: We're going reconvene at 1:30. We're going to break for lunch.

(Proceedings recessed at 12:49 p.m.)

(Transcript continues in sequence in Volume 5.)