BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

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

VOLUME 9

Pages 1007 through 1079

PROCEEDINGS: HEARING

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

DATE: Tuesday, October 13, 1998

TIME: Commenced at 9:10 a.m.

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

REPORTED BY: CATHY H. WEBSTER, RPR

APPEARANCES:

(As heretofore noted.)

INDEX OF WITNESSES

INDEX OF EXHIBITS

ID ADMITTED

No exhibits identified or admitted in Volume 9

PROCEEDINGS

(Transcript follows in proper sequer.~e from Volume 8.)

WHEREUPON,

KEVIN DUFFY-DENO

was called as a witness on behalf of BellSouth and, having been duly sworn, testified as follows:

CONTINUED CROSS EXAMINATION

A As I've said the last three times I've answered that question, no, I disagree with your stat‹ment.

BCPM does spatially locate customers.

Does it assign a different latitude and longitude to each housing unit? No, it doesn't.

Can we argue that BCPM does say, well, we've located housing units to a microgrid; that microgrid has a spatial orientation. If we took a map of Florida and overlay -- we would overlay the microgrids, those microgrids aren't random. They have a spatial orientation. Their perimeters are defined by latitude and longitude.

COMMISSIONER GARCIA: But you can't hit a house? You can hit -- You can hit close, but you just can't hit the house on a map? In other words, you can't pinpoint the individual customer?

A Correct.

COMMISSIONER GARCIA: You could probably bomb them, but you just couldn't shoot them?

A Yeah; correct.

What we do is we say within this one-tenth of a square mile area, there likely are ten houses, but we don't know exactly where those ten houses are within that small area; yeah.

BY MR. LAMOUREUX (Continuing):

Q Let me see if I can draw a simple example, see if that might help. I'm sure there are no actual grids that are going to look this way, but I want to pick something simple.

Suppose you've got a census block that's a square. You've got four -- I'm sorry; yeah -- census block that's a square. You've got four microgrids that are squares inside that census block; okay, just to keep things simple.

A Okay.

Q The way BCPM works, as I understand it, is let's say there's 100 total miles of road in the census block. Okay. And it calculates that in this microgrid there are 25 miles; in this microgrid there are 50 miles; in this microgrid there are 15; and in this microgrid there are 100; is that right?

A You mean 10?

Q Thank you. Ten. For a total of 100.

As I understand it, what BCPM does is it says for this upper left hand quadrant, since this microgrid has 25 miles out of the total miles of 100, there are 25% of the customers in the census block in this microgrid?

A That's a fair characterization.

Q Okay. So to keep things simple, if there are 100 customers total in the census block, BCPM would allocate 25 customers to this microgrid in my simple example?

A In your simple example, yes.

Q Okay.

A Yeah.

Q And while the microgrid has a spatial location, BCPM does not locate any of the individual 25 customers in that microgrid, within that microgrid?

A Within -- Correct. Within the microgrid, as I just explained, BCPM will say, yes, there are likely 25 housing units or customers within that microgrid, but it doesn't make a determination within that microgrid where they might likely be.

COMMISSIONER GARCIA: But it's that broad of a concept? Twenty-five miles, it assigns twenty-five people because that's a quarter of the area within that space; right?

If we're talking about 100 miles, 100 customers, you'd divide it into four quadrants: one quadrant had a quarter of the miles and therefore you gave it a quarter of the population?

A That's what it is.

COMMISSIONER GARCIA: So you wouldn't even be able to bomb it? You just know they're in this area?

A Well, it depends on the strength of your bomb.

COMMISSIONER GARCIA: Right.

COMMISSIONER DEASON: Let me ask you: When you say that the microgrid is one-tenth of a square mile, is that one-tenth mile by one-tenth mile?

A It's 1500 feet by 1700 feet. So I'm not quite sure if that's a tenth by tenth, but the dimensions are 1500 by 1700 feet.

COMMISSIONER GARCIA: But that microgrid is much bigger?

A Well, good point.

Yeah, he drew a very large microgrid.

COMMISSIONER DEASON: There is no microgrid that could have 25 miles of road in it?

A That would be a very large microgrid, yes. And it would not be a microgrid used by BCPM.

COMMISSIONER DEASON: If a microgrid -- I understand it depends on the longitude and latitude and where you are on that as to the configuration of the microgrid?

A Correct.

COMMISSIONER DEASON: If the shape of the microgrid in Florida is different than Maine?

A Slight variation; yes.

COMMISSIONER DEASON: But if it's generally one-tenth of a mile, you're basically one-tenth of a square mile, one-tenth by one-tenth, you're talking 6.4 acres, which is a pretty small area?

A Uh-huh. I don't know what the translation is to acres, but --

COMMISSIONER DEASON: Well, a square mile I think is 640 acres.

I think a square mile is 640 acres. So generally 6.4 acres. You're talking about -- 6.4 acres, you're talking about a few house lots, you know, large house lots?

A We're talking not a very large area.

MR. MELSON: Sixty-four.

COMMISSIONER DEASON: No, if it's one-tenth mile by one-tenth mile, that's 1/100th of a square mile. So it would be 6.4 acres.

I'm trying to get an order of magnitude.

Or is it 64 acres?

A I don't know. I don't know.

COMMISSIONER DEASON: Well, see, it depends on how you determine your microgrid. If the dimensions on it is one-tenth of a mile by one-tenth of a mile, that's 1/100th of a square mile.

If it's one-tenth -- If you take a square mile and divide it into ten rectangles, then each one of those rectangles is 64 acres generally. And I'm trying to understand are we talking 6.4 acres or 64 acres?

A Let me see if I can get an answer to you before I go off the stand.

The dimensions of a microgrid is 1500 by 1700 feet in general. And let's see if we can convert that to acres.

COMMISSIONER GARCIA: Let's go back because we represented there microgrid that was 25 miles by 25 miles. Is that a possible in your mind?

A Twenty-five miles within this -- I doubt it. That's a -- That would be --

COMMISSIONER GARCIA: Why would that happen? Why would you get a microgrid of that size?

A Well, you're not expanding the size of the microgrid. You would be cramming a lot of roads in that microgrid.

COMMISSIONER GARCIA: Gotcha. Is that possible to put 25 miles?

A Twenty-five miles?

Intuitively it doesn't seem possible, but to be absolutely --

COMMISSIONER GARCIA: In Florida, in an area that small. I mean, let me understand: The microgrids don't change in size?

A Correct.

COMMISSIONER GARCIA: It's only their density?

A Correct.

COMMISSIONER GARCIA: And their density by the number of miles that are in there of roadway?

A It's one way to characterize the density, yes.

COMMISSIONER GARCIA: So the only way you get that kind of -- I'm trying to think in my mind how you get that kind of density. I guess a downtown area?

A That's the only place.

COMMISSIONER GARCIA: But I don't know how you could get 25 miles of roadway in 6.4 acres or whatever, one-tenth by one-tenth.

A It seems -- Maybe Mr. Lamoureux can come up with a better number.

BY MR. LAMOUREUX (Continuing):

Q Well, suppose --

COMMISSIONER DEASON: Just one second. If it's 1500 feet by 1700 feet, it's more than 6.4 acres.

A Okay. It must be in the magnitude of 64 acres.

BY MR. LAMOUREUX (Continuing):

Q Isn't it a tenth of a square mile?

A It's a tenth of a square mile, but it's 1500 by 1700 feet, so.

Q Let's say you've got X miles of roads in that Microgrid. Okay. Just to keep the numbers out of there. And let's say you figured out --

COMMISSIONER GARCIA: I'm sorry. What was the -- Forgive me. We were still discussing acres. What was the first variable you began with?

MR. LAMOUREUX: X; trying to get the numbers out this time.

BY MR. LAMOUREUX (Continuing):

Q These two grids look at all the roads that run through this microgrid and calculated, there are X miles of road in the microgrid, I mean, in the census block.

A Correct.

Q Okay. Let's say, you know, that there are quarter -- just keep real simple -- a quarter in each microgrid, proportionate of those roads. So this microgrid has a quarter of that amount of roads in the microgrid. This microgrid has a quarter of X in that microgrid and so on.

What BCPM does is based on that pro rata share of the road mileage in the census block assigns an amount of customers to a microgrid?

A That's correct; yeah.

Q And a microgrid is 1500 by 1700 feet?

A Give or take some, yeah. I would note that when we're talking about rural areas, those census blocks tend to be very large. So you wouldn't have just four microgrids. You would have a very large number of microgrids within a census block, rural census block microgrid.

COMMISSIONER GARCIA: And there are lots of microgrids and two or three people or something?

A In some cases, yeah. In some cases not a lot of roads.

BY MR. LAMOUREUX (Continuing):

Q And just to be clear, this method of assignment based on road mileage, that's typically done for the rural areas? There's a different method of assignment for the more dense areas?

A That's correct. And to be specific, census blocks that are less than a quarter square mile in size, the apportionment of customers within that census block is simply done in land area to a microgrid. Apportionment to microgrids is simply done on basis of land area. For census blocks greater than a quarter of a square mile, we use the roads. And since we're talking about rural areas or high cost, obviously we focus on the road methodology.

MR. CARVER: Excuse me for just a moment. I've just been advised that a microgrid is 58.5 miles. And I have the calculation here that I can provide to the witness in case anyone has questions about how that was arrived at.

COMMISSIONER JACOBS: You mean 58.5 acres?

MR. CARVER: I'm sorry. Yes, that would make a difference; wouldn't it. Fifty-eight point five acres; sorry.

A If it was 58 miles, I would have to go home.

MR. CARVER: And, if I may, I would like to provide the calculation to the witness.

COMMISSIONER GARCIA: Mr. Carver, if I can ask, I know you didn't do that calculation. Who in BellSouth has the technical capacity to do that?

MR. CARVER: I believe the calculation was done by one of the members of the Georgetown group who will be taking the stand as a rebuttal witness later this week.

A Would you like me to -- Would you like me to convey to you what the --

COMMISSIONER DEASON: I assume what you did is you took 1500 by 1700 and calculated the square footage, and divided that in -- and then -- I mean, divided it into the number of square feet in an acre to determine the number of acres?

A Actually, what they did is they converted it into square miles and they said there were 640 acres per square mile. Same answer.

COMMISSIONER GARCIA: Then they took a satellite picture, reduced it.

MR. CARVER: And then we bombed the microgrid.

BY MR. LAMOUREUX (Continuing):

Q Okay. Dr. Duffy-Deno, all this was prelude. All I wanted to ask you --

A Have you made your point yet?

Q While BCPM apportions or allocates a number or a count of customers to a microgrid, it never locates individual customers within that microgrid?

A It does not explicitly locate customers within that microgrid. And, as I said before, for talking purposes, since it is a road-based methodology, you could argue that they are all located at the road centroid at the microgrid.

Q But BCPM itself does not do that?

A It does not explicitly do that, no.

COMMISSIONER GARCIA: Does that tend to hurt the company in its calculations, the fact that the way you allocate them within that microgrid puts them near roads and the possibility is that they're off those roads?

Do you think that's conservative for your estimates to calculate? I mean, I want you -- From our perspective, we're clearly trying to be conservative. Does it help or hurt you that you don't know specifically where they are, that I am calculating on reaching out to them?

A It's a good question.

I think the answer is, or the way I would answer it is that it depends on how fine do you want to get in terms of locating customers. Do we need to go down to a latitude and longitude for each estimated customer, or is it enough to identify the likely number of customers within a small area?

I don't -- I haven't seen a cost analysis that would compare those two to tell you if it makes a large difference.

The BCPM sponsors obviously --

COMMISSIONER GARCIA: Why is it that the Hatfield folks think it's so important to know exactly what that estimate is?

A Well, it's important to know where customers are located, number one.

Okay. I think it's more a matter of a different estimating methodology. They felt that by using address geocoding that they could more accurately locate customers in an area than using roads, but we haven't seen any proof of that.

COMMISSIONER DEASON: Would you agree it kind of boils down to whether you want a high degree of specificity for each customer, realizing in some rural areas you may only be able to do that for 20 or 30% percent of those customers as opposed to a general location for all of the customers?

In other words, you say you have a location for all of the customers and you do that on mileage. As I understand the Hatfield, they can only geocode a certain percentage of customers based upon the limitations of their database. So while they can highly predict where -- show where customers are in rural areas, it might be for only 20 or 30% percent of those customers?

That's -- In comparison, that's what we're trying to find out which methodology is best. Would you agree with that general characterization?

A I would agree with that general characterization. I think you hit the nail on the head.

We've got two methodologies. And I would throw one other issue into the pot. And that is the cost of doing this. The census data upon which BCPM is based is free. The only cost involved is the processing cost, which is not a whole heck of a lot.

The geocoding, the address geocoding, is considerably more expensive just for the data. So I'd throw that into the pot, also.

But what we fundamentally are based with is a comparison between two methodologies designed to estimate customers.

BCPM, because roads are -- The road database is comprehensive, we know basically where all the roads are, but we don't know where all the addresses are.

And even if we had all the addresses, we don't know how those addresses translate into specific streets.

COMMISSIONER DEASON: Well, have you attempted to use the best of both, in the sense that you use the geocoded data for those which you have addresses and you can do that, and then for those that you don't, you just use your methodology of allocating based upon road mileage within each quadrant, or not quadrant, but each microgrid?

A Well, that issue has been looked into a lot. The FCC was struggling with that issue.

I know that Sprint in this proceeding, Dr. Brian Staihr, presents an analysis where geocoded data was used in BCPM instead of the roads. And in that analysis there wasn't very -- It was I think one and a half percent difference in the estimated cost. So for those areas, the geocoded data didn't really add anything to the --

COMMISSIONER GARCIA: I'm sorry; what was that again?

A What Sprint did is they took for -- I don't recall exactly -- I'll say five wire centers. They geocoded their customer data, address geocoded, and then put that data into BCPM. That is, once you've got spatial estimation of customers, you can overlay the microgrids and populate the microgrids with that data.

And the results of that, when you compare it with the standard BCPM run, was that the cost difference was on the order of magnitude of a percent and a half.

So, doesn't make a lot of difference.

Now combining data, if you've got address geocoded data for some, it doesn't make sense to use a road-based methodology for the others.

There are some problems there when you combine address geocoded data with some other methodology and you can introduce some bias into your overall estimation of customers within that area.

I know there is an exhibit to Dr. Staihr's testimony which was an FCC ex parte, which talks just about that issue.

So the proposals that I have seen, and I believe the proposal being made by the BCPM sponsors, is that if you want to go that route, that you use -- And you decide that address geocoding is the way to go, you would use address geocoding only when the success rate is extremely high. And I think the number being thrown out is 80% or higher. And then in all other areas you use a road-base methodology, and maybe even a more refined one like we talked about earlier where you look at specific types of roads.

But that is completely consistent with the BCPM methodology. If you want to go with geocoding, BCPM can incorporate that data. You don't need to go to another model.

COMMISSIONER GARCIA: Doesn't that capture the majority of it? I mean, aren't the anomalies those specific outlying areas?

In other words, when you're talking about 58 acres, I think the number was -- or what is it -- 1500 by 1200, whatever, the microgrid; when we're talking about the microgrid, when we're talking about an area like -- I don't know -- downtown Miami, if you were to overlay that with specific address information, we'd probably have a pretty complete record?

A It would -- I don't know if it's complete, but it's certainly very high.

COMMISSIONER GARCIA: Very high?

A Yeah.

COMMISSIONER GARCIA: So when we're looking at these outlying areas, although they may incorporate the majority of territory, we're talking about a very small minority of customers?

A We're talking about a very small portion of the customers, but we are talking about the majority of the high cost of serving areas.

And because address geocoding fails miserably in these areas, assuming you use this hybrid approach, you essentially would be using address geocoding for your heavily urbanized areas where really probably doesn't make a heck of a lot of difference if you use roads or area allocation or address.

COMMISSIONER GARCIA: You said it makes at most a one and a half percent difference?

A That's what Dr. Staihr found, yeah.

And in your rural areas, you would use the BCPM methodology of allocating along the roads.

BY MR. LAMOUREUX (Continuing):

Q Just to follow up on a question from Commissioner Garcia, the smallest density levels, where the geocoding rate is low, those density levels typically have 1% or less of the State's entire population; don't they?

A Typically, yes, but what percent of the cost is in those areas? I would guess that's considerably more than 1%.

Q I just want a couple of last questions to wrap up this line of questioning.

The finest level of geographic specificity that BCPM uses to locate customers is the roughly 58-acre area of the microgrid?

A Fifty-nine acres.

Q Okay.

A That's correct; the microgrid.

Q And the finest level of geographic specificity that Hatfield uses to locate customers is the actual longitude and latitude point of individual customers?

A No, not the actual.

Q Okay.

A Okay. We're talking -- You know, just so we're careful.

COMMISSIONER GARCIA: Actual of the ones they found?

A But it's the actual of the address. Address geocoding -- And that's why I like to use the term "address geocoding." You're not identifying the latitude and longitude of a house. That database doesn't exist, unless the Pentagon has it.

What you're identifying is the latitude and longitude of an address as placed on a road. And we're trying to identify the spatial location of houses and business structures. That's a customer. That's to where the plant is built.

So just as long as we're careful as to when we use the term "actual."

BY MR. LAMOUREUX (Continuing):

Q Let me ask the question a little more finely then. The finest level of geographic specificity that BCPM uses to estimate customer location is the microgrid?

MR. CARVER: I'm going to object at this point. I think he's answered that question two or three times as to both BCPM and Hatfield. And Mr. Lamoureux keeps asking the same question over and over regarding customer location.

MR. LAMOUREUX: In answer to my last question, he changed the words that were in my question. That's why I'm asking the question again and with different words.

CHAIRMAN JOHNSON: I'm going to allow the question.

BY MR. LAMOUREUX (Continuing):

Q I just want to make sure we get an apples to apples comparison of the constru ts used in the two models. The finest level of geographic specificity that BCPM uses to estimate customer locations is the microgrid?

A That's correct.

Q And the finest level of geographic specificity that Hatfield uses to estimate locations of customers is a latitude and longitude point?

A Is a latitude and longitude point. The only caveat would be that it is an estimated point. And we also have to remember that the Hatfield customer location methodology consists of two parts.

We've got address geocoding, but we also have this other census block perimeter placement, which in the rural areas is the dominant point of estimation.

Do they assign a latitude and longitude? Yes.

How accurate it is, you don't know.

Q Just to be clear, let's say you've got a census block. And Hatfield geocodes some number of customers in that census block, and then there are some other customers that can't be geocoded and they are placed on the boundary of the census block; right?

A That's correct.

Q But all of those customers, including the ones that were placed on the perimeter of the census block are assigned a latitude and longitude point?

A That's correct, yes.

The question, though, that goes begging is how well does that methodology predict. I could place a point at any latitude and longitude, but is that where a house actually might be?

Q Going back to BCPM, although BCPM begins from an assumption that customers are located on or along roads, the model itself does not actually have a process for locating customers on roads?

A That's correct. Within a microgrid, customers are assigned to a microgrid, for example, ten customers to a microgrid; BCPM does not go any further and say, well, those ten customers are along this particular road in that microgrid. That capability does exist. The processing, though, would be increased significantly to make that determination.

Q And BCPM assumes that each road that's used in the calculation of road mileage and therefore used to assign proportions of customers to a microgrid, each one of those roads is equally likely to have customers on it?

A That is correct. As I said earlier, that is, though, a refinement that I personally would like to see happen.

Q So if a state highway cuts through a microgrid and there's also a residential street in that microgrid, the BCPM assumes that each of those two roads is equally likely to have customers on it?

A It does. It does. And, you know, again, we can sit here all day and argue about assumptions, but how well does the methodology predict. I assume you're going to get to that.

Q An effect essentially of the assumption that each road is likely to have customers on it is that customers, you can draw a conclusion that customers are equally spaced out along all the roads in the microgrid, too; is that correct?

A Yeah, that would be a logical conclusion. BCPM doesn't explicitly make that assumption, but it would be a logical conclusion.

Q Well, in fact, don't you say in your rebuttal at page 17 that BCPM effectively assumes that within each microgrid all customers are evenly spaced along all roads?

A Well, when I use the term "effectively," that's what I mean.

It doesn't explicitly make that conclusion, but you could logically infer that from the methodology.

Q Okay. And in terms of using roads to distribute the customers, BCPM does not use all the roads that might be found in the State of Florida; some roads are excluded?

A That's true. True. BCPM makes -- The developers made a determination as to what roads people typically might live along.

As an example, a road that goes -- Roads -- First of all, just some background: When we talk about roads, the census uses what are called "road segments." And if you think of Main Street that might be two miles long, that two-mile stretch of road is divided into many, many, many road segments, where road segment is the distance between an intersection.

So if you consider a road that goes underneath another road, that road segment would be excluded because there are no houses or business structures under that or in that underpass. Roads that go through tunnels are excluded. Limited access highways are excluded. Four-wheel drive dirt roads are excluded. Those are the ones that come to mind.

Q Okay. But state highways, though, are one category of roads that are included?

A To the extent that it is not a limited access highway, yes, it's included.

Q Just as an example, if there was a microgrid that covered the Big Cypress National Preserve, which is a nature preserve in Osceola National Forest, if there was road mileage in that microgrid, that road mileage would be used to allocate customers in those microgrids that cover a national park, a nature preserve, or areas like that, as long as they had road mileage in them?

A In the -- Yes.

COMMISSIONER GARCIA: All right Before you move off, explain to me why that cost allocation wouldn't be

correct because obviously that's what he's driving at.
I can't cross him. But why is that allocation --
A If only we could.
COMMISSIONER GARCIA: Why is that allocation wrong? Why is that allocation wrong?
I mean, clearly, if you've got someone there, you have to allocate them somewhere. You allocate them along that national road, what differential would that produce compared to the Hatfield Model?
A Well, relative to the Hatfield Model, I don't know. But to address I think your general --
COMMISSIONER GARCIA: Philosophically, though, you could probably tell me what the distinction is.
A Well --
COMMISSIONER GARCIA: If you can't, you can't; I understand.
A Well, let me -- Let me -- Let me kind of reverse your question and address his first.
COMMISSIONER GARCIA: That's fine.
A And then maybe an answer to yours will pop out.
You've got a national forest, nature preserve, and you've got roads through it. If those roads --
COMMISSIONER GARCIA: Roads which are already in microgrid format. So you've got hundreds of microgrids in that area?

A Correct, hundreds of -- Yeah, that's a fish net we lay over the whole state.

COMMISSIONER GARCIA: Right.

A ʗou've got roads in those areas. And let's assume they are part of the roads that BPCM incorporates in their assignment process.

Yeah, if it's a state highway that's not a limited access that goes through this area, that's part of the road data base.

Question, though, is -- I think Mr. Lamoureux driving at, well, isn't that kind of odd to assign customers to a natural preserve or a national forest.

Maybe I'm wrong, but if he is making that, driving at that point, I need to point out that people do live in those areas. And we only allocate or assign housing units from a census block to a microgrid if that census block is populated.

So if you have a census block overlaying a nature preserve and there are people living within that census block, and the roads within that nature preserve are part of the road database, then, yes, and a road goes through a microgrid, customers -- those census housing units will be allocated to a microgrid that could lie within a nature preserve. If there are people living there, they need service.

COMMISSIONER GARCIA: I'm sorry for pulling you away from your line.

MR. LAMOUREUX: That's okay.

COMMISSIONER GARCIA: I just wanted to get a better understanding.

MR. LAMOUREUX: Well, I've never been accused of being obtuse and so let me try and -- I want to narrow in exactly what I'm trying to get at.

BY MR. LAMOUREUX (Continuing):

Q Since BCPM distributes customers based on road mileage, if an ultimate grid has the right sort of roads in it that BCPM looks at, BCPM might still build plant to that ultimate grid even in the real world it was known somehow that no one actually lived in that ultimate grid if there were roads running through that ultimate grid?

A Okay. The answer is yes, but we need to make a jump here. We've been talking about micrograids all morning and now we've got a new concept called an ultimate grid.

So the answer to Mr. Lamoureux's question is, yes, it is possible, but we need to spend a little bit of time getting ourselves from the microgrids up to the ultimate grid.

COMMISSIONER GARCIA: I didn't understand the distinction of his question. His question was that we would run, theoretically we would run service to that area.

There is a cost of serving that area and there is no one there?

A That's what he's driving at, yes.

COMMISSIONER GARCIA: Why would there not be anyone there if it's a census block that is determined that there is supposedly someone there?

A Well, I can draw a picture.

COMMISSIONER GARCIA: Probably be helpful to me.

A It's helpful to me, too.

If I can find my picture.

Yeah. There it is.

Okay. Do you understand microgrids versus ultimate grids?

COMMISSIONER GARCIA: I know there's 58 acres, but give me the ultimate grid, the distinction, because obviously that's a distinction for the national forest.

A Yes.

What the model does is it overlays the entire state with this fish net, if you will, of microgrids. Then customers are assigned to microgrids.

The next step is to aggregate these customers into serving areas.

That's next step of both prongs, customer location, and then form a serving area.

What BCPM does is it aggregates together micro-continuous, for the most part continuous microgrids, to form what's called an ultimate grid, which also has a latitude and longitude or degrees dimension.

And in a rural area in the interior of a wire center, an ultimate grid will have 64 microgrids in it.

So we've got eight tall and eight wide (indicating). This would be your ultimate grid: 1, 2, 3, 4; 1, 2, 3, 4 (indicating).

And the same this way: 1, 2, 3, 4 (indicating).

So an ultimate grid is simply a collection of microgrids. And that is the fundamental serving area in a model.

Now what I'm going to do -- What the model does next is it says instead of building plant to the entire area, let's use information on customer locations obtained -- residing within the microgrids to further identify where in this area customers are located. Not all of these microgrids are populated because roads don't go through all the microgrids.

So what the model does is it divides this area into quadrants like this based on the road centroid of the ultimate grid (indicating). And by doing so, it identifies whether each of these quadrants is indeed populated.

So I'm going to call this quadrant here the upper left quadrant (indicating).

And what Mr. Lamoureux is getting at is the following:

For the sake of argument, and if I may take this ultimate grid bring it out here and blow it up so we can look at it.

This is the upper left quadrant on their quad over here (indicating). We have got 1, 2, 3, 4; 1, 2, 3, 4 (indicating).

There's our 16 microgrids in the upper left quadrant. And let's suppose --

COMMISSIONER DEASON: Let me interrupt for just a second. Your quadrants, are they always equal in area or are they different depending on where the road center?

A Correct.

COMMISSIONER DEASON: It's depending on the road center?

A Correct.

COMMISSIONER GARCIA: Flip that back so we stay with the discussion. Let's put a national park in there.

A Okay.

COMMISSIONER GARCIA: Let's say part of -- You don't have to put it in the quadrant that you spun out. What is this called, the four together?

A This is the ultimate grid.

COMMISSIONER GARCIA: Ultimate grid.

A The carrier serving area of the model.

COMMISSIONER GARCIA: So, in other words, if you put a national park in there somehow or bordering or touching it, how does that affect the shape of the quadrant that you take out?

A It doesn't affect the shape.

COMMISSIONER GARCIA: Well, you just said that they're not always the same size.

A The location of this -- I'm sorry. The location of this point, the cross hairs, is dependent on the road centroid within the ultimate grid.

COMMISSIONER GARCIA: In this case it's the centroid within the ultimate grid. And I know that this was gone through at the initial, but this is where the central area of road meet in this ultimate?

A Yeah, you can think of it that way, but I think --

COMMISSIONER GARCIA: I was looking at a small town.

A You would have the roads would be concentrated in that area.

COMMISSIONER GARCIA: Main Street would most probably be through there or the state highway or something to that effect, state road?

A Yeah, if this was all unpopulated and you had a town right there, yeah, that's where all your roads would be concentrated (indicating).

Okay. So a state park somewhere. You know, I --

COMMISSIONER GARCIA: It doesn't have to be impregnated.

A It doesn't have to be there. You know, I could have a state park boundary doing something like this (indicating) or here's a state park (indicating).

Let me do the same thing over here. Let's -- I'm going -- Let's suppose we have a census block like this that kind of incorporates this whole upper left quadrant (indicating). So this is a huge census block. And let's suppose that is inside a state park.

What Mr. Lamoureux is getting -- And there are some roads in here. Let me just put a road. Suppose we have got a road traveling through here like this (indicating).

Let's suppose that there are people who actually reside right there (indicating). Nobody actually resides over here (indicating).

What the model will do is it will take these customers and assign them along this road. And, yes, some assignment may occur there because that microgrid has some share of the road, even though there actually might not be somebody living there. And that is a distinct possibility.

The issue that comes to mind, though, is how often that occurs. And, unfortunately, a determination of that is very difficult because we don't have a comprehensive database on that.

COMMISSIONER GARCIA: Let's take that example: Wouldn't there be a series of microgrids over the area that you haven't covered? Wouldn't there be another quadrant to the left of that one, correct, or in this case to the west, and there would be two of them to the north?

A Right.

COMMISSIONER GARCIA: So if that were a state park there that you've shown is a road, road that goes through and drops you at the state park, and there's three people there, what does the model do? It allocates those three people throughout that ultimate grid or does it allocate them along the road so that these two quadrants will be left empty, in essence?

A Good. Yes, it would. These are all microgrids again. I can keep drawing. And suppose this is the only road through that area. And there are three customers.

COMMISSIONER GARCIA: It's a huge wide area and it's a park and we know that the census block tells us there are three or three households out there.

A Yes. The model will then allocate those three households along just this road, leaving everything else empty.

So, yes, even though they're actually located here, the model will distribute them along here based on the assumption that people live along roads (indicating). But it won't allocate them over here where they truly don't belong (indicating). This is open space and there is no road. Nobody is going to be allocated there.

COMMISSIONER GARCIA: Give me the argument that those who propose the Hatfield will give us about this. I'm sure this question will take us there and it will help me. But can you give me their argument so that I can understand you right here right now. Why is Hatfield better for estimating where these guys are in their theory?

A In their theory, well --

COMMISSIONER GARCIA: In their theory I'll know -- Well, let me ask you. In their theory I know where one of those three is for sure. If I'm hitting it about 70%, I know that in rural areas it's not that specific, but, you know, at 30% in rural areas I know where one of them is.

A Okay. Let's take one.

COMMISSIONER GARCIA: I can hit one of them in the head? So one of those three I know exactly where they are.

A Okay. One of them is -- Okay. We'll take this guy and let's say that we know him geocoded. Okay. So he's assigned to -- for sake of argument -- the right road segment. We don't know where he is from the road. We just got him right on the road.

COMMISSIONER GARCIA: You're making the argument that we know where his mailbox is; we don't know where he is? Is that the argument you're making, in geocoding?

A We know that -- We know where his address is. What geocoding does is it takes an address and assigns it to a road. So that's the only assignment made. We don't know where he is on the road.

COMMISSIONER GARCIA: Okay.

A So the Hatfield methodology -- Okay. We've address geocoded one guy. These two guys are then placed uniformally somehow on the boundary of this huge census block (indicating).

Where? I have no idea. We don't know what that algorithm is, but they are placed on the boundary of that census block.

And then we're faced with, okay, we've got two methodologies that predict customer locations: one that allocates it along the roads and one that uses a combination of address geocoding and surrogate placement, as they call it. Which one does a better job?

COMMISSIONER GARCIA: What will that do to the cost of service?

A Of doing this (indicating).

COMMISSIONER GARCIA: Uh-huh.

A Versus?

COMMISSIONER GARCIA: Versus yours. Yours would have them along that line, along the road?

A I don't know. I don't know.

COMMISSIONER GARCIA: All right. I'm sorry. I know I've interrupted your line. I'm sorry.

MR. LAMOUREUX: That's okay.

A Are we done with this point, Mr. Lamoureux?

MR. LAMOUREUX: No, not quite yet.

BY MR. LAMOUREUX (Continuing):

Q Let me put something up.

A I thought I had been very helpful.

Q This is a transparency of one of your exhibits, KDD-10. And if I understand what this is, this is the Yankeetown Wire Center. You hired ERIM to do the satellite analysis. And the yellow dots represent where ERIM identified actual customer locations as a result of looking at satellite images; is that right?

A That's correct.

Q And the numbers inside these squares, those are the numbers of customers that BCPM places in those ultimate grids?

A That's correct.

Q So, for example, where there's this 10 here, BCPM predicts ten customers in that ultimate grid and then you can count the number of yellow dots to see how many customers ERIM estimated to be in that ultimate grid?

A That's correct; uh-huh.

COMMISSIONER DEASON: I'm sorry, I've got to interrupt and ask this question. Why don't we just get the satellite for every area and count them and we know where everybody is?

A It's expensive.

COMMISSIONER DEASON: Well, is it more time consuming than what we're going through here right now arguing this?

A Well, I think --

COMMISSIONER DEASON: I know you did it for this one area because you wanted to show the accuracy of your prediction. You're saying it is not practical cost wise or time wise to use a satellite and determine where every customer is located? It can't be done or it's just --

A No, it can be done.

COMMISSIONER DEASON: It's impractical?

A To do our analysis, it cost -- To get the satellite observations, it cost $9,000 for that wire center. If it's $9,000 per wire center, multiply that by the number of wire centers in the state and you come up with a ballpark figure.

COMMISSIONER CLARK: How many wire centers are there in this state?

A I was afraid you were going to ask that. I want to say 300 plus. And I'm sure I'll be corrected on that.

BY MR. LAMOUREUX (Continuing):

Q What I wanted to ask about were just a couple of the ultimate grids on your exhibit. There's an ultimate grid right here (indicating). It's a little hard to see on the overhead. But BCPM identifies one customer in that ultimate grid; right? Right here (indicating)?

A (Indicating).

Q Right. The satellite imagery shows no customers in that ultimate grid?

A That's correct.

Q So isn't this an example of an ultimate grid that by your own evidence you say is unpopulated but BCPM populates at least with one customer?

A Strictly speaking, that is an example of that possibility; yes.

Q And isn't this one up here another example of that where there are no satellite images at all but BCPM places one customer in that ultimate grid (indicating)?

A That's correct. And we also need to point out that the data used by BCPM is 1990 census data updated to '95 based on county growth rates. The satellite data is 1995 vintage. So -- And that's just the artifact of the models. So there could be a mismatch because of that.

Q But you don't know for a fact that that's why BCPM puts one customer there even though the satellite image shows none?

A No, I don't know for a fact if that's the case there.

Q And, in fact, if BCPM had earlier data than the satellite data, the only way that would occur is if the house was torn down between the BCPM data and the satellite data?

A Yeah; not out of the realm of possibility, especially in these rural areas.

I need to point out that when I've looked at a correlation between just this, that is, the satellite images per ultimate grid versus the BCPM predicted per ultimate grid, the correlation has been very high. So, yes, we can pick out specific ultimate grids and say, aha, aren't you guys messing up in there.

Overall BCPM does very good when you look at a correlation across a large number of ultimate grids.

Q Well, let me ask that: Did you do any

correlation between numbers of customers as identified by the satellite image and numbers of customers as predicted by BCPM in this Yankeetown Wire Center?

A I did not. I can, though.

Q And since -- I think what you said before is since there is no satellite image for the other wire centers because it would be pretty expensive, there is no way to predict how many ultimate grids there might be where the satellite imagery shows there is no population but BCPM predicts some population?

A That's correct. We simply don't know.

Q I guess one further thing on that: And this gets to why I wanted to ask this. Because BCPM identifies at least one customer there, BCPM will build plant to that ultimate grid because there's a customer there to serve that one customer?

A Yeah, it will build plant to that ultimate grid.

Now another point is that the customer locations identified on that visual are housing units, some of which are occupied, some of which are not.

Now if the Commission determines that this is a significant problem with BCPM, that problem might be mitigated by building to households. And that might be an unoccupied housing unit out there. And when you look at just households which are occupied housing units, you might see the frequency of this occurrence diminish.

Q Well, did ERIM look for households or housing units?

A Housing units.

Q Okay. So ERIM identified no housing units in that ultimate grid and BCPM identified one housing unit in that ultimate grid?

A Correct. Correct. But ERIM did not know if that housing unit was occupied or not.

Q Okay. But you don't know if that's a housing unit or a household; so by switching to a household -- I mean, it could very well be a household?

A It could be. It could be.

Q So switching to households might -- won't necessarily eliminate that problem?

A Not necessarily, unless we went out and checked.

Q I want to move off of location and talk about the aggregation process a little bit.

A Okay.

CHAIRMAN JOHNSON: We're going to --

Q Moving off of microgrids to macrogrids.

COMMISSIONER JOHNSON: Sir, because you're getting ready to transition here, we're going to go ahead and take a ten-minute break.

MR. LAMOUREUX: Sure.

(Brief recess.)

CHAIRMAN JOHNSON: Let's go back on the record.

MR. LAMOUREUX: I've been told I don't speak loud enough. So I'm going to try this.

A Before we start, Commissioner Clark asked how many wire centers there were. I was told that BellSouth, GTE, and Sprint have 336, according to the models.

Statewide there's over 400.

COMMISSIONER CLARK: Thank you.

A You're welcome.

BY MR. LAMOUREUX (Continuing):

Q What I want to do is I want to just continue the discussion a little bit that you started about how you get from microgrids up to ultimate grids and then eventually how you figure out how cable is distributed in service areas. And I want to see if I get this right.

Once you've got an ultimate grid, which is comprised of 64 microgrids, then what the model does is it divides the ultimate grid into four quadrants; is that right?

A That's correct, for determining the distribution quadrants within that serving area, yes.

Q So an ultimate grid is the serving area?

A Yes.

Q And then what you need to do is figure out how is cable distributed within that serving area?

A That's correct.

Q So, if this is an ultimate grid, and just to keep it -- And the quadrants are divided up based on the road centroid of the ultimate grid; is that right?

A That's correct.

Q So just to keep things simple, if the road centroid were actually in the middle of the ultimate grid, the four quadrants would be true squares?

A They wouldn't be squares, but they would be equally sized; yes.

Q And if the road centroid were somewhere else in the ultimate grid, these quadrants would not all be the same shape?

A Correct.

Q Okay. Once you've got these four quadrants, then what the model does is it creates an area within the quadrant called a road reduced distribution area; is that right?

A That area is created and is used as a modeling tool to estimate backbone and branch and drop cable.

Q But it's a model to use to estimate those distances, or feet or whatever, of the branch and backbone cable; is that right?

A And drop.

Q And drop?

A Yeah.

Q And, again, the road reduced distribution area is based on the centroid of the quadrant; is that right?

A At this point I prefer not to spatially locate the road reduced area. However, the centroid of the road reduced area is at the road reduced -- I'm sorry -- at the road centroid of the quadrant.

Q All right.

A That's a mouthful.

Q Just for illustrative purposes then, if these are the centroids of the quadrant, the centroid of the road reduced distribution area would lay on top of the centroid of the quadrant (indicating)?

A Fair enough.

Q And all I want to get at is that these road reduced distribution areas within the quadrants within the ultimate grid are the -- are used in the model for modeling purposes to estimate the amount of backbone and branch and drop cables to serve those quadrants within the ultimate grid; is that right?

A Yes, to serve -- That is correct; to serve the customers in the micrgrids that reside in those quadrants.

Q Now in terms of comparing a clustering technique versus a gridding technique for estimating route distance, the FCC has recently said that it considers a model platform that groups customers using a clustering approach because it appears to have advantages over gridding approaches; is that right?

A I'm not certain. I have not been closely involved with the FCC. I believe Dr. Brian Staihr would be the better person to direct those type of questions to.

Q Have you seen the public notice that the FCC issued on August 7th of this year?

A I may have seen it. I don't -- I couldn't recall what exactly is in it.

Q Are you aware of a general statement by the FCC favoring clustering approaches over gridding approaches?

A I'm aware of a -- I'm aware that the hybrid cost proxy model being proposed by the FCC Staff uses a clustering methodology. It is a different methodology, however, than what is used in the Hatfield Model.

Q And the reason the Staff in the hybrid cost proxy model has proposed a clustering approach is they believe the clustering approach has advantages over gridding approaches; would you agree with that?

A No, I wouldn't because I don't know specifics as to why they've gone with that methodology.

Q Do you think it would be more appropriate for me to ask these questions of Mr. Staihr?

A I believe so. He's more intimately involved with that process.

Q Okay. Going back to customer location just briefly, if it were possible to get information on actual customer locations for most customers' geocoded locations, do you agree that that would be a preferred way to go?

Let me try and ask that again. I'm sorry. I don't think I asked it right.

If it were possible to get information on actual customer locations by using geocoded information, would you agree that that would be a preferred way to go?

A And by "actuals" we mean geocoding to the street address?

Q We'll start with that; sure.

A If we had -- So we had a methodology. I'm just thinking out loud.

Q Sure.

A We have a methodology that -- It's an address geocoding methodology that yields a very high success rate comprehensively in rural areas and in urban areas?

Q Yes.

A If we had something like that? Well, my inclination would be I would need to look at that very seriously, but that is a tremendous leap from what we have now. But if we had something like that, although it's not perfect and it's not exact, you're not getting the exact location of a house, no, I would say, yeah, we would need to look seriously at it.

Q Okay. And all I wanted to get at is all other things being equal, for customer location purposes if you had a geocoded methodology that had a high enough success rate for you, would you agree that that would be the preferred way to go?

A Well, I only have a concern with the word "preferred." I would agree that I would need to look at that very seriously. However, I would also want to look at how that methodology stacked up with, say, the BCPM methodology; you know, just to test whether even if you had a high success rate that you could predict more accurately than a less costly way such as that used by BPCM.

Q Now in the Hatfield Model, in order to locate the surrogate locations, the ones that cannot be geocoded, the model actually will allow you to place them on interior and boundary roads rather than just on the perimeter of the census blocks?

A It does?

Q I'm asking. Are you aware that it can do that?

A No, I am not aware of that. That is not a user adjustable input as far as I'm concerned.

Q So you're not aware that the model could be run using geocoded information for the ones that can be geocoded and placing the remainder customers on interior and boundary roads?

A Well, let me take that back. That would have to be done in the preprocessing stage to create a new database. That's something that users certainly cannot do.

Q So you're not aware that the model can be run by a user so that the surrogate locations, the ones that cannot be geocoded, rather than being placed on the boundary of the census blocks are placed on the interior and the perimeter roads?

A If you're asking whether the user has the option to make that determination when they sit down to run the model, is there an input box that the user can go to and, say, yes, I want to place them on the boundary or interior roads, I am certainly not aware of that option.

Q Now in your testimony you refer to an AT&T ex parte presentation where AT&T brought up the possibility of placing surrogate locations on interior and boundary roads; don't you?

A Yes, I do.

Q So doesn't that suggest to you that it is possible to run the model that way?

A Well, we need to be clear here on what we mean by running the model. I mean, when staff sits down to run the model, they take the CD, put it into the machine, the model comes up and as far as I'm concerned and as far as I'm aware there is no option in the drop-down menus that give the user the choic of determining whether the surrogates are placed on the boundary or on the roads.

As far as I understand, that has to be done in the preprocessing stage and a new HM5.0MDB file, which is the main database, would have to be generated and provided to the staff in order to do that run.

Q Okay. But at least if that were done in the pre-processing, then the model would be run placing the surrogates on interior and boundary roads rather than on the perimeter of the census blocks?

A If that was done in preprocessing. I'm assuming they can do that in preprocessing, yes; same way that BCPM could incorporate address geocoded data in the pre-processing.

Q Well, if that could be done, then the question of where to place surrogate locations is not really a modeling question; is it? It's more of an input question.

A It's more of -- No, it's more of a modeling assumption.

Q But if that assumption can be changed and it doesn't change the remainder of the model, then it's not really a modeling question; would you agree with me on that?

A No, I think it's a fundamental model assumption. And it's -- It's a far cry from changing the, say the default value for the cost of 200 pair of cable. And we're talking another database, another preprocess database. I mean, I don't consider that an input. I consider that a modeling assumption that goes into the construction of that database.

Q I want to go back to the exhibit that I put up on the screen here from your testimony. Now the yellow dots, those are the dots that ERIM identified as actual customer locations based on looking at satellite images; is that right?

A That's correct. Those are according to ERIM the location of houses.

Q Okay. Can you tell me precisely how ERIM did that?

A Precisely?

Q Yes.

A No, I can't. I'm not an expert in that area. We did file in an interrogatory a description of the process. Generally, though, I can describe what they do.

Q Okay. Generally how do they do that?

A Generally what they do is they buy a satellite picture. And I believe for this wire center they had to use two satellite pictures to get the whole wire center. They then -- And this picture is digitized so you can bring it up on a computer. And then they correct that image for any distortions that may occur. And, again, I'm stepping out of my league here in terms of what those distortions or what that correction might be.

And then they visually inspect each area of that wire center to see if they can see houses.

They use census data as a guide as to how many they should expect to find in certain areas. And then they rely on their expertise in viewing these images to determine whether a specific object they see is indeed a house.

Q So basically it's some people with some experience looking at a satellite picture and determining from that picture if a structure they see is a house or not?

A In a very crude way, yes. I mean, I certainly wouldn't want to tackle this. And the people who do this have considerable experience looking at all types of satellite photography.

Q I want to talk about the concentric rings analysis that you mentioned very briefly in your summary.

A Yes.

Q Now as I understand what you did is you drew these rings around the wire center and you identified where BCPM would -- in what ring BCPM would put a customer in relationship to the cross hairs of those rings; is that generally about right?

A Well, it's a little bit more precise than that. What we did is, as Mr. Lamoureux just described, we constructed one-mile-wide concentric rings that emanate from the central office. And you can see that when you overlay those rings on the map of the wire center that show the satellite observations, you can then count up how many actual houses fall within each ring.

The next step was to overlay that map on the microgrids in that wire center, which I don't show because it would be a very busy picture. And then count up how many housing units BCPM predicted to occur within each ring.

And for each ring, I think there was 13 rings or something like that, compared the counts of the actuals versus the BCPM predicted. And that was the graph that I showed during my summary here today.

Q Okay. I want to just try and do an example. Suppose there was a microgrid that fell there (indicating).

A You're outside the wire center.

Q Uh-oh.

A Now you did it. Do you want an erasable pen?
Q Thank you. Suppose there was a microgrid that fell here (indicating).
A Yes.
Q Now BCPM doesn't locate customers in a microgrid. So how did you determine if the customers in this microgrid should be in this ring or this ring?
A Well, you're correct. BCPM does not identify where within the microgrid customers are located. So what we did in this case is we simply used the centroid of that microgrid.
Q Okay. So if there were ten customers in that microgrid and the centroid of the microgrid were in this lower ring here, you assigned all ten customers of those microgrid to that lower ring?
A Yes, we did.
Q Effectively that's an assumption that the customers are equally disbursed within that microgrid; isn't it?
A No. It's an assumption that the customers are all aggregated at that centroid.
Q But if you look at the centroid of the microgrid -- I'm sorry. It's an assumption that the customers are all aggregated at the centroid of the microgrid?

A Yes.

Q But you know that's not likely to be true; don't you?

A Yeah. In reality they're distributed along the roads.

Q And the roads in that microgrid could fall in the upper ring or the lower ring?

A That's true. That's absolutely true. What we're just trying to do is trying to identify whether given this benchmark does BCPM accurately predict the distribution of customers across the wire center in terms of distance from the wire center.

Yeah, there's going to be a little bit of error there on either side, but when you look at the entire wire center BCPM seems to do a very good job of that.

Q Using the assumption that customers are equally spaced along the roads in a microgrid, couldn't you allocate customers to rings by spacing them along the roads and then putting them in the appropriate ring where they fall on the road?

A You certainly can. We just didn't have -- Because BCPM's database isn't that detailed, we didn't have the data readily available to do that type of allocation.

Q Okay. And what your analysis will yield is if there are ten customers in this ring, and this ring is nine miles from the wire center, what you did is you summed up all the customers that are in that ring, nine miles from the wire center, and found how many actual customers are nine miles from the wire center. So your analysis yields the relationship between the number of customers at a particular distance from the wire center as found by BCPM and as found by your satellite images?

A That's correct; yes.

Q So it doesn't actually yield a relationship of spatial points on a map? It yields a relationship of distances from the wire center?

A I disagree with that. It yields a spatial distribution of the predicted and actual locations that occur within these one-mile bands. That certainly is a spatial distribution.

Q Okay. Well, take an example: All the satellite images in this ring are over here in the ring; right (indicating)?

A Correct.

Q So they would all be nine miles from the wire center?

A Correct.

Q If all the BCPM customers were on this side of the ring, spatially they wouldn't be very close to the satellite images, but in terms of distance from the wire center they would be exactly the same distance; wouldn't they?

A Yeah, you're absolutely correct. And what I think you're saying is that, gee, maybe we ought to divide that into quadrants maybe and look at the distribution by quadrants.

What Mr. Lamoureux is getting at is exactly right. You could have a lot of satellite observations over here, BCPM populated microgrids over here, and you would get the same results based on this simple analysis (indicating).

So what that suggests to me is, well, we need to look a little more closely at this wire center. For example, suppose we divide it into quadrants and do the analysis four times; that is, look at the spatial distribution for this northeast quadrant, for the southeast, southwest, and northwest, and see what that gives us.

And just so happens I do have that analysis. Let me just quickly put up what the results of that analysis is.

The top chart shows the northeast quadrant. Again, we've got the distribution of actuals versus that predicted by BCPM. Again, a very close match. And, indeed, if you look at the correlation between those two, for the northeast quadrant, you get a correlation of .96.

Remember, .99 for the whole wire center.

If we look at the southeast quadrant; same thing.

BCPM distribution and actual distribution matches up very well. Simple correlation is .97.

Just to be complete, let's look at the other two quadrants. We see in the southwest quadrant, again, a very close match. Kind of interesting in this quadrant you can see the population drops off after five miles. And if you look at the map, you can see we're out in the water after five miles. So, of course, we would expect the population to drop off.

The correlation in the southwest quadrant is .99 between predicted and actual.

And if we go to the northwest quadrant, the last quadrant, we get the same thing: a very close match between the distribution predicted by BCPM and that actually occurs. Simple correlation is .98.

Now Mr. Lamoureux can come back up, which he might. I don't know. But he might come up and say, well, even looking at the quadrants, we've got actuals down here; maybe BCPM puts them up here (indicating). And he'd be right. And what that suggests is we go down another level.

Let's divide the wire center up into eighths and do the same thing.

I've done that. And the correlations -- I don't have pictures, but I can read the correlations off, just for the record.

The first section would be .88; Section 2, .94; Section 3, correlation of 1; Section 4, correlation of .47. Yeah, okay, there's a section where the correlation isn't so high; need to look at that one a little more, see what's going on.

Section 5, correlation of 1; Section 6, correlation of .95; Section 7, another correlation of 1; Section 8, correlation of .98.

So, Mr. Lamoureux's point is well taken. And, indeed, that is a possibility. So we need to be careful and look more closely as to where within these pie slices, if you will, where customers tend to be actually occurring and where they're predicted to occur by BCPM.

Q Just to follow-up a little bit on that, the correlations that you've mentioned, those are correlations of counts of customers at a distance from the wire center; right?

A That is a correlation between -- Over the 13 rings, it would be the correlation between the count of predicted and the count of actuals that occur within each ring.

Q So it's a correlation of -- If you've got for each mile band you've got a number of customers, it's the correlation of that information for BCPM as measured against the satellite images?

A It's -- No, it's the correlation between the two counts predicted and actual.

Q So if BCPM predicts six customers at three miles and the satellite image predicts four customers at three miles, it's that correlation?

A Yes, over all the rings.

Q And all I want to get at is it's a correlation of distance, mileage? It's not a correlation of longitude and latitude locations?

A Well, no to your first question; yes to your second. It is a correlation between the spatial counts within concentric ring bands over the [illegible] rings of the wire center.

We don't have latitude and longitude. We're not coordinating latitude and longitudes. We're [illegible] correlating counts within each band [illegible].

Q Okay. I want to talk very briefly about the minimum spanning tree.

A [illegible] briefly?

Q Relatively.

COMMISSIONER DEASON: Before you do that, let me

Q So it's a correlation of -- If you've got for each mile band you've got a number of customers, it's the correlation of that information for BCPM as measured against the satellite images?

A It's -- No, it's the correlation between the two counts predicted and actual.

Q So if BCPM predicts six customers at three miles and the satellite image predicts four customers at three miles, it's that correlation?

A Yes, over all the rings.

Q And all I want to get at is it's a correlation of distance, mileage? It's not a correlation of longitude and latitude locations?

A Well, no to your first question; yes to your second. It is a correlation between the spatial counts within concentric ring bands over the -- across the [illegible] rings of the wire center.

We don't have latitude and longitudes. We're not coordinating latitude and longitudes. We're just correlating counts within each band across those [illegible].

Q Okay. I want to talk very briefly about the minimum spanning tree.

A Only briefly?

Q Relatively.

COMMISSIONER DEASON: Before you do that, let me ask a question before you do that. Was Yankeetown the only wire center you analyzed in this fashion?

A It was. And the primary reason was cost. As I mentioned earlier, the satellite imagery for the photos and the production of the satellite geocoded points was 29,000.

It's certainly possible to look at other wire centers. It just would cost roughly the same.

I need to point out, though, that that wire center was randomly chosen. What we did is we took -- We randomly selected all of the BellSouth wire centers with density less than 25. And I think that yielded eight counties. I'm sorry. We selected counties that way. That yielded eight counties.

And then we, from that selection, selected three at random: Washington, Dixie and Levy. And then the wire center that was chosen for the satellite observation analysis was done solely on the basis of cost. We selected the one, the wire center that was the least costly to analyze.

BY MR. LAMOUREUX (Continuing):

Q Breaking down the concentric rings into quadrants and then into eighths, is that a finer degree of analysis than just doing the concentric rings analysis you did in rebuttal testimony?

A Is it a finer level of analysis? Yes, it is.

ask a question before you do that. Was Yankeetown the only wire center you analyzed in [illegible]?

A It was. And the primary reason was cost. As I mentioned earlier, the satellite imagery for the photos and the production of the satellite geocoded points was [illegible].

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And then we, from that selection, selected three at random: Washington, Dixie and Levy. And then the wire center that was chosen for the satellite observation analysis was done solely on the basis of cost. We picked the one, the wire center that was the least costly to analyze.

BY MR. LAMOUREUX (Continuing):

Q Breaking down the concentric rings and into quadrants and then into eighths, is that a finer degree of analysis than just doing the concentric rings as you did in your rebuttal testimony?

A Is it a finer level of analysis? Yes, it [illegible]

Q Why then did you not include the quadrants and the eighths in your rebuttal testimony? Why did you only do the concentric rings?

A Primarily it was a decision to make my rebuttal testimony more digestible; trying to consolidate what we put in the testimony to make it more readable. And putting in all this could really bog down a reader.

COMMISSIONER DEASON: Excuse me. You picked counties with densities -- To do your random determination, you picked counties with densities of less than 25 households per --

A Square mile.

Let me -- I may have mischaracterized what we did. Let me make sure I got it right. What we did is we took all of the BellSouth counties that fall in that density zone and then randomly selected out of that population three. That yielded Dixie, Levy and Washington.

BY MR. LAMOUREUX (Continuing):

Q There were only eight counties?

A Correct; yes.

Q So out of those eight counties, you randomly selected three?

A Correct.

Q And then you picked the Levy County to do the analysis because to do the analysis on any of the other wire centers would have been a lot more expensive?

A I don't know how much more expensive. I'm just told that it was chosen because it was the least expensive.

COMMISSIONER DEASON: By the way, I always thought that was pronounced "Levy."

MR. LAMOUREUX: I actually knew that. I talked a little too fast.

BY MR. LAMOUREUX (Continuing):

Q On page 3 of your rebuttal, you refer to the minimum spanning tree analysis as a reality check?

A Yes.

Q My question is in doing the MST for the Hatfield Model, the way you calculate the MST is to calculate the minimum spanning tree distance for the geocoded locations plus the surrogate locations?

A Correct. The minimum spanning tree for the Hatfield Model clusters is the minimum connecting distance that connects the locations within that cluster, which includes the address geocoded as well as the surrogate points.

Q And so the MST number that you come up with for those clusters is not in any way -- It's an MST of the Hatfield estimation of customer locations? It's not an MST of in reality in Florida how much distance might be necessary to connect actual customer houses?

A I agree. And this is a good point. I'm glad you brought it up. I used the term "reality check" in the testimony. Yeah, it's not really -- We're not using actual locations. So maybe that use of that phrase was a little bit -- I should have used "validation check" would be a better phrase there.

And what the MST test is doing -- And it's important we realize what it's doing and what it's not doing. The test is determining whether a model builds at least enough cable to connect customers in the locations identified by the model.

Okay. For example, the Hatfield Model locates customers and then forms those customers into clusters, those irregular shaped polygon PNR clusters.

What the minimum spanning tree test says is whether or not the model builds enough cable to simply connect customers in those locations identified by the model, not in their actual locations.

Used in that way -- and we can't use actual locations because we don't have data on it. That's the whole point. We've got to go with what the models are doing. So are the models internally consistent in this regard?

And as I've stated, when we apply that test to both Hatfield and BCPM, we find that BCPM is much more internally consistent than is the Hatfield Model. The Hatfield Model comes up short in 68% of its serving areas. BCPM comes up short in only 24% of its serving areas. Okay. And, again, the question is how does the model -- Does the model estimate enough cable distance to simply connect customers in the locations identified by the model?

And when we use that definition and the correct counting of cable, we find that BCPM performs, the performance is much superior to that of Hatfield.

Q I think you agree with me that the MST analysis is not a comparison of amount of distance in the model versus amount of distance that you might go out and find actually in the real world in Florida?

A That is correct. It was never intended to do that.

Q Now at Table 9 in your rebuttal testimony where you present the results of your analysis for the Hatfield Model, that table only adds up the Hatfield clusters in which you found a Hatfield distance less than the MST distance; right?

A That is correct. Table 9 on page 33 of my rebuttal testimony provides the results of the Hatfield MST analysis in terms of only the main clusters that fall short in terms of their MST.

Q Okay. And the percentage of shortage in that table is only a percentage of shortage in those clusters in which you found a shortage?

A Absolutely. And this is the only valid way to look at this test. When you look at the analysis performed by Wood and Pitkin, what they're doing is they're saying, okay, there are some shortages but we can offset that with some clusters who builds distribucion cable in excess of the minimum spanning tree amount. And that is a completely inappropriate way to do this test.

This test is a test of the minimum amount of cable needed to connect customers. You cannot offset that shortage with surpluses, if you will, in the other clusters because we do not know what is the appropriate amount of cable needed to serve those customers. We just know that you need at least the minimum spanning tree amount. So it is a low-end benchmark.

The models need to come up to that benchmark. How much higher than the benchmark, we don't know, but at least they need to get up to that benchmark.

Q Is the MST comparison an absolute criteria? If you fail the MST, your model is out?

A No, it's not, obviously. It's a matter of degree.

Q And I just want to -- I think you said this. You did not include in your results any of the clusters in which Hatfield had more than the MST distance?

A The data reported in these tables are only for those serving areas for which the MST is greater than the amount of cable estimated by the model for those clusters.

Q And that's the same thing for your reporting of your results for BCPM as well; right?

A Yes, it is. Yes, it is.

Q You don't think it would be information worthwhile having to compare in the entire state whether on the entire state basis Hatfield is over or under versus BCPM being over or under on a composite level?

A One -- Are you asking would it be advantageous to look at one figure for each model that counts up both shortages and surpluses and nets out a figure?

Q Sure.

A No, absolutely not. That is the wrong way to do this test. The test is a test of the minimum amount of cable. You cannot take cable and cluster X and put it in cluster Y if there happens to be too much in this cluster. The model -- You can't do that.

Q So because you believe you can't do that, you don't think that's important for the Commission to have?

A Absolutely not. I think it obscures the issue.

The issue is do the models estimate at least enough cable to connect customers in their locations, that minimum amount. We don't know how much cable should be built for these clusters. We only know that the amount built should be at least enough to connect customers and the model should be brought up to that minimum amount. We don't know how much higher is the appropriate amount.

Q What's the purpose of the models in these proceedings, to your knowledge?

A To estimate the cost of basic local service in Florida.

Q It's not to design a network to serve customers in Florida? You wouldn't use this as an engineering model to actually go out and lay plant; right?

A I guess that would be a more appropriate question for an engineer. Probably not. Probably not, but that doesn't mean we have to totally abandon what these models are supposed to be doing. I mean, they are supposed to be designing an engineered network, or else why don't we just come up with a cost figure out of the air. Why do we go through all this effort to design a network based on engineering principles and then throw that number out and get rid of that and simply say, well, we can just add up pluses and minuses and we would come out ahead, so we're okay. Why go through all this effort, all this expense if that's all we're going to do.

No. What we're doing is we're trying to design an accurate model, a model designed to yield an accurate cost estimate of what it would cost on a forward-looking basis to rebuild essentially the wire base network we have here in Florida. It's an engineering model. Engineering assumptions go into that model. Customer locations goes into that model. We need a certain amount of cable to simply connect customers to each other.

If the models can't achieve that minimum benchmark -- and there aren't a lot of quantitative benchmarks we have. If they cannot achieve that, then something has got to be done. We've got to adjust that, something in the model to get those estimations up to that minimum amount.

Q The purpose of what the Commission is doing is to calculate the cost of providing service in the State of Florida; is it not?

A Yes, based on an engineering model.

Q And there have been no determination of how support, once support is arrived at, is going to be targeted or calculated; is there? Could be on a statewide basis; couldn't it?

A BellSouth is proposing on a wire center basis. I haven't seen any statewide support proposals.

Q Do you have an opinion on whether or not it's appropriate to have the same basis of costs as revenue calculation in terms of geographic units?

A I guess I don't have an opinion. I haven't studied that issue.

Q At page 36 of your rebuttal, you say there has been no quantification of any offsets in HAI5.0a; right?

A That's correct.

Q Now that's only because you didn't include the information to be able to provide that quantification?

A No, absolutely not. Absolutely not. Quantification of an offset means that we know what the appropriate amount of cable is needed to serve customers in these clusters, not the minimum amount, but some amount above that.

If you knew that number, then you can quantify an offset; but just throwing in all clusters for which there is a greater amount than the minimum spanning tree amount, that is not a quantified offset in any stretch of the imagination.

Q So when you define -- When you use the word "offset" in this testimony, you meant something more than comparing overages and underages?

A Yes, absolutely. What I meant was, again, is -- If I can go to the easel.

The minimum spanning tree amount is simply the lower end. That is the minimum amount of cable needed to connect customers in a serving area.

Now what it would take to actually serve those customers is going to be greater than the minimum spanning tree amount.

Why?

Well, the minimum spanning tree amount doesn't account for the fact that cable has to go around lakes, go around hills, go around natural obstructions or manmade obstructions.

The amount of cable that's actually needed to serve an area is going to be much greater. I don't know how much. It's going to be larger than the minimum spanning tree amount.

Now -- And let me just call that "needed."

Okay. When I talk about a quantified offset, if we knew what that number is, if we had hard and fast evidence what that number is, and we all agreed on that number, then we can go to each serving area in the model and we say, aha, we've got these clusters that exceed the minimum spanning tree and we can quantify that exceedence. That is how I would use a quantified offset.

But what the Hatfield Model proponents are doing is they're saying we don't know what this is either; so let's just take everything above the minimum spanning tree and use that to offset the shortage.

And that simply is the wrong way to do it.

If we don't know what the needed amount of distance is, then let's just stick with the minimum amount and at least get the models up to there.

(Whereupon, the transcript continues in Volume 10 without omission.)

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