speed up the process of improving these models. The same is true of other things like poll counts and the like.

David Krech, FCC

Thank you. Dr. Christensen.

Laurits R. Christensen, Christensen Associates, Inc.

Yes, I'd like to use my minute to clarify some things about the numbers that I've been using in my responses to these questions. First of all, those of you who looked at my paper and wondering where this $12 difference is coming from and the breakdown of it, this is — I extracted this by averaging and rounding off for four states that we've run the Hatfield and Benchmark Cost Models for. This is an average over Texas, California, Utah and Washington. And the results of these models were surprisingly similar for all four of those states in terms of the cost, monthly cost per line. And the number for the Benchmark Cost Model was approximately $29 per month, and for the Hatfield Model was approximately $17 per month. Now, I don't want to leave the impression that effect that making these four adjustments can bring those results close together means that it doesn't matter which model you use. Obviously there's lots and lots of differences between these models. But once we get the results so they're in the same ballpark, then we can look at the models in terms of their economic realism, in terms of their user friendliness, in terms of their transparency, in terms of the

documentation of their data rather than saying, "well, gee, I think maybe I like the Hatfield Model because I just couldn't swallow $15 billion Universal Service Fund," or vice versa, that they think that $5 billion is too low. It's clear that once we do get closure on these inputs that they will be in the same order of magnitude and we should really be able to use objective criteria to choose between them, or in some way perhaps marry them.

David Krech, FCC

Okay, thank you. Lisa.

Lisa K. Hanselman, GVNW Inc./Management

I'm going to pass.

David Krech, FCC

Okay. Page.

William Page Montgomery, Montgomery Consulting

There is an interesting aspect to this that this first round of comments, and several people have sort of alluded to this. We are trying here, I think, to construct benchmarks. Benchmarks by their very nature, I think, are not as precise as they might otherwise be. I'm impressed by the fact that with what Joel was saying in his two-minute presentation that he can find things in

the data that can be correctable. That's an important issue from the standpoint of policy, because the Joint Board and the FCC staff have actually two jobs to do. One is to look at the quantitative evidence and determine what the best quantitative evidence is. But the other job is to design policies that shift the burden of proof to people who claim to have better data, to make that data available publicly, or to explain in detail why the general benchmark that is determined should not apply to them. That's a policy design issue as much as a quantitative issue.

David Krech, FCC

Thank you. John.

John Schrotenboer, Southwestern Bell Telephone Company

Again, I guess I would just reiterate the fact that I think that each of these models deserves more comparison to whatever data we can find that's going to help explain some of the differences that exist. If there is a difference of $12 between the two models for loops for these four s States, there may be some data that is available from an embedded or historical information, whether the source be ARMIS, NECA, or whoever, that could help explain these type things. Maybe it takes looking more at what the models have themselves, like Joel has done in terms of the CBGs to determine some of these things. But I think that we need to use whatever tools we can to try and explain

the differences to come up with a model that more closely approximates what we want. I also think it needs to look at what the model's going to be used for in terms of determining an overall level of support, whether or not it may be used for access prices, however that matches up against embedded costs to determine whether or not these things really are reasonable to apply to all of these various things that we have on the plate in the regulatory world.

David Krech, FCC

Thank you. Joel.

Joel B. Shifman, Maine Public Utilities Commission

I echo what Ben and Lisa have said, these models are not ready for prime time yet. You know, it's not a question of the cliche that "the best is the enemy of the good." We have not gotten to the good yet. And I won't have time to go through it right now, I intend to file, not just criticize, but file an ex parte paper to indicate how you can fix some of the problems that the models create, both in terms of inputs and in terms of model design. But I also think that that econometric analysis in a macro sense can lead to interesting results. For example, although a year ago I was a real enemy of the fact of using just density as an indicia of high cost, and I still am in general. But I did find something very interesting, that within a wire center, that density can be used as an indicia of cost within the

zones, within a wire center. Maybe not within — between wire service between sections of the country, that doesn't work. But within any particular wire center, that we sort of go back to the base rate area — non-base rate, the old doughnut hole, and density within a wire center actually is a fairly good predictor of costs so that there are some things which we are developing in terms of analytical tools, and from those, maybe we can make a model that works. We're not there yet.

David Krech, FCC

Thank you. Vin.

Vincent Callahan, NYNEX

I just want to reiterate what Joel says, I agree 100%. We're just not there yet. I get very concerned about an effort that's gone over the past two and a half years where a lot of people have done a lot of work, and now because there's a statutory four-month deadline that we're going to make some recommendation as a Joint Board, or issue an order as the FCC that's going to be bad public policy. I think we're far better off — I mean, we can still meet the statutory requirements of the law without necessarily having to go immediately to a proxy system if, in fact, it has not been developed properly yet.

David Krech, FCC

Thank you. Jeff.

Jeffery H. Rohlfs, Strategic Policy Research

Some of the panelists have commented that econometric methods are too complex. Well, it ain't so. Let me suggest two standards for when a model really becomes too complex. One is it doesn't fit on a floppy disk, or secondly it doesn't run on an old PC. And if you use that standard, the econometrics analysis is the only one that isn't too complexed for practical use so, the ones that we've been talking about here today. A second point I want to make is that a top-down econometric cost model is not based on embedded costs. The whole reason for using forward-looking cost is that if you value capital properly, you get the same answer using embedded plant that you would get using new plant. And so what we have done is actually re-estimated our model using an estimate of economic value of capital that's consistent with what the LECs have claimed in terms of capital recovery shortfalls, namely that the economic value of cable and wire is about 65% of the rate base.

When we put that in the model, but we also use a consistent assumption with regard to depreciation expense, the costs only go down by about $2 a month, so there's still a $9 discrepancy that needs to be explained between the real world based estimates of the top-down model and the Hatfield estimate.

David Krech, FCC

Thank you. Trevor.

Trevor Roycroft, Ohio University

I wanted to respond briefly to a comment made by Dan about embedded practice as he described and he was relating that to the practice with regard to poles and sharing of poles. It seems that there has been a — if you look at the overall models, there's a lot of reference to embedded practice. I mean, we are starting with the scorched note approach. The Hatfield Model reconciles line counts, the Benchmark Cost Model does not. So, I think that at some point, you know, we have to draw the line between what sort of embedded practice is acceptable. And I think the best way to do that is with the ability to vary user inputs. And to the extent that the models prevent variability of user inputs, then those embedded practices are just going to be assumed by somebody rather than subject to analysis by a broader group.

David Krech, FCC

Thank you. Let's turn now to Question 3. And I think Joel is going to like this question. Does the use of census block groups as the basic building block of the model for purposes of determining cost, support or network design distort the model results? Alternatively, should the wire center census blocks or

geographic grids be used instead of census block groups? And I believe it's Ben Johnson's turn to go first.

Ben Johnson, Ben Johnson Associates

Okay. This ties into a point I was making an earlier day. Our models a little different than the other two in two ways. Number one, we don't attempt to do this mapping technique that the other two models are working very hard to do. Number two, we're not limited to that kind of a technique. Our model was originally designed to run with Bell Company proprietary data as to loop links and numbers of loops and we have run it that way, we've compared the results, they're very similar. And secondly, it's different in the sense that rather than use the census block group as a geographic area around which to design the network, we'll use a stylized networking approach which I think has some real advantages. It is easier for people to tie into and it's certainly a more generalizable way of trying ensure that you, in fact, deal with reality. So that if you start taking this model and move away from a proxy and towards an accurate economic cost by fine-tuning the inputs and fine-tuning the data for specific wire centers, I'm confident that you're going to get costs that are proper and appropriate, even for small companies that would be very heavily affected by some of the simplifying assumptions in the other two models. I think in general, however, the models are to be very commended for this mapping technique because it overcomes one of the problems which is you don't always have the data you need from these smaller companies or from even some of

the large companies. So, I think the approach should be we use geographic mapping — computer mapping techniques at the best level of detail and accuracy we can as our first cut, and then we allow the parties to submit better data if they think it's available or if we can force them to provide it, which I think regulators would have the right to do to the extent the data exists. So, I think a two-fold approach is the best solution. We use the approximation of the computer mapping where that's the best thing we've got, but we need to head towards improving the models, all of the models, to be more precise as real money starts changing hands based on these models or the model.

David Krech, FCC

Thank you. Rick.

Richard Emmerson, INDETEC International

Yes. We talk a lot about CBGs and certainly they're part and parcel of two of the three models here. And yet, I doubt that any individual in this room could step outside their house and point to the boundaries of the CBG they live in. What is a CBG? It's designed for the convenience of taking Census. It contains a few hundred homes, but can contain up to many thousands of homes. It ranges in size from a city square block to thousands and thousands of square miles. This is a very broad set of geographical coverage. What's important about that is that one cannot take that particular geography and plan sensible

networks, whether it be a new entrant or an incumbent, around that. Eventually, we need to be able to get below the CBG level. So, to start off, I think it's a good starting point, provides non-proprietary data about rough locations of households. We shouldn't take it further than that.

In particular, it can distort results. We saw from Joel an example of the distorted result with a concentration of homes at the top of a mountaintop in a ski resort, and a large CBG one can assume that this is uniformly distributed homes across a very large rural area get a very high cost, when indeed, it's not. We've come part way in finding solutions. The BCPM, for example, takes only a thousand-foot swath around a road network and says, "let's assume that's the occupied area and disregard the rest." That presumably would solve a great deal of the problem we saw here. If one goes to census blocks, or a model is capable of going to census blocks, that can solve the problem. If one wants to go further and approximate any area, whether it be a new entrant serving area or an incumbent's wire service area, one can do it either by locating individual homes or grid cells or some other mechanism, which suggests that it's very important that these models at least be capable of going below the CBG level to levels that approximate either the incumbents or the new entrant's engineering and planning areas.

David Krech, FCC

Thank you. Dan.

Daniel Kelley, Hatfield Associates

Okay, I think we'd all agree that if we had the ability to model down to the level of where subscribers are actually clustered, that would be a good thing. But, you know, at present we don't have the ability to do that. I think, echoing Rick a little bit here, CBGs are a good place to start given that, and in our model we have been able to improve the use of CBG data over time, so that in Version 3, I think, we've made substantial progress. We now can do a better job of associating CBGs with wire centers, which was a criticism that was made earlier, and we've addressed, we can aggregate up to wire center results in Version 3. Version 3 is going to do a better job of distributing business lines to CBGs. I'd like to echo Ben Johnson here in commending Southwestern Bell for providing some very useful data in that regard. I think it's ironic that the original BCM developers apparently weren't able to get this kind of data from their own sponsors.

A final thing is, and this should make Joel a little happier, I think, we're able to zero out some unpopulated CBGs in large CBGs and that's going to help address some of his issues. Going below the CBG to block groups potentially provides some benefits. I'd like to point out we're already dealing with 250,000 CBGs. When you go to block groups for then entire model, or when you go to grid cells for the entire model, you run into computational complexity that would surely fair Jeff Rohlfs' criteria.

David Krech, FCC

All right, Joel, your name's been brought up. You can go first.

Joel B. Shifman, Maine Public Utilities Commission

We first of all, I want to emphasize that we can't look at this docket in a vacuum. We have to look at this sort of in *pari materi* with access and interconnection, and that is the granularity for which we look at USF has to be looked at with the granularity for which we're doing unbundled network elements and that is some really weird things happen if you don't have the granularity matching in a one-to-one relationship. The opportunities for arbitrage are just infinite and the effects can be very, very bad for the incumbent because of the arbitrage that occurs. And so that, if we're going to do very granular analyses for USF purposes, we have to be prepared also to do very granular de-averaging for unbundled network elements. And if we're not going to do that granular de-averaging for unbundled network elements, then all of this false precision is unnecessary.

The next thing, though, is that with regard to census block groups, we really need to analyze cost, not on the basis of theoretical arbitrary geographic areas, but on the way that the network would be designed and served by a new entrant. So that the optimal thing would be to look at the network, look at the exchanges where the wire centers would be and where the customers are for a new entrant which can be done with LEC COM model.

A suboptimal analysis would be to look at wire centers where they are right now. That will overstate costs, but at least it will reflect costs the way the network actually is designed in reality. If one of them wants to go to a subwire center basis, one then can then, after the fact, disaggregate sub-wire center differences based upon density, because there is a fairly good correlation between density and cost within any given wire center. So that, I guess my point is, is that the network isn't designed on the basis of CBGs. The assumptions which go into the way the customers are scattered throughout the CBSs, even if you remove the unpopulated area, even if you only assume customers are along road, those don't match reality anywhere specifically. They may reflect reality on the average, but particularly for little companies (inaudible) on average, it's going to gore some over or renumerate others, and for even big companies between regional areas, reality on average just doesn't work. You have to look at reality as reality for any given area.

David Krech, FCC

Thank you, Joel. John.

John Schrotenboer, Southwestern Bell Telephone Company

In looking at the census block groups, we have found several, in looking at the information in the BCM2 and Hatfield, we have found several instances where the CBGs were assigned incorrectly to the wire centers. That may be fixed with the new

versions of the models. There's still, I think, a concern that we have in the fact that if you take the information that the models generate in terms of lines and associate that with the wire center, there's still a difference that needs to be explained that I think could be explained by the use of data like we provided in our answer in terms of lines for each sili-code. But there needs to be some sort of, again, a test of actual data or a test of the reasonableness of the data and a comparison made to determine what's reasonable for those sili's, whatever the area is that you determine is going to be appropriate in terms of modeling the cost for determining what's the basis and what's the basis for computating the cost and the support amounts.

David Krech, FCC

Thank you. Page.

William Page Montgomery, Montgomery Consulting

I would think that the ability to move between levels of aggregation is almost as important as the particular level of aggregation. Therefore, I think it would be very useful, as Dan said, that the new version of the Hatfield Model could collect data at the wire center level so that companies like Southwestern Bell that have that data can begin to look at that level. And smaller companies, also, will find it easier to obtain the models and run them to see if there are those kinds of data anomalies. The notion, however, that keeps coming back in through these

workshop discussions that there is always something that can be done to any system to make it better and to make it closer to reality. It's come up in every workshop session that I've listened to, including this one. At some point you have to bound that somehow, otherwise you'll be doing this for the next 10 years. And that's where you fall in to the questions of policy, like who's burden is to actually go forward to prove or disprove a result that comes from a particular model. To what extent is anecdotal evidence going to be weighed in the balance, given the fact that there is a very little amount of time to make some of these decisions. I would think that it's more appropriate for regulators, in particular, to leave some of the quantitative details of this process, which we keep hearing about, to at some point down the road where people who have the data or who have the expertise, can show that there are valid corrections to what has been adopted as an initial policy.

David Krech, FCC

Thank you. Lisa.

Lisa K. Hanselman, GVNW Inc./Management

The only other thing I think I'd like to put out on the table with regard to census block groups is that as we move away, and there's been other things suggested, the wire center, the census block and even grids, like if we move, that it's going to solve the deficiencies of the census block group, but I don't

think we know that for sure. I think as we investigate these other levels of modeling, that we may find other deficiencies with regard to wire centers, with regard to census blocks and groups just as with — just as we have today. And I think maybe what's going to result is kind of along the lines of what you said, Joel. I think as we take a look, we might find actually what works for us is a mixture, maybe census block grids, just a mixture of whatever works best to model the data.

David Krech, FCC

Thank you. Dr. Christensen.

Laurits R. Christensen, Christensen Associates, Inc.

I believe that although census block groups are not a perfect solution, I think they're the best alternative that's available currently and I think that we need to make the best use of the census block group approach that we can in the time that's available to get the best operating models and estimates that we can. In this regard, currently the Benchmark Cost Model is, based on my analysis, substantially ahead of the Hatfield Model, in that the Hatfield Model is simply empty in terms of non-Bell census block groups. If you go into the Hatfield Model, at least the current version — and I know it's represented that they'll be more in the 3.0, but I don't have any 3.0 to analyze at this point — get up on my computer looking at the current version, you go to any non-Bell census block group and it's simply empty.

There is no hypothetical network having been engineered for any of those non-Bell census block groups. And quite the contrary for the Benchmark Cost Model. You go and look at any census block group throughout the country, including all the non-Bells, and there are networks that have been engineered. And especially given the kinds of concerns that Joel is voicing, I think the big issues are going to be how well do these models reflect the realism for these non-Bell census block groups. And so, I think it's critically important that the experience be obtained and we get reasonable results. Just by way of example, although there's currently basically, there's no way to get a per-line cost out of the Hatfield Model for a non-Bell census block group, if you take the most recent version available of the Benchmark Cost Model, you find in Texas that on average, the non-Bell census block groups have a $38 cost versus $27 for Bell CBGs. In Washington it's very similar, $35 versus $26. In Utah it's $79 per non-Bell CBG versus $28 for the Bell CBG. So, there's a lot of action here, and I think it's really important that the models confront that.

David Krech, FCC

Thank you. Trevor.

Trevor Roycroft, Ohio University

I just wanted to bring up that there's another area that may be relevant in the future and that is the areas that the states

establish with regard to the eligible carrier criteria and that the law states that it's the individual state's responsibility to designate areas where eligible carriers will be serving and that may have an impact on the model's ability to predict the cost of universal service in these areas which are, at this point, undefined. Another issue that relates to the embedded practices in the model is that the models assume that new carriers are going to be serving in a manner similar to what carriers are doing today, that is on a wire center basis. And there's some evidence that new carriers may have an entirely different approach to any given market. For example, when Metropolitan Fiber Systems petitioned to begin offering service in Ohio, specifically in the Cleveland area, they were planning on building their switch in Detroit, Michigan, and having their operator services in Illinois. In a similar vein, AmeriTech recently announced that it's just become the sole source provider for UAL, United Airlines nationwide and their approach to offering that service will be entering new markets in a vary narrow fashion to service as UAL's 500 locations nationwide. So, I guess there's some embedded practice that we may have to live with, but in the future, if new entrant practices are radically different, that may be an issue that needs to be reexamined.

David Krech, FCC

Thank you. Jeff.

Jeffery H. Rohlfs, Strategic Policy Research

Bottom-up cost models can be designed for a variety of different levels of disaggregation, census block, wire center or grids, and I think the panelists have accurately identified the factors that go into making that sort of a decision. On the one hand, if you make the model more disaggregated, the model becomes more complex and populating the detailed assumptions is also more difficult. On the other side, the model results may be more accurate and they may provide inferences that are more on target with the policy decisions that need to be based on them. The point I want to make is that, and this is a session on cost validation, a cost validation is very difficult to do at a microscopic level for two reasons. First, the real world data may not exist in sufficient quantity at, say, the census block level to tell whether the model at that level is getting the right answer. Secondly, costs within a particular geographic area are not a well-defined concept. For example, if there is a wire center in D.C., the cost of operating that wire center will depend critically on whether that wire center is a part of Bell Atlantic's larger telephone network, or whether it's a stand-alone operation, and in a sense validating whether the model costs for that small area are correct, in the case it's Bell Atlantic wire center is, in principle, difficult to answer.

So I think the answer is that the model should be developed at whatever level seems appropriate for other reasons, but a lot of the validation needs to be done at the aggregate level. What

you want to make sure of is at the aggregate level the models get accurate answers, that it corresponds to what the costs are in the real world and costs that can be defended on the basis of real world observations. If a model can be validated, that is, if you can point to real world situations and say "the model got the right answer here in the real world," then you could have more confidence that at the microscopic level that you're using it, it also may have reasonable results. On the other hand, if the model can't be validated at the aggregate level, then I would say, if I were a regulator, I would be very hesitant about using it at the microscopic level either.

David Krech, FCC

Thank you. Vin.

Vincent Callahan, NYNEX

Referring to the chart that's already up on the viewgraph machine, as I mentioned earlier, I've been quite concerned about the winners and losers in using CBG type proxy models, and very concerned about the impact on certain areas of the country versus other areas of the country. Last week I tripped on something which I want to bring to everybody's attention. You may recall in the initial filing that we did for the Benchmark Cost Model that there was a reference to La Junta, Colorado, and the census blocks there looked very nice. As you moved farther away from the central office you, in fact, had higher-cost census blocks.

Let me just show you a couple of census blocks that I've looked at. Okay, I realize you can't see that this well, but want I want to tell you is that — by the way, we made a filing, a joint filing, Bell Atlantic and NYNEX, and put all this information on the record last Friday in response to the reply comments on universal service to the Joint Board. Okay, so, but I'm using a different example here because the one that I was dealing with in the filing is New Pauls, New York. This is Hassock Falls, New York, which is right next to Bennington, Vermont. Okay, the point that I want to make here is very simple. Here, if you will, is the central office earning average. This is central office right here, the wire center. If you look at the model what you have is, and I have to refer to this one if you don't mind, you have a yellow area which is $50-60 of assistance and a red area which is $70-80. Now, I guess what I'm saying here, and by the way, this is not aberration, I've got a lot of these, an awful lot of them. If you look at the model, what it says is that, in theory anyway, unless everybody — unless I put the central office somewhere in the woods, you would think that a lot people live near the central office. But, if you look at this model you'll see that something's wrong because, in fact, what we're saying is if the people live over here, perhaps they really aren't high-cost people.

Now, I'm not suggesting that this is the problem with the models. I'm suggesting it's one of the problems. I don't know the problems. But this one bothers me because I've got a lot of these in the Northeast, an awful lot of them.

David Krech, FCC

Okay, thank you Vin. Ben, you get to start the rebuttals.

Ben Johnson, Ben Johnson Associates

Okay. I'm returning to the original question. I think to make it clear, my own belief is that we should distributing support based on either wire centers or a two-stage disaggregation of wire centers, a high-cost zone and a low- or medium-cost zone for each wire center. I think that is administratively more practical and will not create the inappropriate incentives for carriers to come in and target what appear to be high-cost areas when you do a fast cut for the whole nation but, in fact, are not high-cost areas. Furthermore, I strongly believe the point that's been made, which is when you try to administer a fund based on, it was 11,000 CBGs I think they were talking about, whatever the number it just gets extremely difficult to do it right. Now, and from a modeling point of view, I think you want to be modeling cost at a level of aggregation below that, and that's what we do in our model, but then we report the results in terms of either a wire center or a two-zone approach. As to the modeling question itself, again, I think the CBGs are a useful tool, but I think they also create some inaccuracies that we can avoid by not limiting ourselves to that tool.

David Krech, FCC

Thank you. Rick.

Richard Emmerson, INDETEC International

Yes, I'd like to respond as well. I think it's very clear from the examples we've just seen and from some of the other comments that we must go below the CBG level in some cases. We simply can't get accurate information for very large CBGs. Dan made a comment about aggregating up to the wire centers. That works fine when the CBGs are city blocks or small geographical areas that aggregate the wire centers. There are many CBGs that have multiple wire centers. When you assign CBG to the wire center whose centroid falls at that point, you might wipe out an entire independent telephone company. It's absolutely essential to go below the CBG level. The computational difficulty aspect of it is not a problem. We ran the CPM, which is now merged with the BCPM, at the individual customer level in California. We ran it at the 3,000 by 3,000 foot grid cell level. In both cases, the computational efficiency was equal to or better than the Hatfield Model run in that area because of the efficiencies of using a uniform geography. Again, I'd urge you to consider models which are at least capable of going below the CBG level for large CBGs where necessary. Thank you.

David Krech, FCC

Thank you. Dan.

Daniel Kelley, Hatfield Associates

A couple of quick questions. For very large CBs, you're going to find are primarily in rural areas. The Joint Board has bought itself some time in this regard. It's not going to apply to proxy modelers, it's not going to require the proxy model to be applied for three years. In the meantime I would agree with Page Montgomery, we have to draw a line somewhere. I think we have a very good line drawn right now. I think the models, particularly the Hatfield Model, does a good job of doing what the Joint Board needs which is to estimate forward-looking costs for Universal Service Fund application purposes. And the model does that, it does it well.

Finally, for Dr. Christensen, I have some good news for your computer. I think you'll be able to exercise it on the independent soon. Let me finish up with just saying that the crucial thing here is, you know, we can make lots of changes to models, we can aggregate up, we can aggregate down, but the Commission did the right thing, the Joint Board did the right thing, in saying, "let's look at forward-looking costs, let's make universal service a forward-looking cost issue and let's not include within universal service a lot of embedded costs that don't belong there." And I think we need to stick with that.

David Krech, FCC

Thank you. Joel.

Joel B. Shifman, Maine Public Utilities Commission

Yes, you can't let the policy objectives of the model's proponent dictate the way the model you use. And by that I mean it's very important that the policy of one of the objectives of the BCM/BCM2 were to have disaggregated amounts so you could identify high-cost areas on a sub-wire center basis so you would not have the internal subsidies continue to exist. You should not let that dictate a modeling methodology that does not reflect costs. You must use a model that reflects the way the new entrant would construct the network, which in some cases will mean that you will use a methodology which will be smaller than a CBG, in some areas you will use areas that will be larger than CBGs. You must — the assumption that you can't use realistic data is erroneous. That you can, through sampling, develop clustering data and then sample various areas and aggregate the data. For example, you could determine average clustering for rural, urban, suburban areas of Appalachia, you can determine them for rural suburban areas and rural areas in the Midwest, and then you can identify and assign various wire centers to these different criteria, to these different sampled areas and then run the model off of those various types of areas.