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1 P R O C E E D I N G S

2 (Transcript follows in proper sequence from
3 Volume 20.)

4 KENT DICKERSON

5 continues his testimony under oath from Volume 20

6 CONTINUED CROSS-EXAMINATION

7 BY MR. RUSCUS:

8 Q While we're talking about an understanding of the
9 BCPM, have you noticed the cable prices for 24-gauge copper
10 cable assigned to 3000, 3600, and 4200 pair sizes?

11 A Yes. I don't know if you heard my deposition. I
12 saw Mr. Wells attempted to state that Sprint was filing
13 costs for cable that didn't exist. If you take a simple
14 look at it, you'll see that the cost for those sizes are
15 the same as the 26-gauge sizes. The model has inputs for
16 those. We satisfied them. The inputs for the three
17 thousand and above 24-gauge are in fact based on existing
18 26-gauge copper prices.

19 Q In terms of understanding the BCPM, though, do
20 you understand why it deploys cable that doesn't exist?

21 A I don't think it does deploy cable that doesn't
22 exist. To the extent that you handle the inputs to the
23 model in the fashion that I just stated it does not deploy
24 cable that doesn't exist.

25 Q You're suggesting that a price input might be an

1 appropriate correction for the flaw in the model that
2 establishes specific deployments of 24-gauge cable in 3000,
3 3600, and 4200 pair sizes; is that correct?

4 A No, sir; that is not correct.

5 What I said is you have to understand a model in
6 both its function and its form and how the inputs are
7 used. And if you understand that, as I do, there is no
8 flaw in the model. My inputs are correct. The model uses
9 them correctly.

10 Q Now back to the topic of the appropriate prices
11 for Florida, you share territory boundaries with both GTE
12 and BellSouth; correct?

13 A I expect that's certainly true.

14 Q Is it your expectation that if either GTE or
15 BellSouth were to compete for local customers in your
16 territory that somehow, because they are in your territory,
17 their material costs would go up or down to match yours,
18 whatever your stated costs are?

19 A No, I don't think they would. It would be my
20 testimony, again, that what I provided is factual
21 information. It's the best information available. It's
22 certainly predictive of the current providers' costs in
23 Sprint serving area. It will be years down the road before
24 we probably have to deal with the issue you're talking
25 about to a large extent. It's the best information

1 available.

2 Q And you said it's the best information available
3 to predict Sprint's cost; wasn't that your testimony?

4 A Yes. And I think, you know, we can't forget
5 about the customers that this whole proceeding is intended
6 to support. And it's Sprint that's serving those customers
7 and likely to be Sprint that will continue to serve those
8 customers for quite some time because we can't forget we're
9 talking about the more rural areas that Sprint serves.

10 And I've listened to the affordable local rate
11 proceeding and I've listened to this proceeding. There's
12 been quite a bit of recognition that the competition will
13 come slower to the rural areas. So if you're trying to
14 predict the cost of serving these rural areas, this is the
15 obvious logical information.

16 Q Can you turn to page 16 of 51 of your testimony,
17 of your BCPM cost submission.

18 A Sixteen of fifty-one, and what section of it?

19 Q It's called "Loop Cost Inputs."

20 A Okay.

21 Q This -- Let's focus on the portion entitled
22 "26-gauge cable aerial." Do you see that section in the
23 lower block?

24 A Yes.

25 Q When I look at Sprint's inputs, I see what's

1 identified as material costs. I see nothing listed as
2 supply costs, nothing listed for tax placing, splicing, or
3 engineering, or an adjustment. And then I see a total. Is
4 that an accurate representation of what's on that page?

5 A Yes.

6 Q Does that mean that the material costs and the
7 total costs in this, that the material costs actually
8 represents a total cost for material and installation?

9 A That's correct.

10 Q If I'm this Commission and I want to make a
11 decision about the 40%, or whatever it is, of these costs
12 that are attributable to materials different from what
13 Sprint has identified, how is the Commission to isolate
14 your material costs with the way you've presented the data?

15 A They can ask me for that information.

16 Q Okay. And, similarly, if they wish to evaluate
17 your labor costs against any standard of realism or
18 validation, how are they supposed to do that looking at
19 these inputs?

20 A Quite easily. You can go and look at my gross
21 additions for each one of these cable categories for last
22 year, for example. That's what I do. I look -- Yes, sir.

23 COMMISSIONER GARCIA: Well, go ahead and finish.

24 A Well, what I routinely would do is go look at
25 the gross additions. And I would look at the details of

1 what has been capitalized to the books of the company for a
2 very recent period.

3 COMMISSIONER GARCIA: Good. I was going to ask
4 you about that. Let's say that this Commission decided to
5 go to the legislature and say we, you know, we find that
6 there is a need for rebalancing. Do you think that we
7 should have asked the State -- I think we may have it to
8 some degree, but we should ask the legislature for specific
9 power to go into your books and records on a yearly basis
10 as we go into the rebalancing and take a look at what
11 you've spent, how you've spent it, and then allocate that
12 to the rebalancing issue so that we slowly get to a state
13 of rebalancing?

14 I mean, should we go into sort of partially -- I
15 don't know what to use, the word, because it's not
16 regulation but it certainly is revenue balancing. In other
17 words, we go into your books -- I'm certain AT&T would want
18 to participate or MCI or whoever -- but clearly the
19 Commission would go into your books and say, well,
20 Commission, here's what I spent at my plant and my base to
21 provide local service to my customers.

22 The Commission would look at that and you'd
23 probably look at the other side, you know, your losses and
24 whatever, but that wouldn't be central. What would be
25 central is figure out what exactly you're spending on a

1 yearly basis in keeping or maintaining or subsidizing those
2 customers and then allocate that somehow with any
3 rebalancing that we do.

4 And I know that's far and away and beyond and
5 into policy issues, but clearly we would be able to do
6 that; wouldn't we?

7 A The Commission always has, you know, free and
8 full access. And, you know, to whatever extent it would be
9 helpful to look at our actual operations in administering
10 this --

11 COMMISSIONER GARCIA: Counsel points out
12 something that I've been thinking about and I think I
13 expressed it yesterday, how, you know, whether the pole is
14 172 feet apart, whatever, these costs go shifting as time
15 goes on. They go lessening. They may increase. Your
16 deployment of different facilities. And clearly we
17 shouldn't be paying for certain things but other things we
18 should pay for.

19 And I think several of the witnesses have alluded
20 to that in questioning, that this is -- There is no
21 constant number. There is not a target that this
22 Commission could hit. And I would probably beyond that: I
23 am certain that there is no target that the legislature
24 could hit, regardless of what model used.

25 So should it be a process that we just simply

1 come back here and look at these figures, which are
2 changing and use that as a formula?

3 A Yes, I would be open to that. In terms of --
4 Seems like there's two things going on: To the extent that
5 we do the rate rebalancing, I think almost everybody's
6 proposal is that's revenue neutral. But if you're saying
7 let's monitor the actual construction that's going on in
8 these companies' territories to see if the costs are in
9 line with what we're predicting in the model, you know, I
10 think that would be appropriate.

11 You know, I don't know what time period you want
12 to take that on. I think you could identify what the major
13 drivers of the costs are and that's where you could spend
14 your time.

15 But I think that's very much in line with the
16 reality-based approach that I take to doing these cost
17 studies.

18 COMMISSIONER GARCIA: Thank you, counsel.

19 BY MR. RUSCUS (Continuing):

20 Q In this past dialogue about movement and costs,
21 isn't it true that for each and every input you've provided
22 the Commission in terms of material and labor, you have not
23 indexed those prices to reflect anything other than your
24 current operations today?

25 A That's correct. I have not made any speculative

1 future adjustments, but I would take you back, again, to
2 KWD-1. This approach results in substantial reductions in
3 investment levels, 27; more importantly, the associated
4 expenses to operate them, 37%. To apply an indexing on top
5 of this would be redundant and excessive.

6 Q Would you consider a consultation with the TPI to
7 be a speculative process?

8 A TPI is not to take today's costs and predict what
9 tomorrow's cost is. TPI looked at yesterday's costs and
10 said let's bring it up to today's costs.

11 I've already done that. There is no need to
12 apply TPI factor. I didn't go back and look at what the
13 cost of cable and wire, material or labor was five years
14 ago. I looked at what it is as you and I sit in this
15 hearing room this moment.

16 Q So in terms of the cost of the network to build
17 going forward, you didn't even trend out the existing
18 trends, for instance, in digital loop carrier equipment in
19 order to provide inputs for today; is that correct?

20 A I didn't go beyond the 22% reduction that my
21 study reflects for digital circuit equipment. I reflected
22 the current facts as we know them today.

23 I do know; I've worked through this. The cost of
24 digital loop carrier is going up in my experience, not
25 down. It's going up. It's providing increased

1 functionality as it does so, which it relates to the
2 discussion that's gone on numerous times with the need to
3 provide access to advanced services. That's why the
4 digital loop carriers have greater functionality. That's
5 why they're going up in costs.

6 Q Let's look at your digital loop carrier costs.
7 Turning to page --

8 COMMISSIONER JACOBS: Excuse me. This is from
9 your knowledge that you gained that digital loop carrier is
10 increasing in cost?

11 A Yes; that's correct. I've looked at the cost of
12 SLIK 2000 versus the current cost of a Rel-Tech device and
13 they have increased based on the data that I've looked at.

14 COMMISSIONER JACOBS: Go ahead and proceed.
15 BY MR. RUSCUS (Continuing):

16 Q And does that data suggests that the costs have
17 increased per university of traffic or simply per device?

18 A On a per unit of traffic, similarly sized
19 equipment items.

20 Q Referring to page 42 of 51 of your DLC input
21 sheet; do you have that page?

22 A I will.

23 Yes.

24 Q You indicated in your summary a correction to the
25 DLC identified as running from 673 lines, and I suppose

1 that's up to 1344; is that correct?

2 A That's correct.

3 Q And the new value is \$148,000?

4 A Right.

5 Q And you've testified that the national default
6 inputs that the BCPM sponsors put together are reflective
7 of ILEC costs on a national aggregate basis; is that
8 correct?

9 A Could you ask that again?

10 Q Yeah. The default inputs in the BCPM are the
11 product of national averaging of ILEC values or sponsor
12 values?

13 A Yes.

14 Q Can you accept, subject to check, or check it if
15 you want, that the DLC default costs, instead of being 148
16 as you indicated for that unit, is only \$96,000?

17 A What is the associated DLC COT investment for the
18 same size in that default value?

19 Q I don't know.

20 A Well, I think there may be some interaction there
21 is why I ask. But I'll accept that that's the number,
22 subject to check. That's part of the reason why I use
23 company specifics because I know for a fact these to be
24 indicative of Sprint's costs. I've done considerable
25 analysis in this area.

1 I recently did an analysis of five work orders
2 for this same vendor equipment installed in Las Vegas in
3 fourth quarter of '97. It's right in line with this range.
4 It's almost three times the costs associated or suggested
5 by the HAI national default, which is supported by one
6 sentence of documentation.

7 Q And its 50% above the costs suggested by ILEC
8 average data; isn't that correct?

9 A Well, again, I don't have the defaults in front
10 of me. I think there may be some interaction with the COT
11 investment table. I also don't know what the default value
12 for the line card investment is.

13 But I'll accept your math. Again, as I stated
14 earlier, evidence to me that all companies aren't able to
15 buy the equipment at the same price.

16 We are price cap regulated in Florida. If we
17 could buy and install NGDLC devices for the costs suggested
18 by HAI or that BCPM national default, we'd do it. We'd do
19 it every day gladly because we're price cap regulated.

20 Further, the environment upon which our NGDLC
21 contract is negotiated at a national level, three quarters
22 of the Sprint LTD operation is price cap regulated.

23 The prices we have NGDLC reflect the prices
24 afforded to a company that has all the proper incentives to
25 get the cheaper price possible. Our cost is our cost.

1 Q But it's not necessarily the cost of an efficient
2 provider other than Sprint coming in and attempting to
3 serve the Florida territories; isn't that correct?

4 A I'm going to reject the inference of an efficient
5 provider, inference being we're not an efficient provider.

6 If a larger company -- Again, back to simple
7 business dynamics, there are companies -- We serve about
8 seven and a half million access lines, Sprint local
9 telephone division. We're very small compared to even GTE,
10 much less the Bell Companies. I think BellSouth is about
11 three times larger than Sprint.

12 Naturally, they have some ability to buy these
13 equipment items at a cheaper price than Sprint. I see no
14 reason to penalize Sprint; more importantly, the customers,
15 the two million customers served by Sprint by calculating a
16 high cost support fund based on an unobtainable vendor
17 price that Sprint cannot attain.

18 Q Is the answer to my question yes or no?

19 A It was no. I don't agree with your
20 characterization that a more efficient provider could come
21 in and get it cheaper. What I was explaining is that a
22 larger company, some larger box may buy these equipment
23 items cheaper. That's no reflection on efficiency
24 whatsoever.

25 Q For the record, there was no more in my question.

1 I simply said the costs an efficient carrier could achieve
2 other than Sprint could achieve coming in to serve the
3 territory.

4 Moving on, you included nonrecurring costs in
5 your expense pool; is that correct?

6 A Yes. I've calculated the total cost to provide
7 basic local service. That's certainly a component of the
8 total costs.

9 Q So the universal service fund would provide
10 subsidy, in essence, going to the nonrecurring costs;
11 correct?

12 A Well, I don't know that. All I've been asked to
13 do here is to provide a forward-looking estimate for the
14 cost of basic local service. I have done that. How the
15 fund would be administered is yet to be determined.

16 Q Is it your under- -- Excuse me.

17 A It would depend, you know. You could include
18 this in the revenue benchmark, for example. You could
19 perhaps decide that we don't want that in there and in that
20 case it could be taken out.

21 But in providing an estimate for basic local
22 service costs, it's a component of providing basic local
23 service and it's properly included until direction given
24 otherwise.

25 Q And you would agree that if you're collecting

1 money through the fund to fund nonrecurring costs and you
2 weren't including the revenues you receive from customers
3 in the revenue benchmark, that you'd be double counting
4 those costs?

5 A Not double counting them, but I think it would be
6 appropriate to have a match there.

7 Q Okay. Now earlier you stated that all the -- or
8 something to this effect --, that all of the efficiencies
9 that are possible have already been included in Sprint's
10 operations. Is that a portion of your summary?

11 A Mr. Ruscus, I need to back up so we're all clear.
12 The revenues generated from service connection charges,
13 for example, will not match the nonrecurring costs in
14 general. I think the nonrecurring costs will exceed the
15 cost recovery afforded from those rates.

16 I'm sorry; could you ask your next question?

17 Q But your answer still stands that they would need
18 to be matched because --

19 A Yes, I believe they would.

20 Q Earlier you indicated you believed, I think in
21 your summary you said this, that the efficiencies that
22 could be captured were already captured in Sprint's cost;
23 is that correct?

24 A Yes. Let me talk about that for a moment, if I
25 could. I heard Mr. Wood say, well, they'll consolidate

1 their network maintenance center. We've already done
2 that. We've got a network maintenance center, sits in
3 North Carolina, that administers --

4 Q Excuse me. I actually had a question and you've
5 just started off on a mini monologue.

6 My question was whether you had stated in your
7 summary that you had included the efficiencies available in
8 your current costs. And I need a yes for that to
9 transition to my next question or a no if I improperly
10 summarized it.

11 A Yes. I assumed you wanted to hear about it.

12 Q I just want to ask you the following question:
13 Isn't it true that the nonrecurring costs reflect your
14 actual Sprint experience at the present time?

15 A Yes. And that is based on -- And I will explain
16 now. It's based on use of consolidated network maintenance
17 centers. It's use -- It reflects the use of automated
18 provisioning systems, work force management automated
19 systems, which feed jobs to technicians with hand-held HAS
20 units. It reflects sonic technology. It reflects --
21 Mr. Wood suggested we still dig poles with posthole
22 diggers. Mr. Laemmli informed me in his 20 years of
23 outside plant, he's yet to see that done in Sprint's
24 territory.

25 I believe that, yes, the current expense

1 relationships that I have used in my cost study which
2 generate the 37% reduction to 1997 expense levels reflect
3 an efficient operation. It reflects most of the specific
4 examples that the HAI documentation suggests are going to
5 achieve efficiencies into the future. They're already in
6 our network. So to the extent that they achieve
7 efficiencies, they're already reflected in 1997, and I'm
8 already 37% below that level in my cost study.

9 Q When you calculated the nonrecurring costs pool
10 upon which your factor was based, you did not reflect any
11 adjustment for the fact that the model you're sponsoring
12 and involved with deploys next generation digital loop
13 carrier equipment; is that correct?

14 A Well, we are deploying next generation digital
15 loop carrier in our network today.

16 Q What percentage of your actual costs reflect
17 costs incurred using that type of system as opposed to an
18 older digital loop carrier system or an analog system?

19 A I'm not certain. However, the plant non specific
20 network operations in that category, my forward-looking
21 study is 36% below the 1997 ARMIS level. So it certainly
22 allows for some reduction in that expense level.

23 Q But the question I asked you was in the pool of
24 costs you used to calculate your cost factor, did you make
25 an adjustment in non recurring costs based on the fact that

1 the model you sponsor uses next generation digital loop
2 carrier to the exclusion of older technologies?

3 A Not at that level of specificity. I developed my
4 expense loadings with full knowledge of how they are
5 applied and function in the model. To the extent that you
6 depict more efficient technologies in the model, to the
7 extent that you predict forward-looking levels of
8 investment, i.e., 27% below the 1997 level, to the extent
9 that you look at the results and you see that your approach
10 receives a 37% reduction on 1997 levels of expense, to
11 pursue some minutiae level of detail adjustment on top of
12 that would be redundant.

13 Q Earlier you were talking about fill factor. And
14 I believe your testimony indicates that your fill factors
15 have to take into account the requirement that you provide
16 service in three working days and satisfy 90% of trouble
17 reports in a certain time period; is that correct?

18 A Yes, that's correct.

19 Q Is BellSouth subject to the same requirements in
20 Florida?

21 A I assume so.

22 Q And BellSouth's fill factors for feeder are
23 significantly less than yours or significantly greater;
24 isn't that correct?

25 A I don't know. Do you have them in front of you?

1 Q Yeah, you can accept, subject to check, that the
2 ones reported by Ms. Caldwell are 71% and yours range from
3 69% down to 63%, based on the change you made earlier;
4 that a fair assessment of your change?

5 A And you're telling me that BellSouth's feeder
6 fill factors are 71% for every density zone?

7 Q That's what's been identified by Ms. Caldwell.

8 A Well, if that's true, I would not characterize
9 that as substantially higher, no, not at all.

10 Q But you would agree that --

11 A I would suggest that the density zones, which
12 contain the vast majority of Sprint's access lines is
13 almost identical, looking down this revised number where
14 70%, 69, 68, 67, 66; those are where the majority of the
15 lines are. So, 71, no, we're very similar, would be my
16 conclusion.

17 Q But you agree that both of you are subject to the
18 same rules and the fill factors that you've identified are
19 lower than those identified in BellSouth's study; is that
20 correct?

21 A Minimally lower.

22 Q And they range from 69% to 63%; is that correct?

23 A Sixty-two to seven. Again, for the density zones
24 where the majority of the lines are, they range from 65 to
25 70.

1 Q Earlier you indicated that you felt in order to
2 provide -- because you didn't know who would get a second
3 line, you had to provide two distribution pairs to each
4 household; is that correct?

5 A Yes. I explained that the least cost approach to
6 provisioning distribution plant is to put two pair in at
7 the time of initial installation. That's a practice that
8 every facility-based telecommunications provider has in
9 place as we speak.

10 Q And do you know what the number for distribution
11 pairs for households is as reported by BellSouth?

12 A No, I do not.

13 Q Now if I live on a street that has ten houses and
14 I know that between 15% and 20% of those people are going
15 to need a second line or maybe there's a future higher
16 percent, isn't it true that I can simply run one cable all
17 the way down the street that has all the pairs, let's say
18 it's 500-foot street, and simply pull off that 15% at the
19 drop terminal as necessary without providing a full twice
20 as many lines as the number of people on the street?

21 A You could, but you're going to have a huge cost
22 penalty as your second line penetration grows, which it
23 is. As well as you've got a huge cost penalty, first of
24 all. You have to come back and you've got to dig new
25 trenches through streets, sidewalks, driveways, yards,

1 landscaping.

2 Now imagine the inconvenience to the customer of
3 doing business that way on top of this. Again, we're price
4 cap regulated in Florida. We don't do -- You know, why
5 would we do this if we didn't truly believe this was the
6 least cost approach to providing service?

7 Q Isn't it true that if I run a cable down the
8 street, past all my drop terminals that has the number of
9 pairs necessary to serve the people with one line, in
10 addition, has some percentage more but less than fully
11 doubled, that I don't have to dig a single trench in order
12 to -- or cut a single driveway or anything else -- in order
13 to go to my drop terminal pedestal, whatever it's called,
14 and pull and attach the line as necessary to the house as
15 necessary?

16 A Only if you want to make an unrealistic fantasy
17 assumption that second line penetration is not growing and
18 we all know that it is.

19 Q Is your expectation that you use two lines per
20 distribution, two distribution lines --

21 COMMISSIONER GARCIA: Maybe we should just don't
22 provide two lines to AT&T customers, and that way we would
23 move along on this point. I think you've made your point,
24 but, you know, we're --

25 BY MR. RUSCUS (Continuing):

1 Q I'd like to ask you a couple of questions about
2 your switch costs. You've used default inputs in certain
3 instances because you believe that the results when those
4 inputs are used are consistent with Sprint's current
5 experience; correct?

6 A Yes.

7 Q Isn't it true that Sprint's current experience in
8 the SCIS data Sprint has provided to demonstrate its
9 current experience does not reflect the inclusion of GR or
10 TR-303 next generation compatibility?

11 A No, I don't think that is true. I think that the
12 SCIS runs reflect TR-303 compatibility. The NGDLC devices
13 assumed in this cost study certainly reflect TR-303.

14 Q If I go through the 139 switches provided in your
15 response to interrogatory No. 39, do you know whether I'll
16 find more than two switches that are identified and prices
17 having compatibility with TR-303?

18 A I don't know. Again, we use the switching
19 algorithm for about half the switches. And it's my
20 understanding that that is in conjunction with TR-303. The
21 NGDLC inputs that I use are certainly TR-303 compatible.

22 TR-303 increases switching costs, by the way.
23 The savings from TR-303 is on the loop side of the network,
24 not on the switching side of the network.

25 Q Are you suggesting that the ports needed to

1 support GR-303 are more expensive rather than less
2 expensive?

3 A No, I'm suggesting that the overall switch
4 investment is more expensive. I associate the port costs
5 with the loop.

6 Q If you assume that for the purpose of the model
7 that you're supporting that the port costs actually are
8 included in the switch, isn't it true that the GR -- the
9 ports necessary to be compatible with GR-303 technology are
10 actually less expensive than the ports that relate to older
11 technologies?

12 A Yes. I believe that's true. There is additional
13 equipment items as well.

14 Q Now you have also for your small switches used
15 the small switch option in the BCPM; correct?

16 A Yes.

17 Q And isn't that an option whereby rather than
18 using your data, or let's call the regular BCPM data for
19 switches under a certain number of lines, you kick over
20 into what's called the small switch mode and has prices
21 related to those switches?

22 A I think that's correct.

23 Q Isn't it true that the data that the BCPM used to
24 create those costs came from a study by Mr. Gable submitted
25 to the FCC which based those prices on rural utility

1 companies from the RUS?

2 A I don't know. You're really getting into model
3 questions. I'm not a model witness. What you say could be
4 true.

5 Q I beg your pardon?

6 A I said what you said could be true. I'm not a
7 model witness.

8 Q Were that the case, would you not agree that the
9 efficiencies available to Sprint in its 19 states is
10 greater than that commonly available to a small rural
11 provider?

12 A Efficiencies in what? What kind of efficiency?

13 Q Its leverage in purchasing switches, in obtaining
14 discounts.

15 A I don't know necessarily because what I have
16 seen, for example, is that -- Let's go back to digital loop
17 carrier. I've seen where RBOCs buy more of the large size
18 digital loop carriers and they get a better vendor price.
19 I've seen Sprint buy more small sizes and, therefore, they
20 get a better price than a bigger company.

21 That may be the fact with some RUS companies.
22 They may buy more of the smaller switch sizes than Sprint
23 does and, therefore, they may get a better vendor price. I
24 don't know.

25 Q How many switches are commonly deployed by a

1 small rural utility, rural telephone provider?

2 A I don't know. I've not studied that. I've not
3 studied the issue you're asking me about. I've not
4 compared RUS companies' switching costs to Sprint's.

5 Q Does Sprint employ --

6 A Again, let's back up here for a minute because it
7 would be my understanding that the Sprint specific discount
8 still applies in that algorithm. So to the extent that we
9 could purchase them cheaper, it would be my understanding
10 that that discount gets applied in the model.

11 So if what you're speculating is true, it's
12 already reflected in the model results.

13 Q Where did you get your understanding from?

14 A I don't know. It's my understanding in general.
15 That's why I satisfy a model input for a switch vendor
16 discount is because it then gets applied in the model.

17 Q If somebody who had let's say intimate knowledge
18 with the algorithms in the model were to testify that there
19 were no such discount applied, would you have any reason to
20 disbelieve that testimony based on your own personal
21 knowledge?

22 A Well, don't take it personally, but it would
23 depend on who said it. If Dr. Brian Staihr said it, I
24 would be inclined to believe it.

25 COMMISSIONER JACOBS: Can I ask you a question

1 real quick.

2 A Yes.

3 COMMISSIONER JACOBS: I'll give you a scenario.
4 You have a major competing company, who is going to come
5 into your territory and they're going to compete with you
6 on a UNE basis. And you're going to have to buy a new
7 switch to serve that same territory that they're going to
8 be in. Okay?

9 A Right.

10 COMMISSIONER JACOBS: You know they're going to
11 use digital loop technology. Are you going to go out and
12 buy a switch that won't allow you to reduce your per line
13 investment substantially in the future?

14 A What was the last part of your question, please?

15 COMMISSIONER JACOBS: Are you going to go out and
16 buy a switch that won't allow you to reduce your per line
17 investment in that territory in the future?

18 A Are we going to replace our switch as the result
19 of a new entrant coming in?

20 COMMISSIONER JACOBS: No, no, no. Let's say you
21 have to.

22 A I have to replace my switch?

23 COMMISSIONER JACOBS: Yes; that's the
24 hypothetical. Okay. Are you going to buy a switch to
25 compete in that territory that won't allow you to reduce

1 your per line investment substantially going forward?

2 A I think I would buy them at -- If it occurred
3 today, I would buy them at the prices I've reflected in my
4 forward-looking cost study. That's why my forward-looking
5 cost study shows a 53% reduction of digital switching
6 equipment.

7 So I think the answer to your question is yes. I
8 would buy the switch at today's lower price and that's what
9 I've indicated in my cost study.

10 COMMISSIONER JACOBS: So if that competitor were
11 BellSouth or GTE and they would track, their investment
12 would track the Turner, which determine scope of costs for
13 that switch, and show declining costs over time, would you
14 not look to make sure your investment, your price for that
15 switch were not going to track what they're doing?

16 A Well, at whatever point in time that switch was
17 purchased, I think it would be based on the current cost of
18 switching equipment. If --

19 COMMISSIONER JACOBS: No, answer -- Understand
20 what I'm saying. I'm saying you have a competitor who has
21 ability to go out and negotiate on pretty equal terms as
22 you.

23 A Right.

24 COMMISSIONER JACOBS: And they're going to go out
25 and negotiate to acquire a reduction in investment per line

1 to go into your territory.

2 A Right.

3 COMMISSIONER JACOBS: You're not going to go and
4 do the same thing?

5 A And I already have, I guess would be -- Yes. To
6 answer your question, yes, Sprint is price cap regulated.
7 We want to get the cheapest switches possible. That is the
8 way we've approached the contract that is in place. That
9 contract has been reflected here. It reflects what you're
10 talking about. That's why my study results in a 53%
11 reduction in switching investment.

12 COMMISSIONER JACOBS: Okay.

13 BY MR. RUSCUS (Continuing):

14 Q Can you turn for a moment to page 72 BCPM model
15 documentation?

16 A I don't have that available.

17 Q Would you accept, subject to check, that footnote
18 44 on that page indicates that the small switch curve used
19 in this process was developed by Dr. David Gable of Queens
20 College; it was presented to the FCC by Dr. Gable on August
21 20th, 1997, in a study titled "Estimating the Cost of
22 Switches and Cable Based on Publicly Available Data." The
23 study was based on regression analysis using data provided
24 by the Rural Utility Service.

25 A Yes; I'll accept that. I recall reading that at

1 some point.

2 Q Okay. Mr. Dickerson, were you here yesterday
3 when GTE witness Seaman told the Commission that he
4 expected to acquire a universal service fund of
5 approximately 447 million dollars?

6 A I'm not sure I was, but if you want to go ahead
7 and ask your question.

8 Q And Mr. Martin I believe suggested something in
9 the ballpark for BellSouth of 800 million, or a billion two
10 between them. Is it not the case that the BCPM model is
11 capable of taking the costs resulting from your input and
12 calculating at least a range of fund size based on that?

13 A Yes. It's capable of accepting various scenarios
14 for benchmarks, revenue benchmarks, and then calculating a
15 fund size based on a comparison of that revenue benchmark
16 to the costs calculated in the model.

17 Q Did you calculate any service fund size beyond
18 the 1.2 billion indicated by the other companies for
19 Sprint?

20 A I'm confused. One, I don't think a fund size
21 was within the scope of what was requested here, but I'm
22 confused. You're saying 1.2 billion and I'm totally
23 baffled.

24 I do have in front of me that at a \$31 and \$51
25 revenue benchmark that the FCC suggested, my cost results

1 of \$31.98 for Sprint would be a fund size on capped
2 investment of 68 million.

3 Q That was my question.

4 A Yeah.

5 Q And that's just for Sprint's territories and not
6 for the territories identified yesterday; is that correct?

7 A That's correct. And I wasn't clear if you were
8 putting out total Florida numbers.

9 Q Yes, sir.

10 MR. RUSSELL: I have no further questions.

11 CHAIRMAN JOHNSON: Staff, how much will you have?

12 MS. KEATING: Not more than five minute.

13 CHAIRMAN JOHNSON: How much redirect is
14 anticipated?

15 MR. REHWINKEL: It will depend.

16 CHAIRMAN JOHNSON: Okay. Go ahead.

17 MS. KEATING: Chairman Johnson, before I begin
18 I'd like to ask that Staff's exhibit for this witness be
19 identified for the record.

20 We would ask that Exhibit KWD-3, which is the
21 deposition transcript, the Late-Filed Deposition Exhibit
22 Nos. 1 through 7, and errata sheet from Mr. Dickerson's
23 September 16th deposition be identified as Exhibit 82.

24 CHAIRMAN JOHNSON: I have it as 81. Is it 81?

25 MS. KEATING: I believe it's --

1 CHAIRMAN JOHNSON: No, you're right.

2 MS. KEATING: I believe it's 82.

3 CHAIRMAN JOHNSON: It will be 82.

4 MR. REHWINKEL: And, Madam Chairman, if I might,
5 Mr. Dickerson has provided somewhere to me or within the
6 organization an errata sheet to his deposition. I would
7 like to have the opportunity just to provide that. We
8 could do it as a late-filed, if that would be more
9 efficient.

10 CHAIRMAN JOHNSON: You said you do have it now,
11 though?

12 MR. REHWINKEL: I don't have it with me.

13 CHAIRMAN JOHNSON: We'll do it as a late-filed.
14 It will be Late-Filed 83.

15 (Exhibit 82 marked for identification.)

16 (Late-Filed Exhibit 83 identified.)

17 CROSS-EXAMINATION

18 BY MS. KEATING:

19 Q Good afternoon, Mr. Dickerson. I'm Beth Keating
20 for Commission Staff, and I've really just got a few
21 questions.

22 First off, BellSouth and GTE have indicated that
23 they use certain indexes in calculating their inputs into
24 the model.

25 A Yes.

1 Q Did Sprint Florida use any index in calculating
2 its inputs?

3 A No, it did not. I used current costs. And,
4 again, my understanding of the TPI factors generally is
5 they bring historic costs up to current costs. And I think
6 I've established the results of my study produce
7 substantial reductions from current costs today. So I
8 would think it would be redundant to apply them to the
9 inputs that I've developed.

10 I'm not that close to Bell and GTE's inputs, so I
11 don't know if there is some reason, some different
12 methodology that would justify their use in their approach
13 or not.

14 Q Okay. Thank you.

15 Are you familiar with AT&T's witness Lerma's
16 rebuttal testimony?

17 A Yes, I've looked at it. I don't know if I have
18 got it here or not.

19 Q Well, you may not need to refer to it for this
20 question. But in his rebuttal testimony, witness Lerma
21 indicated that GTE-Florida had properly removed non-
22 recurring costs from its calculation of the basic local
23 costs. But he said he couldn't determine whether Sprint-
24 Florida had done the same.

25 A No, we did not. Again, my understanding is we

1 were asked to estimate the total cost of basic local
2 service and that's certainly a cost of providing that. As
3 we discussed earlier, you know, depending on how the
4 Commission wants to go with this, it can be removed or it
5 can be recognized in a revenue benchmark to the extent
6 there's some charges that help recover these costs in
7 addition to the recurring charges.

8 Q Mr. Lerma also indicated that Sprint does not
9 advertise basic local service. So Sprint should not
10 include any advertising expense in the calculation of basic
11 local service.

12 First off, does Sprint advertise basic local
13 service?

14 A Well, certainly Sprint does image advertising.
15 Sprint does second line promotions. I guess, further, a
16 lot of these adjustment discussions are down into the
17 details. I guess I'd take us back to Exhibit KWD-2. Those
18 expenses Mr. Lerma is talking about would be booked in
19 customer service. The category of customer and corporate
20 operations in my cost study, the level of expense is 62%
21 below the 1997 level. That's far and a way sufficient to
22 cover any marketing expenses that Mr. Lerma is concerned
23 about.

24 COMMISSIONER CLARK: I'm sorry. Just so I'm
25 clear: You think there should be marketing expenses in --

1 figured into the BCPM in some input?

2 A Well, I'm not certain, but the question I
3 answered was do you incur marketing expenses associated
4 with basic local service. And my response was, yes, we do,
5 particularly as you head into a forward-looking competitive
6 environment.

7 What I then went on to say is the customer and
8 corporate op and marketing would be part of that category.
9 My forward-looking cost study has 86 million dollars worth
10 of expense in that category. My 1997 level of expense was
11 228 million. So I'm 62% below.

12 So certainly you can view that as nowhere near
13 the totality of the expense categories where marketing
14 expenses are booked would show up in my forward-looking
15 cost study. In fact, only 38% of the total 1997 level
16 costs for that category are in this cost study.

17 COMMISSIONER CLARK: But it's your testimony that
18 it should be in the cost study?

19 A Some level of marketing expense, yes. And I
20 think that the level is going to relate to what you include
21 in your revenue benchmark. To the extent that you include
22 any additional revenues beyond basic local service
23 revenues, my position only increases. You know, you
24 certainly would include them to the extent that you were
25 going to include any vertical services. In fact, you need

1 to include the cost for those services.

2 COMMISSIONER CLARK: What if we don't include
3 them? What would be the purpose of including image
4 advertising?

5 A Well, in a forward-looking environment, where we
6 have predicted substantial reductions, the logic being
7 driven that we're talking about a forward-looking
8 competitive environment which will further discipline
9 companies to be more efficient, I think it's only fair to
10 suggest that in that same environment they're going to
11 advertise to attract and retain customers.

12 Further, we've already included the demand
13 associated with second lines. In fact, the model includes
14 the demand associated with all lines. In order to
15 calculate the lowest unit cost on the loop part of this
16 network, it includes the demand for all lines, special
17 access, business lines. You certainly are going to have to
18 advertise and keep contact with your business customers.
19 And those units are included in this cost study so as to
20 depict the overall unit economies of scale that come about.

21 COMMISSIONER CLARK: Thank you.

22 A Again, I hope I'm not troubling you. There is
23 not substantial amounts of marketing expense in this cost
24 study.

25 COMMISSIONER CLARK: Thank you.

1 MS. KEATING: Thank you. Staff has no further
2 questions.

3 COMMISSIONER CLARK: I did have one other.

4 CHAIRMAN JOHNSON: Commissioners.

5 COMMISSIONER DEASON: I'm looking -- I'm looking
6 at your Prefiled Exhibit KWD-1 that was attached to your
7 prefiled direct.

8 A Okay. Do you have a page number? That would be
9 the cost study itself?

10 COMMISSIONER DEASON: Right.

11 A Okay.

12 COMMISSIONER DEASON: And I'm looking at page 1
13 of the results section.

14 A Okay. This would be the one that showed \$31.78.

15 COMMISSIONER DEASON: Right. It references the
16 \$31.78.

17 I guess my first question is in reference to that
18 \$31.78, you had mentioned in your testimony that you
19 compared that to the \$31 revenue benchmark that at least
20 FCC has proposed. Do you support the use of a revenue
21 benchmark?

22 A No, I don't. That's a standard BCPM output. No,
23 I think Sprint's position would be it should be an
24 affordability comparison, that issue, and several
25 economists testified to it. We'd like to see the issue

1 focused on those customers who truly can't afford to pay
2 the cost of providing them service. And that would -- You
3 know, with that type of focus, it puts the focus on the
4 right issue: Can these customers afford to pay it or not?

5 COMMISSIONER DEASON: But should we be
6 subsidizing -- Is that your definition of universal service
7 fund, the purpose of universal service fund?

8 A A comparison of the cost, of a deaveraged cost to
9 an affordability mechanism? Yes, I believe it would.

10 I could provide you an example. My wife and I
11 live in a rural area. We live about 40 miles south of
12 Kansas City. Combined, we've got a six-figure income. Our
13 basic local service rate is \$5.25. I've got a SLIK rate on
14 top of it. We're paying \$.8.75 for basic local service.

15 If you do a revenue comparison, you're not
16 capturing the fact that my wife and I could afford to pay
17 substantially more for our service.

18 COMMISSIONER DEASON: Well, then are you -- You
19 think the Commission then should get income figures from
20 all customers and determine who can pay what and base rates
21 on that?

22 A I'm not an economist and so I don't know that I'm
23 the best person to provide you guidance for how to
24 establish the affordability benchmark that you would
25 compare to.

1 COMMISSIONER DEASON: So you disagree with the
2 testimony we had yesterday that the purpose of universal
3 service is to subsidize the service, not to subsidize
4 customers?

5 A No, I think -- No, I think -- I believe that what
6 I'm suggesting does subsidize the service and, in fact,
7 does not subsidize customers.

8 What it does is it says if it costs \$50 to
9 provide service where I live, let's not subsidize Kent
10 Dickerson and Pat Dickerson who can clearly afford to pay
11 the \$50.

12 COMMISSIONER DEASON: So what if you have a
13 neighbor who cannot, they pay a different rate even though
14 you're in the same area?

15 A Well, at some point you're not going to be able
16 to get it down to Kent Dickerson and his neighbor. But
17 what you try and do is say we think \$30 is a reasonable
18 level of costs. And, yeah, there might be some Bill Gates
19 out there, but how many of the total people we're looking
20 at here, what is the percent of Bill Gates and Kent
21 Dickersons.

22 What you're really trying to say is at a level
23 that's administratively feasible, let's say that the costs,
24 the reasonable level that people should be paying is \$30.
25 If the cost is \$50, we won't ask them to pay 50; we'll ask

1 them to pay 20. The companies providing service to them
2 will get the other \$20. That \$20 would be revenue neutral
3 to reductions in other rates so that there is no windfall
4 to the service provider.

5 I think this dovetails with the comments I heard
6 you say in the affordable local service proceeding.

7 COMMISSIONER DEASON: Yeah. We're not here to
8 figure out what I think. We're here to figure out what you
9 think.

10 A Okay.

11 COMMISSIONER DEASON: The \$31.78 is the capped
12 amount Can you briefly explain to me -- I understand that
13 there is a \$10,000 limitation. How does that mechanism
14 work and what is the rationale for it?

15 A The rationale for it is at some point it becomes
16 so expensive to serve certain extremely rural customers
17 that you are going to look for an alternative technology,
18 probably a wireless technology. And it caps the overall
19 investment to serve that customer at \$10,000.

20 COMMISSIONER DEASON: And the reason for that is
21 there could be an alternative -- There's something else
22 that could be cheaper than actually running the wire that
23 distance which would result in \$10,000 per line costs?

24 A That is correct.

25 COMMISSIONER DEASON: Okay. That limitation does

1 not address the fact that there could be contributions in
2 aid of construction; does it?

3 A No, it does not.

4 COMMISSIONER DEASON: Does the model -- Does BCPM
5 address the fact that there can be contributions in aid of
6 construction for some customers?

7 A No. It could be modified or that could be
8 recognized in some fashion, but the filings we made have no
9 inputs or mechanisms on that issue.

10 COMMISSIONER DEASON: Should it?

11 A Yes; I think if you're going to continue those, I
12 think you'd need to deal with it. I don't think it's
13 probab'ly material to this two million overall calculation,
14 but, yeah, I think you could look at it and allow for it.

15 COMMISSIONER DEASON: Do you know what the rule
16 in Florida is concerning CAIC? In all honesty, I don't
17 know if that rule is still in effect or not. I think it
18 is; at least in my rule book it says it's still in effect.

19 A No, sir; I'm not familiar with that. I know
20 the --

21 COMMISSIONER DEASON: It's five times annual
22 revenue, annual base rate revenue in a simplistic form,
23 that if the cost of providing service, of extending service
24 exceeds that, that that amount in excess of five times
25 annual base rate revenue can be collected from customers.

1 A Okay.

2 COMMISSIONER DEASON: So you don't think that
3 would have a material impact especially in some of the low
4 density areas?

5 A Is that in the form of you charge an additional
6 monthly charge or is that just --

7 COMMISSIONER DEASON: It can be collected upfront
8 in cash or it can be collected over a period of years in
9 additional surcharges on the bill.

10 A I think that if that is applied regularly, you
11 know, I think it should be looked at, to answer your
12 question. I know that it's troublesome public policy to
13 collect those.

14 COMMISSIONER DEASON: Well, we've talked -- I
15 know we're dealing in theoretical and we're talking about
16 building a system which has even been characterized as
17 falling out of the sky. But in reality, if we were
18 building a new system for all those high cost customers,
19 they would be expected to pay some of that additional cost
20 above some certain level and that would we not be asking
21 other customers to subsidize them. And, in fact, if the
22 company received that NCIAC and then also received in
23 universal service, it appears to me that there may be the
24 possibility of a double recovery; do you agree with that?

25 A Oh, I agree. I think we need to look at it and

1 see what level of contributions in aid of construction are
2 occurring. I think it should reflect that. I do not
3 support recovering the same costs twice.

4 COMMISSIONER DEASON: Moving to page 6 of the
5 result section of your exhibit.

6 A Well, Why don't you go ahead and ask your
7 question. I'm not sure I'm -- Okay. Here I am.

8 COMMISSIONER DEASON: Do you have that?

9 A Yes, I do.

10 COMMISSIONER DEASON: I'm looking at the line
11 data section. And this information is provided by density
12 zones.

13 A Correct.

14 COMMISSIONER DEASON: And I was curious as to the
15 number of residential lines in various density zones as
16 compared to the number of households in various density
17 zones. And the information to me -- Well, for example, in
18 your 5,000 to 10,000 zone, you show data of 56 households
19 and no residential lines. And then for the zone greater
20 than 10,000, you show 5,660 households and 11,948
21 residential lines. That doesn't appear on its face to be
22 rational. Can you explain that?

23 A Not entirely, I don't think. I'll tell you what
24 I know, Commissioner. We provided inputs to the model of
25 actual working lines by wire center. The model itself then

1 distributes those to the density zones based on the Bureau
2 of Census data.

3 It appears like there's -- The 56 to zero is -- I
4 don't know what that is. It's kind of small. But an
5 expectation of having more lines to households is my
6 expectation in more dense areas but not by the factors
7 shown here. So I cannot explain that.

8 COMMISSIONER DEASON: Well, in the least dense
9 area it shows that there is about two-thirds -- the ratio
10 of residential lines to household is about two-thirds. Do
11 you consider that to be representative nationally of low
12 dense zones?

13 A I don't think it's that great nationally. I
14 think that occurs, but I don't know that I would say that's
15 represented nationally.

16 COMMISSIONER DEASON: Okay. Do you have an
17 explanation for the greater than 10,000, why it appears
18 that every household there has at least two lines or the
19 vast majority of every household has two lines?

20 A In the greater than 10,000?

21 COMMISSIONER DEASON: Yes, greater than 10,000.

22 A I don't know for certain. You heard a lot of
23 discussion about households versus housing units. It could
24 be that what we're seeing here is working lines that we're
25 still billing for that aren't considered a household unit

1 in the Bureau of Census because they are snow birds.

2 COMMISSIONER DEASON: And I'm looking at the,
3 towards the end of your result section show the results in
4 costs per line per month for the various wire centers. And
5 I'm looking at page 1 of 2 of that particular section.

6 A Yes.

7 COMMISSIONER DEASON: Can you tell me where the
8 wire center designated ELFD is located? It has a cost per
9 line per month of almost \$8,300.

10 A Let me look at something for a minute. I think I
11 looked at this earlier. I think that's on a military
12 facility.

13 MR. REHWINKEL: That's Eglin field.

14 A And I don't think this materially affects my
15 statewide results, but I would allow -- I don't stand by
16 that number.

17 The problem was we don't have the access line
18 count because they had the switch.

19 COMMISSIONER DEASON: Commissioner Garcia said he
20 would move there and he'd agree not to take telephone
21 service if you would pay him \$8,300 a month.

22 Out of curiosity, could you tell me where HRFD
23 wire center is located?

24 MR. REHWINKEL: That's Hurlburt Field.

25 COMMISSIONER DEASON: That's another military

1 installation?

2 MR. REHWINKEL: Yes.

3 COMMISSIONER DEASON: Okay. Thank you.

4 COMMISSIONER CLARK: I had one question. I
5 noticed you answer on the cost of capital used in your
6 study, you say as provided in the FCC Order, the FCC
7 authorized rate of return is 11, 11.25% was used. Are we
8 compelled to use that in our cost study, your FCC
9 authorized? I know we had testimony on it, but I have to
10 say I didn't read the testimony.

11 A No, I don't think you are compelled to use it.
12 I'm not certain if you would ask the FCC to also use your
13 model and your calculation to calculate your federal, that
14 stipulation may apply. But if you're just trying to
15 determine your Florida without necessarily asking the FCC
16 to use that same calculation at the federal level, I think
17 you're free to do whatever you deem best.

18 COMMISSIONER CLARK: Why did you use it?

19 A Because we believe -- Well, one, I think our cost
20 of money witness, Dr. Billingsley, I think his analysis of
21 forward-looking cost of capital shows it to be very much in
22 line with what he predicts to be a proper level of cost of
23 capital for a forward-looking environment. So that's
24 really why we used it.

25 The FCC has endorsed it for federal universal and

1 it's supported by our cost of money expert's analysis.

2 COMMISSIONER CLARK: I'm not clear. Is that for
3 you or for the general universal service fund?

4 A I think to the extent that you're looking at the
5 forward-looking cost of capital in a competitive
6 environment for service providers, I think you could use
7 that cost of money for all, for the total pool, if you
8 will.

9 COMMISSIONER CLARK: So cost of capital wouldn't
10 be a company-specific input?

11 A I would say probably not.

12 COMMISSIONER CLARK: Okay.

13 CHAIRMAN JOHNSON: Redirect.

14 MR. REHWINKEL: No redirect, Madam Chairman.

15 CHAIRMAN JOHNSON: Exhibits.

16 MR. REHWINKEL: Sprint would move -- And I've
17 lost track of the -- 80 and 81.

18 CHAIRMAN JOHNSON: Show those admitted without
19 objection.

20 (Exhibits 80 and 81 admitted.)

21 MS. KEATING: Staff moves 82.

22 CHAIRMAN JOHNSON: Show that admitted without
23 objection.

24 (Exhibit 82 admitted.)

25 MS. KEATING: Actually, I believe there was an 83.

1 CHAIRMAN JOHNSON: It's the Late-Filed.

2 MR. REHWINKEL: We're going to take a 15-minute
3 break.

4 (Brief recess.)

5 CHAIRMAN JOHNSON: We're going to go back on the
6 record.

7 Preliminary matter, I understand that there's
8 another witness that maybe the parties have reached
9 agreement on.

10 MR. MELSON: Yes. I believe we can stipulate in
11 Mr. Laemmler, if I'm pronouncing it right.

12 CHAIRMAN JOHNSON: Mr. Laemmler.

13 MR. REHWINKEL: Yes.

14 CHAIRMAN JOHNSON: Commissioners, will there be
15 any questions for Laemmler or can we just stipulate?

16 Okay. Then we can excuse Mr. Laemmler.

17 Do we need to take care of it right -- I guess we
18 could take care of it right now.

19 MR. REHWINKEL: Yes.

20 CHAIRMAN JOHNSON: Do you want to go ahead and do
21 everything now?

22 MR. REHWINKEL: Yes.

23 CHAIRMAN JOHNSON: Okay.

24 MR. REHWINKEL: Like we did it earlier, we could
25 just move Mr. Laemmler's testimony and exhibits into the

1 record.

2 CHAIRMAN JOHNSON: Okay. We'll insert his
3 testimony into the record as though read.

4 MR. REHWINKEL: Yes.
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1 **BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION**
2 **REBUTTAL TESTIMONY OF CARL H. LAEMMLI**
3 **ON BEHALF OF SPRINT-FLORIDA, INCORPORATED**
4 **DOCKET 980696-TP**
5 **SEPTEMBER 2, 1998**

6 **Q. Please state your name, business address, employer and current position.**

7 **A. My name is Carl H. Laemml. My business address is 4220 Shawnee Mission Parkway, Suite**
8 **203A, Fairway, Kansas 66205. I am presently employed as Senior Manager – Network**
9 **Costing for Sprint/United Management Company. I am testifying on behalf of Sprint-Florida,**
10 **Incorporated (hereafter referred to as "Sprint" or the "Company").**

11

12 **Q. Please describe your educational background and business experience.**

13 **A. I received a Bachelor of Science degree in Business Administration from Central Missouri**
14 **State University in 1983.**

15

16 I have 22 years of experience in Local Loop planning, design, construction, costing and
17 Customer Service Operations in rural, urban and suburban environments. My experience
18 includes Line and Staff responsibilities for local loop design; new technology evaluation and
19 support, Operational Support System (OSS) design and implementation; Network and
20 Operations Policy development, Policy development and implementation of Network and
21 Operational support for Competitive Local Exchange Carriers (CLEC's) for both ILEC and

1 CLEC operations. I am currently responsible for network and operations costing for
2 unbundled network elements, universal service fund and other product offerings.

3 From 1976 to 1978 I performed contract engineering design work of urban local loops for
4 Southwestern Bell Telephone Company and rural multi-party elimination projects for United
5 Telephone in Missouri. (Sprint).

6
7 From 1978 to 1985, I was employed by United Telephone (Sprint) with responsibility for
8 local loop planning, design, costing and construction, including copper loops, Digital
9 Subscriber Loop Carrier (DLC), as well as local and interoffice fiber optic cable.

10 I worked on United Telephone's (Sprint's) Texas operations staff from 1985 to 1987 with
11 responsibility for Customer Service Operations methods and OSS implementation.

12 From 1987 to 1994, with United Telephone (Sprint) in New Jersey, I held positions of
13 Network Engineering Manger, (Responsible for Outside Plant (OSP) and Special Circuit
14 Engineering), Service Center Manager (Responsible for Dispatch, Assignment, Testing and
15 the Repair Call Center) and Area Service Manager (Responsible for Residential and Small
16 Business Customer Installation, Repair and Network Maintenance).

17
18 From 1994 to the present I have held several corporate staff positions with Sprint/United
19 Management Company. I have had responsibility for: Network Support of Access
20 Restructuring; New network technology assessment/implementation; OSS development,
21 Network and Operations Policy Development; Results development, Operations and Network
22 Policy and Methods development for Unbundled Network Element and Resale
23 implementation. I have also been responsible for the development of the Operations
24 infrastructure for Sprint - National Integrated Services, Sprint's CLEC. I am currently

1 responsible for network and operations costing for unbundled network elements, universal
2 service fund and other product offerings.

3

4 **Q. What is the purpose of your testimony?**

5

6 **A.** The purpose of my testimony is to respond to the direct testimony and exhibits of Mr. James
7 W. Wells testifying on behalf of MCI Telecommunications Corporation and Mr. Don J. Woods
8 testifying on behalf of AT&T Communications of the Southern States and MCI
9 Telecommunications with respect to the validity of certain HAI Model assumptions and inputs.

10

11 My rebuttal testimony:

12

- 13 • Discusses proper geographic sizing of Carrier Serving Areas (CSA) and the impact that this
14 sizing will have on enhanced services and USF model outcomes.
- 15 • Identifies realistic structure sharing opportunities; shows that the HAI structure sharing
16 inputs are completely unsupported, based on pure conjecture, and are not achievable today
17 or in the future.
- 18 • Demonstrates that the HAI national default plant mix percentages are irrelevant and
19 inappropriate to Florida conditions, and are not supported by fact.
- 20 • Shows that AT&T and MCI's assumption of using copper "T1" to serve remote customers
21 is not forward-looking and will deprive rural customers of access to enhanced services.

22

23

24 In addition, my testimony identifies instances in which AT&T and MCI misquote, omit key
25 information and misapply technical references; instances in which AT&T and MCI state one set

1 of assumptions in their documentation and then fail to apply those assumption in the HAI
2 model; and instances in which model assumptions are not followed consistently. The impact
3 of these omissions and changes is to consistently understate USF costs. All citations identified
4 by footnotes are provided in Exhibit CHL Rebuttal 1.

5
6 **Carrier Serving Area (CSA) Sizing**

7
8 **Q. Have you had the opportunity to review the HAI Model Description and HAI Inputs**
9 **Portfolio (HIP) filed by Mr. Don Wood and Mr. James Wells relative the engineering**
10 **design of Carrier Serving Areas (CSAs)?**

11
12 **A. Yes.**

13
14 **Q. Does Sprint have any concerns regarding the CSA engineering design principles used by**
15 **the HAI Model?**

16
17 **A. Yes. In defining the engineering principles behind CSA design, Bellcore states that:**

18
19 The evolution of the network that can provide digital services using distribution plant
20 facilities has led to the development of the CSA Concept. A CSA is a geographical
21 area that is, or could be served by, a DLC from a single remote terminal site and
22 within which all loops, without conditioning or design, are capable of providing
23 conventional voice-grade message service, digital data service up to 64 kbs, and some
24 2-wire, locally switched voice-grade special services¹ [Footnotes are included as
25 endnotes in Exhibit CHL-1].

1
2 Essentially, Bellcore defined the "forward-looking technology" that serves as the basis for both
3 the HAI and BCPM cost proxy models. At issue is the proper CSA geographic size. That is,
4 what is the furthest distance that a customer should be from the Digital Loop Carrier? Sprint
5 supports 12,000 feet (12 kft). AT&T and MCI, through the HAI model inputs, support 18,000
6 feet (18 kft).

7
8 This issue is important because it has an impact on network cost and the ability of the network
9 to support advanced services. In general, the larger CSA's proposed by AT&T and MCI
10 will result in lower costs, since there are fewer DLC's required. However, that will impede the
11 provision of advanced services because of the longer distances from the DLC to the customer.

12
13 AT&T and MCI support an 18,000 foot CSA based on a single reference to a Bellcore
14 document. In their documentation, AT&T and MCI misrepresent a statement supporting 18,000
15 foot CSAs to be a direct quote from the referenced Bellcore document. The Bellcore reference
16 is clearly taken out of context. It refers to a plant design that requires load coils and is,
17 therefore, clearly not forward-looking nor relevant to this proceeding.

18
19 Furthermore, the quotation has been materially altered from the original source which actually
20 recommends CSA placements beginning at 24,000 feet, not 18,000 feet.

21 Finally, 18,000 foot CSA sizes are inconsistent with industry practice, and other Bellcore and
22 AT&T documentation.

23
24 Q. On page 36 of the HIP, section 2.7.6, AT&T and MCI provide a direct quote from
25 Bellcore document, *BOC Notes on the Network - 1994, p.12-4²* as supporting an 18,000

1 foot maximum distance from the Central Office to the customer. Does this document,
2 in fact, support an 18,000 foot maximum distance?
3

- 4 A. No, it does not. This reference has been taken completely out of context and is actually
5 referring to a network design that is not forward-looking and has no relevance to this
6 proceeding.
7

8 The AT&T/MCI citation refers *only* to the "Revised Resistance Design" (RRD) method of
9 designing local POTS loops, not to CSA design. The RRD method is not a forward-looking
10 design method, as it recommends load coils on pairs that extend between 18,000 feet and
11 24,000 feet from the central office. In its order in the USF Docket, the FCC specifically
12 states that load coils are inconsistent with the required forward looking network design.

13 The order states, "Load coils should not be used because they impede the provision of
14 advanced services."³
15

16 Additionally, in what is represented by AT&T and MCI to be a direct quote from this
17 Bellcore document, the quotation has been materially altered to support their position.
18 AT&T and MCI represent the document as saying, "Loops exceeding 18 kft in length
19 should be implemented using Digital Loop Carrier". In fact, the document reads, "...loops
20 longer than 24 kft should be implemented using Digital Loop Carrier...".

21 Furthermore, AT&T and MCI have made a significant omission. The statement, "...loops
22 18 kft to 24 kft in length (including bridged-tap) should be loaded and have loop resistances
23 less than or equal to 1500 ohms." has been omitted from the middle of the direct quote. The
24 actual paragraph, which does not support 18,000' CSAs reads:
25

1 RRD guidelines recommend that loops 18 kft in length and less, including bridged-
2 tap, should be non-loaded and have a loop resistance of 1300 ohms or less; loops
3 18 kft to 24 kft in length (including bridged tap) should be loaded and have loop
4 resistances less than or equal to 1500 ohms; loops longer than 24 kft should be
5 implemented using Digital Loop Carrier (DLC) as a first choice or by CREG or
6 MLRD as second choices" 4 5

7
8 HAI's incomplete and inaccurate reference to this Bellcore documents clearly provides no
9 support for their position.

10
11 **Q. Does the document *Bellcore Notes on the Network* - referenced by HIP - provide any**
12 **support relative to the use of either 12,000' or 18,000' maximums for Carrier Serving**
13 **Areas?**

14
15 **A. Yes, on the next page, in section 12.1.4 *Bellcore Notes on the Networks*⁶, speaks at length to**
16 **Carrier Service Area Design and to the need for a 12,000' maximum loop to support enhanced**
17 **services. It states:**

18
19 The evolution of the network that can provide digital services using distribution plant
20 facilities has led to the development of the CSA Concept. A CSA is a geographical
21 area that is, or could be served by, a DLC from a single remote terminal site and within
22 which all loops, without conditioning or design, are capable of providing conventional
23 voice-grade message service, digital data service up to 64 kbs, and some 2-wire, locally
24 switched voice-grade special services (see Figure 12-2). *The maximum loop length*
25 *in a CSA is 12 kft for 19-, 22-, or 24-gauge cable and 9 kft for 26-gauge cables.*

1
2 Additionally, Table 7-11 entitled *Loop Design Plans*⁷ (page 7-70) summarizes CSA, RRD and
3 MLRD design plans. In the column for Carrier Serving Area design, it clearly states that the
4 maximum loop length should be 12 kft. The accompanying text⁸ reiterates that the reason for
5 this limit is to facilitate the provision of digital services.

6
7 **Q. Does the document *Bellcore Notes on the Network* - referenced by HIP - provide any**
8 **support relative to the use of either 12,000 feet or 18,000 feet maximums for Customers**
9 **served from a Central Office?**

10
11 **A. Yes. Section 12.1.4 *Bellcore Notes on the Networks* further states that this 12,000' limit is also**
12 **applicable to customers served directly out of the central office.⁹ The Bellcore document reads:**

13
14 The area around the serving central office within a distance of 9kft for 26 gauge
15 cable and 12 kft for 19-, 22-, and 24-gauge cable, although not a CSA, is compatible
16 with the CSA concept in terms of achievable transmission performance and
17 supported services."

18
19 **Q. Are there other published documents supporting an industry standard 12,000' CSA**
20 **design instead of 18,000'?**

21
22 **A. Yes. In AT&T's *Outside Plant Engineering Handbook*, on page 13-1 under the heading**
23 ***Carrier Service Area (CSA) Philosophy* it clearly states that CSAs should be designed based**
24 **on a maximum 12,000' distance from the Customer to the Digital loop carrier. It states:**

1 The boundaries of the CSA are based on [cable] resistance limits of 900
2 ohms for the distribution plant beyond the RT [Remote Terminal]. These
3 limits basically equate to 9,000 feet (2743.2 m) of 26-gauge cable and
4 12,000 feet (3657.6 m) for 19-, 22- or 24-gauge cable including bridged
5 tap.¹⁰

6

7 Also, the same handbook, on page 3-16, under the section headed *Carrier Serving Area (CSA)*
8 *Design*, states:

9

10 To meet the 64 kb/s transmission rate, the secondary system cables
11 [distribution cables] within a CSA must not exceed 9,000 feet (2743 m) in
12 26-gauge (.4 mm) design area and 12,000 feet (3658 m) in a 24/22/19-
13 gauge (0.5/0.6/0.9 mm) area. If there is a concentration of special services
14 in the area these limitations may have to be reduced.¹¹

15

16 **Q. What cable gauge does the HAI model utilize?**

17

18 **A.** AT&T and MCI state that all feeder and distribution cables 400 pairs or larger are assumed
19 to be smaller, less costly 26-gauge cable. As noted above, a predominantly 26 gauge design
20 would further limit CSA size to 9,000 feet. AT&T and MCI need to increase cable costs to
21 reflect 24-gauge or larger cable, or reduce their CSA sizes to 9,000'.

22

23 **Q. Please summarize your testimony regarding CSA size.**

24

1 A. The size of Carrier Serving Areas that are assumed in a forward-looking proxy model
2 materially impact network cost and the ability to support or impede the provision of enhanced
3 services. AT&T and MCI have changed assumptions as needed to produce the lowest cost.

4

5

6 Sprint has proposed the industry standard CSA size of 12,000 feet. This size is supported by
7 Bellcore and AT&T engineering guidelines, and will not impede the delivery of enhanced
8 services.

9

10 AT&T and MCI support a CSA size of 18,000 feet. The only support provided for 18,000
11 foot CSAs is a misquote of a Bellcore document that refers to a loaded loop design, which
12 is by definition, not a forward-looking plant design. The cited Bellcore document, in fact,
13 supports 12,000 foot CSAs, in order not to impede the deployment of advanced services.

14

15 AT&T and MCI's CSA sizes are inconsistent with the cable gauges that they use for the
16 purposes for developing cable prices. These assumptions are mutually exclusive.

17 Finally, the unsupported selection of an 18,000 foot CSA size serves only to artificially reduce
18 the network cost produced by the proxy models and to thereby reduce support.

19

20 II. Structure Sharing - Introduction

21

22 Q. What is "Structure"?

23

24 A. For modeling purposes, "Structure" is considered to be poles, underground conduit and the
25 "hole in the ground" (plowed, backhoed, trenched, etc.) into which a buried cable is placed.

1 "Underground Cable" is cable that is placed in an underground conduit. "Buried Cable" is cable
2 that is placed directly in the ground.

3

4 **Q. What is structure sharing?**

5

6 **A.** Structure Sharing occurs when more than one company shares the use and the cost of a
7 structure, such as attaching to the same pole or sharing a trench.

8

9 **Q. Why is it important to get the correct input values for structure sharing?**

10

11 **A.** Structure cost is one of the largest costs of building the outside plant network. While there are
12 many real opportunities for sharing, there are also many limitations. These may be driven by
13 regulation, physical limitation, the economics of different utility networks, weather, soil
14 conditions and many other factors. Incorrectly evaluating these factors can result in
15 unachievable structure sharing percentages and dramatically different model costs.

16 Structure sharing inputs must be based on sound, factual information that reflects actual
17 conditions. For instance, it is far more economical for a power company to place aerial cable
18 than to place buried, whereas the opposite tends to be true for telephone. It is not unusual for
19 a power company to be 80% aerial in an area, where telephone is 80% buried. It would be
20 inappropriate to assume that they would suddenly, perfectly coincide. This is because each is
21 responding to its own economic realities, not because either is making poor network decisions.

22

23 **Q. Have you had the opportunity to review the testimony and structure sharing inputs**
24 **sponsored by Mr. Wells (MCI Telecommunications Corporation) and Mr. Woods**

1 (AT&T Communications of the Southern States and MCI Telecommunications) in
2 this proceeding?

3

4 A. Yes, I have.

5

6 Q. Does Sprint agree with the structure sharing inputs proposed by the AT&T and MCI?

7

8 A. No. A comparison of the structure sharing inputs proposed by Sprint and the HAI sponsors
9 is attached to this testimony as Exhibit CHL-3. In general, AT&T and MCI propose levels of
10 sharing that are significantly higher than those proposed by Sprint. These inputs are not
11 achievable today, or at any point in the future. Use of the AT&T/MCI inputs will result in a
12 significant understatement of the cost of providing universal service to customers in Florida.

13

14 In reviewing the inputs and testimony I have determined that:

15

- 16 1) HAI inputs are unsupported by any data and do not appear to have been validated.
- 17 2) The HAI structure sharing percentages, improperly apply the "rebuilt network
18 principle" by unrealistically assuming not only a complete reconstruction of the
19 telephone network, but also of every other power, CATV, water, gas and sewer
20 company's infrastructure.
- 21 3) The HAI modelers do not correctly apply the underlying assumptions that they
22 describe in the HAI Inputs Portfolio and Model Description.
- 23 4) AT&T and MCI recognize that there is additional cost incurred in order to share a
24 pole, but fail to add the additional cost when sharing underground conduit and buried
25 cable.

1 5) The HAI model inputs fail to properly recognize the safety code issues.

2 6) The HAI model inputs inaccurately portray the economics of sharing.

3
4 These input values have too significant an impact on model outcomes to use unsupported
5 numbers.

6
7 **Q. AT&T's response to a Sprint data request¹² (see Exhibit CHL-4) demonstrates that**
8 **AT&T and MCI believe that power and telephone will share virtually 100% of all**
9 **telephone network structure. Is there any basis provided for this conclusion?**

10
11 **A. No. This is simply not a reasonable assumption. It is not supported with any facts and is 180°**
12 **out of sync with experience. It is in direct conflict the AT&T and MCI's HIP which states that**
13 **power cannot share feeder to the extent that it shares distribution¹³. Power company networks**
14 **are predominately aerial while telephone networks are predominately buried.**

15
16
17 In order to accept this assumption, one must believe that for every single inch of plant in the
18 network, if telephone is aerial, power will be aerial. For every inch of plant in the network, if
19 telephone is buried, power will be buried. For every foot of telephone feeder conduit, power
20 will abandon their existing facilities and choose to bury cable.

21 The reality of the situation is this; the economics of power and telephone networks are different.
22 It is far more expensive for a power company to bury a cable than it is for them to place aerial
23 wire. This because of the far more expensive buried conductors, deeper trench required, and
24 more expensive transformers, etc. that must be used. In contrast, because the cost varies less
25 and there are significant maintenance savings, Sprint finds burying cable to be the far more

1 economical alternative. Each provider is going to make network decisions that are in their own
2 economic interests.

3
4 The net result is that Florida Power Corporation is 81%¹⁴ aerial while Sprint is 78% buried.
5 Sprint is 17% underground and Florida power has no underground facilities. Structure sharing
6 does not overcome the economics driving this mix and it is not expected to change significantly
7 in the future.

8
9 **Q. Do AT&T and MCI follow the model assumptions for structure sharing that they**
10 **describe in their Hatfield model documentation?**

11
12 **A. No. The HIP states that, due to technical constraints, power and telephone cannot share a**
13 **feeder trench to the same degree that they can share a distribution trench. The HIP reads:**

14
15 In addition, LEC shares of buried feeder structure are larger than buried
16 distribution structure shares because a LEC's ability to share buried feeder
17 structure with power companies is less over the relatively longer routes that
18 differentiate feeder runs from distribution runs. This is because power companies
19 generally do not share trenches with telephone facilities over distances exceeding
20 2500 ft.¹⁵

21
22 However, in the model, AT&T and MCI actually assume that the telephone company will share
23 a trench with power 100% of the time in both feeder and distribution, even though their
24 documentation states that this is not technically possible.

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Sprint Exhibit CHL-4, provided by AT&T in response to a Sprint data request, clearly demonstrates that for buried trenches, AT&T and MCI assume:

- 1. 100% of Distribution trenches are occupied by telephone, power and 1 "other"
- 2. 60% of Feeder trenches are shared by telephone, power and one "other"
- 3. The remaining 40% of feeder trenches are shared by telephone and power.

AT&T and MCI have not followed their model assumptions.

Q. Has AT&T published other recommendations for joint trenching with power?

A. Yes. AT&T has stated, "Joint trenching with power facilities should be employed only for distribution cables and service wires, not for feeder or trunk cables."¹⁴ AT&T now apparently recommends that *all* feeder be placed with power.

Q. Are AT&T and MCI's below ground structure sharing percentage based on a reasonable assumption relative to the "rebuilt network standard?"

A. No. AT&T and MCI's below ground feeder sharing inputs assume that, not only is the entire telephone network being reconstructed, but evidently the entire power, cable, water, gas and sewer infrastructure as well. To accept these inputs, one must be willing to believe that there are 1 to 2 other companies with a need to build a network at the same time and in the same place, for every single foot of Sprint's Florida network. AT&T and MCI have stretched the rebuilt network standard to the point of absurdity.

1 AT&T's overlay of the fictitious assumption that the entire United States utility infrastructure
2 are being reconstructed simultaneously reduces the proxy model approach to pure fantasy.
3

4 **Q. Are the AT&T and MCI structure sharing inputs achievable today?**

5
6 **A.** MCI's witness, Mr. Wells, does not believe so. In previous testimony¹⁷, Mr. Wells stated that,
7 to his knowledge, no local exchange company (incumbent or new entrant) has been able to
8 achieve a sharing factor of the magnitude that AT&T and MCI support. Mr. Wells
9 acknowledged that the two most likely candidates for sharing support structure with a LEC,
10 the electric and CATV companies, already have networks in place, and presumably have no
11 interest in sharing the cost of the support structures necessary to reconstruct the telephone
12 network.¹⁸ Finally, Mr. Wells admitted that the sharing fraction proposed by AT&T and MCI
13 has not been achieved today, and cannot be achieved today.
14

15
16 Sprint, as well, believes that the AT&T and MCI structure sharing inputs are not achievable
17 today, nor in the foreseeable future.
18

19 **Q. What empirical evidence do AT&T and MCI provide to support the HAI structure**
20 **sharing inputs?**

21
22 **A.** In response to a Sprint Data Request¹⁹ regarding support for aerial feeder and distribution
23 structure percentages, AT&T responded:
24

1 The HAI Model Default input values for aerial feeder and distribution structure
2 percent assigned to the telephone company are based on the expert opinion of a
3 team of engineers with extensive experience. Questionnaires were not sent to
4 vendors, contractors, nor to any other party to determine the default input values
5 for aerial feeder and distribution structure assigned to the telephone company.

6
7 When asked²⁰ to provide copies of structure sharing contracts that were used as a basis for
8 developing structure sharing inputs, AT&T responded:

9
10 A specific contract or contracts were not explicitly sourced in deriving the
11 structure sharing default values in the HAI model.

12
13 AT&T and MCI provide no empirical evidence to support the HAI structure sharing inputs.
14 Instead, AT&T and MCI rely upon opinion. These inputs have a significant impact on total
15 cost. Development of these costs cannot be based solely on unvalidated opinion.

16
17 In the HIP²¹, AT&T and MCI refer to the current structure sharing percentages in New York
18 City's, Nynex owned Empire City Subway as supporting underground sharing percentages,
19 even stating that "...well over 30 telecommunications providers" now occupy Nynex ducts.
20 However, when asked to provide documentation in support of this assertion²², AT&T
21 responded, "...that information would undoubtedly be considered proprietary by Bell Atlantic,
22 and is not available to AT&T and its consultants." [emphasis added by Sprint]

23
24 Furthermore, the Empire City Subway support is actually irrelevant to this proceeding. The
25 cited example represents leasing or renting of duct space from an ILEC. The HIP (Appendix

1 B page 152) specifically – and correctly - states that the Hatfield Model does not assume leased
2 conduit to be “shared” for modeling purposes. Since both BCPM and HAI cost out only the
3 actual conduit used by the LEC, and not the cost of the additional, leased conduit, the cost of
4 the additional conduit cannot be “shared away”.

5
6 **Q. Is Mr. Wells familiar with how the structure sharing inputs were developed?**

7
8 **A. No.** On page 24 of his testimony, beginning on line 22, Mr Wells states, “The HAI Model
9 OSP Team has done a more thorough job than any other model proponent in documenting
10 assumptions and validating input values...”

11
12 However, in the North Carolina USF proceeding, Mr. Wells stated that these inputs were
13 developed before he joined the HAI Model Outside Plant Engineering Team²³; that he had no
14 knowledge of: who proposed this group of inputs, the extent to which the inputs were
15 discussed, or any information as to how they were developed.²⁴ Mr. Wells indicated that he was
16 unaware of any documentation that reflects this process²⁵ and was sure that if any
17 documentation existed, he had not seen it.²⁶

18
19 **Q. Has AT&T demonstrated that it has done anything at all to validate these critical**
20 **structure sharing inputs?**

21
22 **A. No.** On page 24, line 21 of his direct testimony, MCI witness, Mr Wells states that, “...there
23 are many ways to validate expert opinion”. Based on his direct testimony and AT&T
24 responses to data requests, AT&T has not used any of these “many ways” to validate the
25 opinions of the HAI engineering team.

1

2 **Structure Sharing – Buried Cable**

3

4 **Q. Is there any direct correlation between structure sharing percentages that can be attained**
5 **on aerial pole lines and the percentages that can be attained for buried facilities?**

6 **A. Clearly not. As a practical matter, one would normally expect to see higher sharing of poles**
7 **than of trenches. A pole line will be in place and accessible to all parties for as long as it exists.**

8 **A trench can only be used within a short window of days that it remains open. Therefore**
9 **sharing only occurs to the extent another company has a need to build facilities along that same**
10 **identical route at the same identical time. This is not at all comparable to an asset that is**
11 **available and accessible for sharing at any time over many years.**

12

13 **Q. Do HAI inputs supported by AT&T and MCI for Buried and Underground Structure**
14 **costs include the additional costs that would be incurred in order to "share" the**
15 **structure.**

16 **A. No. They include the additional cost for poles, but not for buried or underground structure.**

17

18 **The HAI national default inputs assume that a 40' pole is used at every pole location. If a pole**
19 **was placed solely for a single telephone company's use, it is likely that a 25' or 30' pole would**
20 **be adequate. So, in the case of "Pole Structure", the model clearly recognizes the need to add**
21 **the higher cost of "shared" structure –in this case a larger pole - before reducing this higher cost**
22 **by the structure sharing percentage for poles.**

23

24 **However, in the case of underground conduit or buried cable, the cost of the structure is not**
25 **increased to reflect this additional cost before applying the sharing percentage. In order to**

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share a trench with power, Sprint must pay a higher cost of trenching due to deeper and/or wider trenches, additional back filling and material handling.

Nowhere in the HAI national default input documentation is it demonstrated that these increased costs are considered. As such, AT&T's inputs for underground construction costs are clearly conceptually inconsistent pole sharing assumptions and further understated when used in conjunction with their unrealistically high assumptions for structure sharing.

Q. Do AT&T and MCI fail to consider construction codes that must be followed when placing cables?

A. Yes. National Electrical Safety Code® (NESC) specifies rules for placing buried power and communications cables. The (NESC) is a technical publication of the Institute of Electrical and Electronics Engineers, Inc. (commonly known as the IEEE). It established rules for the purpose of "...the practical safeguarding of persons during the installation, operation or maintenance of electric supply and communications lines and associated equipment. These rules contain the basic provisions that are considered necessary for the safety of the employees and the general public *under specified conditions* [emphasis added by Sprint]."²⁷

The current edition of the code is NESC C2-1997. It contains 256 pages of technical specifications, most of which is specific to particular situations or conditions. When referencing the code, it is always necessary to understand the specific context of a citation as well to read the entire relevant sections.

1 Q. Do Sprint construction practices conform to the NESC rules?

2

3 A. Yes.

4

5 Q. Does the NESC prescribe rules regarding the placement of buried communications cable
6 and buried power lines?

7

8 A. Yes. The NESC has clearly defined rules that require vertical and horizontal separation of
9 communications cable and power lines. This means that communications and power cables
10 cannot be simply thrown into the same trench and covered in one operation – at no additional
11 cost – as modeled by AT&T and MCI.

12

13 It requires physical separation for the electrical protection of workers and the public. It is
14 intended to ensure that each company can access their cable for maintenance without
15 causing damage and service interruptions to other companies' facilities and customers. The
16 code does allow exceptions to these rules with additional requirements of the power
17 company. They also require the agreement of *all* involved parties. Placing power and
18 telephone cables directly together in the same trench is commonly called, "random lay".

19

20 Placing buried power and communications facilities together without any physical separation
21 is hazardous to workers and the public and does not provide adequate space to maintain each
22 companies facilities. Sprint's workers are not trained, licensed nor equipped to work in the
23 immediate proximity of high voltage power lines. Furthermore, Sprint's customers would
24 not be tolerant of the delays in service restoration time that would result from having to wait

1 for the power company to show up to move and de-energize the power cable before Sprint
2 could begin service restoration.

3
4 The NESC requires the agreement of all parties before allowing exceptions to the
5 separations rules. If a power company, CATV company or communications provider does
6 not want to put their facilities at risk by placing them all together, they can effectively
7 prevent Sprint from doing so. Clearly, Sprint is not the sole decision-maker on matters of
8 joint, buried construction. There are no power companies in Florida that have agreed to
9 allow Sprint to use "random lay".

10
11 **Q. Why don't power companies agree to do random lay?**

12
13 **A.** Power companies don't agree to do "random lay" because *they* have nothing to gain and much
14 to lose.

15
16 There is no upside: The power company will receive essentially the same structure sharing
17 dollars whether the telephone company places their facility in the bottom of the trench with
18 the power cable or throws in 12" of dirt and then places their telephone cable.

19
20 There is a lot of downside: "Random Lay" requires the power company to spend more
21 money for hardware and labor cost to meet NESC bonding and grounding requirements and
22 requires additional coordination. The power company's exposure to increased future
23 maintenance cost goes up dramatically as does its exposure to potential liability problems.

24

1 Power companies have a vested interest in maintaining code-required separation. They act
2 reasonably and in their own self-interest when they refuse to do "random lay". Telephone
3 companies cannot force a power company to agree to do random lay.

4

5 **Q. What are the NESC rules relative to placing buried power and communications cable?**

6

7 **A. The NESC rules for buried cable are defined in section 35. Beginning on Page 186, the relevant**
8 **rules are the following:**

9

10 **Rule 351A1:** Cables should be located so as to be subject to the least
11 disturbance practical. Cables to be installed parallel to other subsurface
12 structures should not be located directly over or under other subsurface
13 structures, but if this is not practical, the rules of separations in Rule 352 should
14 be followed.

15

16 **Rule 351A3:** Cables are to be routed so as to allow safe access for construction,
17 inspection and maintenance.

18

19 **Rule 352A:** Horizontal separation. The horizontal separation between direct-
20 buried and other underground structures should be not less than 300mm (12 in)
21 to permit access to and maintenance of either facility without damage to the
22 other. Installations with less than 300mm (12 in) horizontal separation, shall
23 conform with the requirements of Rule 352C, Rule 354 or both.

24

1 **Rule 352B4: Crossings.** Adequate vertical separation shall be maintained to
2 permit access to and maintenance of either facility without damage to the other.
3 A vertical separation of 300mm (12 in) is, in general, considered adequate, but
4 the parties involved may agree to a lesser separation.

5
6 **Rule 352C: Parallel Facilities.** When conditions require a cable system to be
7 installed with less than 300mm (12 in) of horizontal separation, or directly over
8 and parallel to another underground structure (or another underground structure
9 installed directly over and parallel to a cable), it may be done providing all parties
10 are in agreement as to the method. Adequate vertical separation shall be
11 maintained to permit access to and maintenance of either facility without damage
12 to the other.

13
14 **Rule 354D: Supply cables** ["supply" refers to power cables] and
15 communications cables or conductors may be buried together at the same depth
16 with no deliberate separation between facilities, provided all parties involved are
17 in agreement and the applicable rules in 354D1 are met and either Rule 354D2 or
18 354D3 is met. (Note: These rules reference additional bonding, grounding and
19 protection requirements.)

20
21 **Q. Do these rules apply to fiber optic cables as well?**

22

23 **A. Yes.** Fiber optic cable can be purchased with a shield and central strength member that is
24 made of a metal material or made of non-metallic material such as Kevlar®. (The "shield"
25 surrounds the bundles of glass fibers and provides mechanical protection, the central

1 strength member makes the cable more rigid and allows it to be pulled without damaging the
2 fibers). The HIP²⁸ suggests that fiber optic cables without metallic components would be
3 exempt from NESC buried cable separation requirements. This statement demonstrates a
4 lack of understanding of network operations, and a misunderstanding of the purposes of the
5 NESC buried cable separation rules.

6
7 Telephone companies generally do not bury fiber optic cables that do not have metallic
8 components. Without a metallic component, the cable can not be easily located or identified.
9 The fiber optic cables are the backbone, the high traffic carriers of the network. A
10 Bellcore summary of all major service outages reported to the FCC for the year ending June
11 30, 1997, found that fully 79% were caused by fiber cuts. Companies must clearly be able
12 to locate their fiber cables in order to keep the network healthy and functioning.

13
14 Secondly, the intent of the separation rule is not just to provide electrical isolation, but it is
15 to permit access to and maintenance of either facility without damage to the other. (NESC
16 352A, 352C) It's hard to imagine a more certain guarantee of a service outage than a fiber
17 cable that can't be located, lying right beside someone else's cables.

18
19 **Q. In Florida, do developers provide free trenches and place telephone cables at no cost to**
20 **the telephone company?**

21
22 **A. In the HIP²⁹, AT&T and MCI state that in new subdivisions, builders, "...usually dig**
23 **trenches at their own expense, and place power, telephone and CATV cables in the**
24 **trenches, if the utilities are willing to supply the materials. Thus, many buried structures are**
25 **available to the LEC at no charge."**

1
 2 There is no requirement in Florida that builders in new subdivisions provide a trench at no cost
 3 to the telephone company. Developers in Florida will not do Sprint's network construction
 4 at no cost to Sprint.

5
 6 **Structure Sharing - Underground Conduit**

7
 8 **Q. Do you agree with AT&T and MCI that Sprint should be able to recover one-half to**
 9 **two-thirds of the cost of Underground conduit trenching cost?**

10
 11 **A. No.** As previously noted, Sprint and AT&T/MCI agree that leasing of individual ducts is
 12 not appropriately considered "structure sharing" for modeling purposes.³⁰ This leaves
 13 sharing the cost of the "hole in the ground" for the conduit system as the only opportunity
 14 to share cost.

15
 16 AT&T and MCI suggest that LEC's can readily share the costs of constructing conduit,
 17 "...with other telecommunications companies, cable companies, electric, gas or water utilities,
 18 particularly when new construction is involved."³¹ However, there is actually almost no
 19 opportunity for sharing of the magnitude AT&T and MCI suggest.

20
 21 1) It requires that another company needs to build the same route at the same time.

22
 23 In order to achieve the AT&T and MCI sharing percentages one must assume that there will
 24 be 1 or 2 other companies that need to build in the exact same location at the exact same

1 time - 100% of the time. This is, frankly, an utterly absurd assumption that is completely
2 without any basis in experience or fact.

3
4 2) It is more economical to lease space than to share structure cost.

5
6
7 A telecommunications provider or CATV provider has two options when deciding to place
8 additional plant along a new telephone company conduit run. They can either lease a conduit
9 from the ILEC or they can pay 50% of the cost of the trench. AT&T and MCI correctly point
10 out in the HIP³² that the Telecommunications Act *requires* non-discriminatory access to ILEC
11 structures at *Economic* prices.

12
13 The economic cost of leasing one duct will clearly be a fraction of the cost of paying for 50%
14 of the trench. For example, in a 12 conduit system, the economic cost would be about 1/12th
15 of the conduit system cost. No reasonable provider will ever opt to share the cost of the trench
16 when they can lease a duct.

17
18 This is evidenced by the HIP indication that "...well over 30 telecommunications occupy
19 conduits owned by Empire City Subway in New York. AT&T and MCI further acknowledge
20 this saying, "...use of existing conduits is a much more economical alternative than excavating
21 established street and other paved areas³³"

22 3) Code standards make sharing conduit structure uneconomical and unattractive.

23
24 As a practical matter, other utilities do not seek to build next to Telephone Company conduit
25 systems as is implied by the AT&T and MCI structure sharing percentages. In fact, they

1 deliberately avoid placing their facilities in close proximity to a telephone company conduit
2 system because of the tremendous liability associated with potential damage.

3
4 Additionally, the National Electrical Safety Code (NESC) significantly restricts the construction
5 of other sub-surface structures near underground conduit systems.

6
7 Specifically, the NESC states that Conduit systems extending parallel to other sub-surface
8 structures should not be located directly over or under other sub-surface structures.³⁴

9 Where this is not practical, rules for physical separation are provided. In general these rules
10 state that separation between a conduit system and other underground structures paralleling
11 it should be large enough to permit maintenance of the system without damage to the
12 paralleling structure.³⁵ Specifically, conduits occupied by power must be separated by 3" of
13 concrete, 4" of masonry, or 12" of earth.³⁶ The NESC requires that water mains be located
14 as far away as practical to protect the conduit from being undermined if the water main
15 breaks.³⁷ Conduit should have sufficient separation from fuel lines to allow the use of pipe
16 maintenance equipment.³⁸

17
18 In actual practice, this means that a conduit system might be built in proximity to an *existing*
19 utility line, but when building two new facilities, one would never build by placing another
20 utility's line directly above or below a conduit system. It means that, the two new facilities
21 would actually be placed side by side, with a minimum of 12" to 24" separation to allow each
22 company access to maintain their facilities. There is no cost savings to this approach.

23
24 4) Sharing increases overall cost.

25

1 Finally, AT&T and MCI assume that – in the unlikely event that someone is willing to share
2 50% of the cost of the excavation – the overall cost does not go up! Clearly, if another
3 utility is to share the trench, it must be either deeper or wider, at additional cost. This cost
4 must be added to the total cost before the sharing percentage is applied. HAI includes
5 these additional sharing costs for poles, but ignores them for underground conduit and
6 buried cable.

7
8 Additionally, a conduit system requires a large excavation, 24"- 36" wide and 36"-60" or
9 more deep. Clearly, another conduit system could not occupy this same space, so the only
10 facility that might possibly share the trench would be a buried power cable or
11 communications cable. Such a cable would require an excavation only 3" wide and 24"-
12 30" deep. AT&T and MCI provided an analysis of pole sharing cost in which they
13 conclude that the companies share cost based on the relative amount of space they occupy.³⁹

14 However, when determining the sharing of costs for conduit trenches, they assume that the
15 company that takes 3" of the space will be willing to split the cost 50/50 with the company
16 that requires 24" of space. AT&T Practice 917-356-100, page 15, provides a detailed
17 description of the calculations to be used to fairly apportion the cost of a jointly used trench
18 between the occupants. The method apportions cost based on actual usage, not on equal
19 shares to all occupants as the HAI model does.

20
21 The effect of AT&T and MCI's inconsistent approach is to always share away the greatest
22 percentage of the cost.

23
24 **Q. Are Sprint and the HAI sponsors in agreement that commercial electrical power lines**
25 **are not candidates for sharing of ducts conduit systems?**

1

2 A. Yes. AT&T and MCI indicate that for safety reasons, telephone company conduits cannot
3 be shared with power lines.⁴⁹

4

5 Q. In light of these obstacles and practical realities, does the assumption by AT&T and
6 MCI that a telephone company can share away one half to two thirds of the cost of the
7 trench for every foot of underground conduit systems, seem in anyway credible or
8 achievable?

9

10 A. No, absolutely not. The FCC's requirement that telephone companies lease conduit on a non-
11 discriminatory basis to CLECs, *at economic cost*, makes leasing space more attractive for
12 telecommunications providers and CATV companies than offering to share in the cost of the
13 trench. Sprint and the HAI supporters agree that leasing is not relevant to the modeling of
14 structure sharing.

15

16 The NESC allows conduit to be placed in close proximity to other underground structures on
17 such a limited basis, that it is fanciful to assume that this will happen 100% of the time.

18

19 AT&T and MCI fail to acknowledge the obvious fact that the trench must be wider or deeper
20 to accommodate another company in the trench with a conduit. They fail to increase the cost
21 accordingly before they apply their sharing fraction, although they clearly recognize the need
22 to include the additional costs for poles.

23

24 Finally, AT&T and MCI assume that occupants of a pole will share on a pro rata basis based
25 on the space that they use. However, for underground conduit they assume that the cost

1 shared on an equal basis, regardless of the space that is used. It is unrealistic to think that
2 this would be true. In fact AT&T documentation provides a formula for calculating pro-rata
3 sharing of trench costs.

4

5 Structure Sharing – Aerial Cable

6

7 **Q. Sprint and HAI inputs for pole sharing are relatively close. Does this mean that Sprint**
8 **is in agreement with the assumptions used by HAI in their development?**

9

10 **A. No.** Sprint's structure sharing input for poles is simply a modeling issue. Both BCPM and HAI
11 model the pole line by assuming 100% joint use poles large enough to accommodate multiple
12 providers. Since Sprint would rarely need to use this large a pole for our sole use, Sprint must
13 logically share away a large portion of the cost to get a reasonable structure cost out of the
14 model. The pole sharing factor, a factor derived to accommodate model constraints, cannot be
15 compared to actual feeder structure sharing percentages.

16

17 **Q. Does HAI inappropriately share the cost of anchors and guys?**

18

19 **A. Yes.** In the HIP⁴¹, AT&T and MCI indicate that the costs for anchors and guys material and
20 labor are included in the HAI labor costs for placing poles. As such, this cost would be
21 shared along with the cost of the pole when the structure sharing percentage is applied.

22

23 Anchors and guys are designed only to support the telephone facilities on one cable strand.

24 As such, 100% of their cost should be allocated to the telephone company. HAI

1 inappropriately assigns as little as 25% of the anchor and guy cost to the telephone company.

2

3

4 **III. Plant Mix Inputs**

5

6 **Q. Have you had the opportunity to review the HAI Model Description and HAI Inputs**
7 **Portfolio (HIP) filed by Mr. Don Wood and Mr. James Wells relative the selection of**
8 **aerial, buried or underground cable – generally referred to as plant mix?**

9

10 **A. Yes.**

11

12 **Q. Does Sprint have any concerns regarding the Plant Mix inputs that are proposed by**
13 **AT&T and MCI in the HAI Model inputs?**

14

15 **A. Yes. AT&T and MCI have proposed national default values instead of Florida specific input**
16 **values for Plant Mix. Because the AT&T and MCI national defaults are not Florida specific they**
17 **are not appropriate for use in this proceeding.**

18

19 National default values are simply not representative of the particular conditions that exist in
20 Sprint's Florida exchanges. In particular, the ease of burying cable in Florida's soil and the
21 obvious need to significantly storm-proof Sprint's network causes Sprint to place large amounts
22 of buried cable.

23

24 In contrast to AT&T and MCI's national defaults, Sprint has used actual Florida plant mix data
25 as the source of the Plant Mix input.

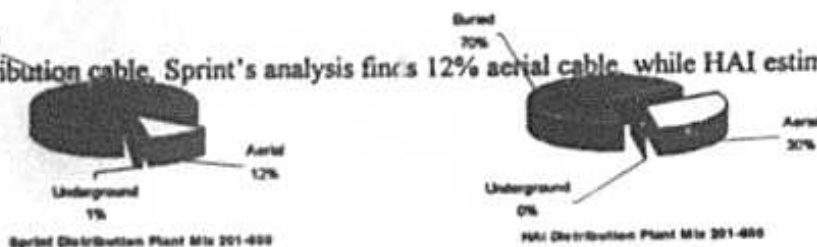
1
2 In comparing Sprint's actual Florida data with AT&T and MCI's national default data, we find
3 that the AT&T and MCI national defaults are heavily skewed toward aerial cable which may
4 have a lower initial cost. In fact, the HAI model itself reflects a bias toward aerial cable. While
5 it contains an algorithm that will place buried cable instead of aerial in certain conditions, it will
6 not do the opposite when long term costs for buried are lower than aerial.

7
8 The maintenance costs for aerial cable and poles is significantly higher than the maintenance
9 costs for buried cable. These maintenance costs, along with customer service levels and
10 protection of the network must be considered in selecting aerial or buried cable.

11
12 Q. In general, how do the results of the Sprint analysis compare to the HAI's national default
13 inputs?

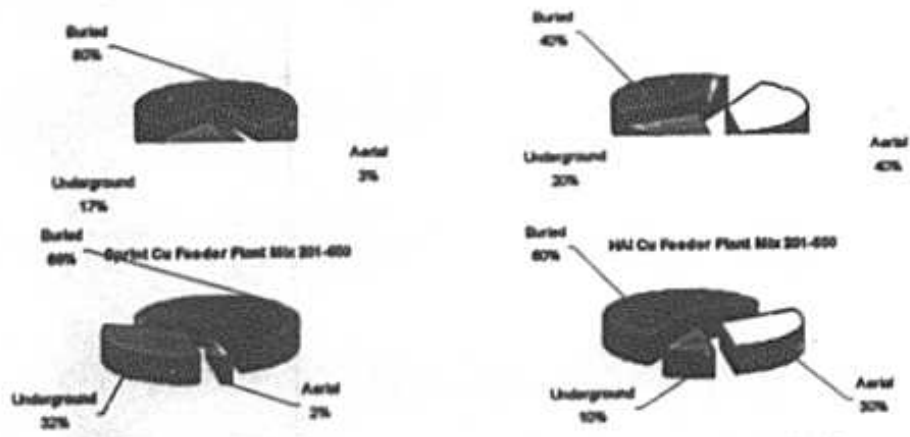
14
15 A. In general, the HAI national default inputs tend to assume significantly more aerial cable than
16 Sprint's analysis shows is actually the case. For example, looking at the 201-650 Density zone -
17 which contains the largest number of Sprint customers - for distribution cable, Sprints analysis
18 finds the following differences:

19
20 For distribution cable, Sprint's analysis finds 12% aerial cable, while HAI estimates 30%.



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For Cop, r Feeder cable, Sprint's analysis finds 3% aerial cable, while HAI estimates 40%.



For Fiber Feeder cable, Sprint's analysis finds 2.0% aerial, while HAI estimates 30%.

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A complete comparison is included in my testimony as attachment CHL-2.

Q. What is the impact of this inappropriate bias for placing aerial over buried cable?

A. The HAI model, with the national default inputs, will understate the cost of the telephone network in Florida, and the level of support that is required to support Florida's high cost customers.

Q. What factors does an engineer consider when deciding whether to place aerial, buried or underground cable?

A. The decision to place aerial buried or underground cable is impacted by a multitude of factors. The *AT&T Outside Plant Engineering Handbook* provides a very good discussion of these factors. They include such issues as; Initial cost, Maintenance Cost, Growth Rates, Access to right-of-way, Availability of poles or conduit, Governmental requirements or restrictions, Future reinforcement requirements, condition of existing plant, trees, rock, potential for service

1 disruptions, aesthetics and many other factors.

2
3 As OSP Engineers design Sprint's Florida network, they have to consider all these factors and
4 make the appropriate decisions for every foot of cable that is placed. While no proxy model
5 could hope to develop the same sophistication in decision making that comes from this level of
6 review, a model can approximate the outcome with the correct inputs.

7
8 This is easily done by taking the composite result of this engineering work – the existing plant
9 mix – and applying it to the model. This is exactly what Sprint has done.

10 By using existing plant mix as a guide, Sprint is able to reflect all of the weather, soil, regulatory,
11 service level and other impacts that are specific to Florida and drive an appropriate and efficient
12 Plant Mix for this market.

13
14 **Q. Do AT&T and MCI provide any fact-based support for the Plant Mix inputs used in**
15 **the HAI model?**

16
17 **A. No.** There are no studies, surveys, analysis, statistics, trend analysis, summary of current
18 national plant mix nor any other support provided for national defaults that AT&T and MCI
19 represent as being applicable to the Florida. These are the same national defaults that are used
20 by AT&T and MCI in every market in the U.S., regardless of any regulatory, geographical or
21 weather conditions that may exist.

22
23 **Q. Does HAI's "Shifting Algorithm", which ostensibly changes the plant mix to reflect local**
24 **rock conditions, cause HAI to more accurately portray plant mix?**

25

1 A. No. On Page 6 of his testimony, beginning on line 14, Mr. Wells states that the HAI model,
2 "...automatically adjusts the buried and aerial structure percentages to account for varying
3 maintenance costs and placement costs occasioned by local Florida soil conditions and bedrock."

4 This would seem to suggest that the model could place *more* buried plant than the Buried Plant
5 percentage input, if total long run costs were lower. However, HAI does not do this.

6

7

8 The HAI model *will* shift from buried cable to aerial cable. But regardless of the long run costs,
9 it will never place more buried cable than the buried cable percentage input. Therefor, HAI does
10 not adequately adjust the default inputs to reflect local conditions. In fact, even in some CBG's
11 in Florida without any rock, HAI inexplicably shifts the plant mix from buried to aerial.

12 Sprint performed a sensitivity analysis in which we reduced buried structure cost to "\$0". One
13 would think that this would result in a significant shift of the plant mix toward this very
14 expensive option. In fact, changing the cost to bury cable to "\$0" caused the model to place
15 only .4% ($4/10^{\text{th}}$ of one percent) more buried cable. (HAI reduced the amount that it had already
16 shifted from buried to aerial.)

17

18 Q. Is the HAI Model, with national default inputs, able to recognize the need for, and plan
19 a network that will withstand the extreme weather conditions that are encountered in
20 Florida?

21

22 A. No. With one national set of inputs, AT&T and MCI's HAI model will build the exact same
23 network regardless of the incidence of hurricanes, and the subsequent need to storm-proof the
24 telephone network.

25

1 **Other Issues**

2

3 **Q. Have you had the opportunity to review the HAI documentation regarding the use of**
4 **Copper T1 carrier to serve remote clusters instead of fiber optic cable and DLCs?**

5 **A. Yes, I have.**

6 **Q. Does Sprint have any concerns about the validity of this approach to serving remote**
7 **customers?**

8

9 **A. Yes.** USF models are supposed to identify the costs of serving high cost customers. When these
10 high cost customers are encountered in the HAI model, AT&T and MCI change the rules to
11 artificially generate an unrealistically low cost. AT&T and MCI selectively apply different
12 modeling standards for "forward-looking technology", "least-cost" and "provisioning of
13 advanced services". Under the AT&T and MCI approach, rural customers will not be afforded
14 the same quality and access to advanced services.

15

16 This clearly distorts the intent of this effort. Sprint has these specific concerns:

17

18 *1) Copper T1 Carrier is not forward-looking technology.*

19

20 T1 Carrier running on copper cable pairs and Fiber Optic cable are both technologies that can
21 be used to connect Digital Loop Carriers to host central offices. T1 carrier technology is over
22 25 year old. It is very high cost to maintain and has inherently limited bandwidth. Sprint has
23 not placed new T1 carrier routes for many years.

24

25 In the HAI Model Description's discussion of options for feeder technology⁴³ there is no

1 mention of Copper T1 Carrier being considered as an alternative feeder technology. Only
2 fiber optics and regular copper pairs are considered, even though T1 is technically a
3 completely viable alternative. Apparently T1 carrier over copper pairs is not considered to
4 be forward-looking technology, so it is not considered as an option.

5
6 In the HIP⁴⁴ discussion of potential wireless alternatives to copper distribution, AT&T and
7 MCI indicate that HAI assumes fiber optic feeder to the remote radio sites. T1 carrier
8 would certainly work in this application. But again, apparently T1 carrier over copper cable
9 pairs is not considered to be forward-looking technology, so it is not considered to be an
10 option.

11
12 So how can T1 carrier over copper pairs suddenly become forward-looking technology? Are
13 governments, schools and businesses clambering for "copper"? No, they want fiber. Are long
14 distance companies wooing customers with television commercials touting their modern "all
15 copper" networks?

16
17 Copper T1 is not forward-looking technology in any application.

18
19 *2) Copper T1 is not "Least-cost" technology.*

20
21 The migration from copper to fiber is driven by fiber's inherently lower long-term cost. Copper
22 T1 is very expensive to own and operate. Instead of only two active electronic components,
23 as in a fiber optic network, it also has electronic repeaters every 3,000'. It is susceptible to
24 electrical interference, it has no remote provisioning, remote maintenance or other OAM&P

1 capability. It requires technicians on site, to complete virtually all maintenance and
2 management functions.

3 AT&T and MCI apply the same percentage of maintenance cost to T1 over copper as they apply
4 to NGDLCs that have almost 100% remote administration capability.

5

6 *3) Copper based T1 carrier will not support advanced services.*

7

8 Think of it this way. The total bandwidth available to serve all 24 customers that could be
9 served over a T-1 carrier is 1.544 mb/s. Customers operating out of NGDLCs can receive
10 1.544Mb/s each, and more.

11

12 *4) The models already cap investment.*

13

14 Both models recognize that there may be future alternative technologies available at lower cost
15 and provide a user adjustable cap on per line investment. There is no need to additionally
16 constrain investment by changing the rules for the level of service that will be provided to rural
17 customers.

18

19 **Q.** Have AT&T and MCI assumed that all loop carrier will be NGDLCs - and that no copper
20 T1 carrier will be placed - when it creates a more favorable cost outcome for them?

21

22 **A.** Yes, they have. When developing Non-Recurring Charges for the installation of services in a
23 forward-looking environment, AT&T and MCI assume that 100% of the digital loop carrier
24 network will be served using Next Generation Digital Loop Carrier (NGDLC), and that there
25 will be no copper based T1 carrier used. NGDLCs have remote provisioning capabilities that

1 allow trips to the carrier site to be avoided when installing new service. Copper based T1's do
2 not have this capability. Changing their network assumption in this instance allows AT&T and
3 MCI to assume a lower cost for service installation and lower non-recurring charges.

4
5 **Q. Do AT&T and MCI understate the material cost of cable by using unreliable means to**
6 **estimate cost rather than simply obtaining price quotes?**

7
8 **A. Yes, rather than simply obtaining price quotes, AT&T and MCI use two different methods to**
9 **estimate the cost of cable, depending on the size of the cable. Both of these methods grossly**
10 **underestimate the cost of cable.**

11
12 For cable from 12 pairs to 400 pairs, AT&T and MCI use the formula: Cable Cost = \$.30 +
13 (Pairs * \$.007). This formula understates the cost of cable for every cable size. For instance,
14 for 400 pair cable, Sprint's actual cost is \$2.75 per foot. The AT&T and MCI formula generates
15 a cost of \$.58, which is only 21% of the actual cost.

16
17 Most importantly, one cannot simply rely on an unvalidated formula. Some "reasonableness
18 test" should be applied to ensure that the formula is producing valid results. The obvious
19 way to do that is to simply obtain the prices. Certainly companies the size of AT&T and
20 MCI would have relationships with manufacturers and distributors that would have allowed
21 them to obtain the actual costs for 17 sizes of cable. AT&T and MCI state that they did, in
22 fact, obtain actual price quotes for 6- and 12-pair cables⁴³. The price quotes did not support
23 the AT&T and MCI formula. So, AT&T and MCI changed the input values. Presumably,
24 AT&T and MCI could have obtained price quotes for the other sizes of cable as well.

1 For cables larger than 400 pairs, AT&T states, "A review of many installed cable costs
2 around the country were used...."⁴⁶ However, when asked by Sprint to produce source
3 documents used in this "review", AT&T responded that none existed and that the values
4 were based solely on expert opinions⁴⁷. AT&T and MCI could certainly have obtained the
5 actual costs of these cables along with the 6- and 12- pairs cables that they claim to have
6 externally validated.

7
8 In summary, rather than use readily obtainable, actual costs, AT&T relies on formulas and
9 "opinion" which grossly understate costs. In the only instance in which they acknowledge
10 attempting to validate cost, the actual numbers proved the formula wrong. Rather than revisiting
11 their assumptions, AT&T and MCI simply change the input values and assume that the remaining
12 values are correct.

13
14 Q. Do AT&T and MCI understate the cost of indoor SAIs?

15
16 A. Yes, the AT&T and MCI costs for Indoor SAIs are significantly underestimated. Furthermore,
17 if one attempts to validate AT&T and MCI's input values by using data provided by AT&T and
18 MCI, one can easily demonstrate that this fact.

19
20 Indoor SAIs are "built" on site. The costs include material and labor for splicing cables, placing
21 terminating blocks (66 Blocks), tying down cables on the terminating blocks, cost for protection,
22 placing protection and splicing protection, as well as placing jumper wires and testing of the
23 installation. Sprint was able to determine the AT&T and MCI model costs for the protection,
24 the cost of the 66 blocks and the jumper running. These items represent a small portion of the
25 total cost of an indoor SAI. When only these few costs are totaled, they exceed the total

1 AT&T and MCI input values for each indoor SAI. The following table demonstrates this
 2 calculation for a 7200 pair SAI. Source data is footnoted. Sprint has used an estimated labor
 3 rate times an AT&T/MCI work time for jumper running.

7200 Pair Indoor SAI	Unit Cost	Quantity	Total
Protection, per pair ⁴⁸	\$2.00	3,100	\$6,200
66 Blocks, bracket and cover ⁴⁹	\$8.00	288	\$296
Place Jumpers ⁵⁰	\$1.34	2,480	\$3,323
Total from Documentation			\$9,819
AT&T and MCI Input			\$9,656

10
 11 Using AT&T component cost data, it is clear that AT&T and MCI have not accounted for
 12 much of the cost of an Indoor SAI.

13
 14 Q. In support of distribution span length inputs, the HIP⁵¹ quotes the book, *Outside Plant,*
 15 *ABCs of the Telephone Series* as stating in part, "...where conditions permit open wire
 16 spans can approach 400 feet in length...". What is "open wire"?

17
 18 A. "Open Wire" refers to individual Iron or Copper alloy wire conductors strung between poles on
 19 glass insulators attached to pins or wooden 10-Pin cross arms. One frequently sees "open wire"
 20 depicted in photos of telecommunications plant from the 1920's and 30's. The green glass

1 insulators may be purchased at antique stores. Sprint does not consider "open wire" to be
2 forward-looking technology.

3

4 **Q. Please summarize your testimony.**

5

6 **A. AT&T and MCI have presented National Default inputs in this proceeding that are not**
7 **representative of the costs or realities of providing telephone service in Florida.**

8

9 AT&T and MCI have misquoted, misrepresented and omitted key pieces of technical references
10 in order to make them appear to support their inputs, when in fact the documents do not. This
11 has included support for:

12

13 Carrier Serving Area size

- 14 • Using the longer possible "open wire" spans to support cable span lengths
- 15 • Existing conduit leasing to support sharing of trenches
- 16 • Network capability to support enhanced services

17

18 AT&T and MCI change key model assumptions when doing so allows the model to generate
19 lower universal service costs. Assumptions are changed for:

20

- 21 • Degree to which power can share feeder trenches
- 22 • Whether Copper based T1 is, or is not, forward-looking
- 23 • Whether the network is 100% NGDL or a mix of NGDLC and copper
- 24 • Formulas for calculating cable costs

- 1 • Whether a network must be able to support enhanced services
2 • Plant mix should shift to reflect conditions...except for aerial to buried

3

4 AT&T and MCI rely on opinion and conjecture, and have not provided any empirical support,
5 validation or accurate technical documentation:

6

- 7 • CSA sizes
8 • Copper based T1 carrier
9 • Structure Sharing and Plant Mix
10 • Cable Cost
11 • Ability of network to support advanced services
12 • Florida Costs

13

14 AT&T and MCI ignore factual realities related to:

15

- 16 • National Electrical Safety Code restrictions on structure sharing
17 • 80% of Power network is aerial;
18 • The timing and availability of potential sharing partners
19 • Weather in Florida

20

21 The HAI Model and AT&T and MCI inputs will not accurately estimate the costs that will be
22 incurred to provide universal service to Florida customers.

23 **Q. Does this conclude your rebuttal testimony?**

24

1 A. Yes.

1 MR. REHWINKEL: Mr. Laemmler had four rebuttal
2 exhibits: CHL Rebuttal 1 through 4; would ask that those
3 be identified as a composite exhibit.

4 CHAIRMAN JOHNSON: What was that title again?
5 You said --

6 MR. REHWINKEL: CHL Rebuttal 1 through 4.

7 CHAIRMAN JOHNSON: Composite Exhibit 84.
8 (Composite Exhibit 84 marked for
9 identification.)

10 CHAIRMAN JOHNSON: Want to go ahead and move that
11 in?

12 MR. REHWINKEL: We would ask those be moved into
13 the record.

14 CHAIRMAN JOHNSON: It will be admitted without
15 objection.

16 (Exhibit 84 admitted.)

17 CHAIRMAN JOHNSON: And the witness is excused.

18 I think we're prepared now for the next witness,
19 MCI's witness.

20 MR. HENRY: Madam Chairman, MCI calls James W.
21 Wells. Mr. Wells hasn't been sworn yet.

22 * * *

23 WHEREUPON,

24 JAMES W. WELLS

25 was called as a witness on behalf of MCI and, having been

1 duly sworn, testified as follows:

2 CHAIRMAN JOHNSON: Thank you; you may be seated.

3 DIRECT EXAMINATION

4 BY MR. HENRY:

5 Q Mr. Wells, are you the same James Wells that
6 caused to be filed direct testimony consisting of 25 pages
7 and 4 exhibits on August 3rd, 1998?

8 A Yes.

9 Q And did you also cause to be filed rebuttal
10 testimony consisting of 78 pages and 3 exhibits on
11 September 2nd, 1998?

12 A Yes.

13 Q And did you further cause to be filed on October
14 1, 1998 a revised version of your rebuttal testimony?

15 A Yes, for redaction purposes.

16 Q Okay. Can you tell us what that revision was?

17 A Staff suggested that we had been overzealous in
18 redacting and asked us to in essence unredact some of the
19 redactions. And so that's what that was.

20 Q Okay. Now if I ask you the questions that are in
21 your direct and rebuttal testimony today, would your
22 answers be the same?

23 A Yes.

24 MR. HENRY: Madam Chairman, I would move
25 Mr. Wells' direct and rebuttal testimony into the record.

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CHAIRMAN JOHNSON: It will be so inserted.

002465

BEFORE THE

FLORIDA PUBLIC SERVICE COMMISSION

DIRECT TESTIMONY OF

JAMES W. WELLS, JR.

ON BEHALF OF

MC TELECOMMUNICATIONS CORPORATION

Docket No. 980696-TP

August 3, 1998

1 **I. INTRODUCTION**

2 **Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

3 A. My name is James W. Wells, Jr., and my office address is 5280 Laithbank
4 Lane, Alpharetta, GA 30022

5

6 **Q. BY WHOM AND IN WHAT CAPACITY ARE YOU EMPLOYED?**

7 A. I am the President of J. W. Wells, Inc. Currently, I am providing consulting
8 expertise in Outside Plant (OSP) infrastructure planning, design and
9 construction, including costing aspects of the local loop.

10

11 **Q. ON WHOSE BEHALF ARE YOU TESTIFYING?**

12 A. I am testifying on behalf of MCI Telecommunications Corporation.

13

14

15 **II. PURPOSE**

16 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

17 A. The purpose of my testimony is to describe the engineering and cost aspects
18 of telecommunications Outside Plant (OSP) and explain how they have been
19 incorporated into the modeling methodology and input values of the local
20 loop portion of the HAI Model, formerly known as the Hatfield Model.

1 My testimony is complemented by the testimony of Mr. Don Wood, which
2 addresses the overall HAI Model. There are two attachments to Mr. Wood's
3 testimony, which provide detailed explanations in support of my testimony:

- 4 • The HAI Model Release 5.0a Model Description (MD) and
5 • The HAI Model Release 5.0a Inputs Portfolio (IP).

6
7 **Q. HAVE YOU PROVIDED OTHER TESTIMONY IN THIS**
8 **PROCEEDING?**

9 A. No.

10
11
12 **III. QUALIFICATIONS AND EXPERIENCE**

13 **Q. PLEASE STATE YOUR EDUCATIONAL BACKGROUND AND OSP**
14 **WORK EXPERIENCE.**

15 A. I have Bachelor of Engineering (Electrical Engineering) and Master of
16 Business Administration degrees and certification as a Project Management
17 Professional. I have gained OSP experience in the following assignments
18 with:

- 19 • South Central Bell Telephone Company (now BellSouth) in
20 Birmingham, AL: OSP Construction Foreman - 1 year, OSP
21 Facilities Engineer - 4 years, OSP Planning Engineer - 2 years,
22 • Western Electric and AT&T Network Systems (now Lucent
23 Technologies): Technical Representative for OSP Products - 5

- 1 years and District Manager - OSP Engineering and Construction -
2 5 years,
3 • AT&T Local Infrastructure and Access Management: District
4 Manager OSP Engineering and Construction - 1 year,
5 • AT&T Local Services Division: District Manager Outside Plant
6 Cost Engineering - 1 year, and
7 • J. W. Wells, Inc.: OSP Consultant - 1 month.
8
9

10 **IV. OVERVIEW OF TESTIMONY**

11 **Q. PLEASE PROVIDE AN OVERVIEW OF YOUR TESTIMONY**
12 **REGARDING THE OSP PORTION OF THE HAI MODEL.**

13 **A.** My testimony falls into two basic categories: (1) OSP modeling methodology
14 and (2) OSP input values. In regards to the HAI Model OSP modeling
15 method, my testimony addresses the engineering assumption used to
16 ensure that the local loop network designed by the HAI Model meets OSP
17 requirements and captures all the efficiencies available today to outside plant
18 engineers. In particular, this testimony addresses significant enhancements
19 incorporated into Release 5.0a of the HAI Model (HM 5.0a) and the least-
20 cost, most-efficient loop design standards from the wire center to the
21 customer's premise. My testimony with regard to the HAI Model OSP
22 inputs addresses the costs of an efficient provider of telecommunications
23 services building a network today, as well as the manner in which OSP
24 engineers developed and validated these cost inputs.
25

1 Q. HOW HAVE THE OSP MODEL ASSUMPTIONS AND OSP INPUT
2 VALUES TO THE HAI MODEL BEEN DETERMINED?

3 A. A team of experienced OSP Engineers utilized their collective expertise in
4 determining the OSP assumptions and input values to the HAI Model. This
5 HAI Model OSP Engineering Team, of which I am a member, has over 187
6 years of OSP experience with Incumbent Local Exchange Carriers (ILECs).
7 A summary of our qualifications and experience is detailed in Exhibit ____
8 (JWW-1) attached hereto.

9
10 The OSP Engineering Team reviews the HAI Model based on information
11 gathered, feedback from various sources and our own experiences as
12 witnesses in support of the model. Our recommendations are passed to the
13 HAI Model's sponsors and developers for implementation in subsequent
14 releases. As a member of this team, I support each of the OSP modeling
15 methodology assumptions and input values to the HAI Model.

16
17 Q. HOW DOES AN OUTSIDE PLANT ENGINEER GAIN
18 KNOWLEDGE AND EXPERIENCE REGARDING THE DESIGN
19 AND COSTS OF OUTSIDE PLANT?

20 A. The job of outside plant engineers is to design local loop networks and
21 estimate their cost for approval within generally accepted outside plant
22 engineering methods and procedures. In addition to this acquired
23 fundamental level of OSP knowledge, the members of the HAI Model OSP
24 Engineering Team have also developed a wealth of additional experience in
25 areas such as planning, procurement, operations review, methods and

1 procedures, and management of all aspects of OSP. Application of this
2 experience is critical to determine the efficiencies available today to a local
3 telecommunications provider, and is what separates a true least-cost, most-
4 efficient model from an "embedded" cost proxy model that reflects outdated,
5 inefficient ways of doing business.

6
7
8 **V. OSP MODELING METHODOLOGY**

9 **Q. HOW HAS THE OSP ENGINEERING TEAM PARTICIPATED IN**
10 **THE DEVELOPMENT OF THE OSP MODELING**
11 **METHODOLOGY?**

12 **A.** OSP modeling entails the determination of the most appropriate methods for
13 planning and designing the local loop and conversion of those methods into a
14 mathematical format that can be run on a computer. In developing the OSP
15 modeling methodology that the HAI Model uses to model the local exchange
16 network, the OSP engineering team applied the principles set forth in
17 paragraph 250 of the FCC's Universal Service Order along with our
18 knowledge of and experience with local loop outside plant engineering
19 concepts. These principles require that the OSP network design be based
20 upon:

- 21 • the least-cost, most-efficient, reasonable technology currently
22 available;
- 23 • existing wire center locations, wire center line counts and average
24 loop length; and
- 25 • sound local loop transmission and design practices.

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A detailed explanation of the entire HAI Model's OSP modeling methodology is included in the HAI Model Release 5.0a Model Description (MD), attached to the Direct Testimony of Mr. Wood. OSP enhancements included in the HAI Model Release 5.0a are discussed below.

Q. WHAT ARE THE OSP IMPROVEMENTS IN RELEASE 5.0a OF THE HAI MODEL AND HOW DO THEY ENHANCE THE MODEL'S ABILITY TO CAPTURE REAL-WORLD NETWORK DESIGN EFFICIENCIES?

A. The following significant model enhancements have been made to the OSP portion of the HAI Model in Release 5.0a:

Dynamic Aerial and Buried Structure Selection: A substantial portion of the costs of deploying outside plant facilities is the cost of placing and maintaining those facilities (as opposed to the costs of the materials themselves). Depending on terrain features, the cost, for example, of burying telephone cable (buried plant) or placing it on poles (aerial plant) may be dramatically different. OSP engineers carefully consider these differences, in light of existing technologies and demand, in designing efficient networks. For this reason, HM 5.0a automatically adjusts buried and aerial structure percentages to account for varying maintenance costs and placement costs occasioned by local Florida soil conditions and bedrock. The amount of one type of structure substituted for another depends both on differences in placement cost and on a life-cycle analysis of maintenance and capital

1 carrying costs of the two types of structure (ref. MD 6.2.5 and IP 2.5). This
2 enhancement (from a fixed user defined mix of plant structure by density
3 zone) was requested by the Federal Communications Commission (FCC), and
4 it more realistically represents the real-world decision process of an OSP
5 Engineer.

6
7 Carrier Serving Area (CSA) Size Limitations: Optimum Carrier Serving Area
8 size and location are key characteristics of an efficiently designed universal
9 service network. CSAs are the geographic customer areas that are served by
10 a single remote site of Digital Loop Carrier (DLC) equipment. OSP
11 engineers situate CSAs to serve clusters of customers efficiently. In addition,
12 OSP engineers size CSAs to take advantage of the capabilities of currently
13 available DLC equipment technologies. If a model fails to design to the
14 capabilities of currently available DLC technologies, it may deploy too much
15 expensive DLC equipment to too many remote terminal sites and place too
16 much feeder cable to carry telephone signals to this equipment.

17
18 The HAI Model 5.0a designs the universal service network consistent with
19 the requirements of the most-efficient CSA design given the technologies
20 available today. The HAI 5.0a, however, places two necessary and realistic
21 limitations on CSA design to ensure the quality service Florida consumers
22 expect and the FCC Order requires:

- 23 • First, there is a transmission requirement that no load coils be used in
24 the design of the universal service network because they would inhibit
25 advanced services utilizing digital signals. Additionally, the maximum

1 distance over which copper cable can carry a quality analog signal
2 without adding load coils is 18,000 feet. Therefore, HM 5.0a ensures
3 that no point in a CSA may be more than 18,000 feet from the centroid
4 of the main cluster, which is the location of the DLC remote terminal.

- 5 • Secondly, the number of lines served by a single CSA cannot exceed
6 90% utilization of the capacity of the largest currently available DLC
7 terminal units (ref. MD 5.5.1 and 6.2).

8
9 Digital Technology to Outlying Areas on Separate Cables: One important
10 challenge faced by OSP engineers is the task of serving small pockets of
11 isolated customers in a cost-effective manner. HM 5.0a addresses this by
12 connecting these "outlier clusters" (i.e., fewer than five lines) to larger "main
13 clusters" (ref. MD 6.3.2 and IP 2.8).

14
15 Dynamic Selection of Copper-to-Fiber Crossover: OSP engineers designing
16 networks also must make decisions concerning the use of fiber or copper
17 cable in the feeder portion of the loop (the large "pipelines" carrying
18 telephone signals from the switch to the distribution portion of the network).
19 Copper cable is generally more expensive than fiber, but the electronics
20 required when using fiber cable are also rather expensive. In general, an OSP
21 engineer finds that after a certain distance (i.e., the copper-to-fiber crossover
22 point), the cost of several thousand feet of copper is so high that use of fiber
23 and electronics is the clear choice. HM 5.0a makes this decision on a cluster
24 by cluster basis, as an OSP engineer should. If the model determines that use
25 of copper feeder is a technically acceptable option, it then performs an

1 analysis of the relative life-cycle costs of copper versus fiber feeder to
2 determine which feeder technology should be used to serve the given main
3 cluster (ref. MD 6.3.5). This dynamic selection function of the model more
4 accurately reflects the decision process of an OSP Engineer based on the
5 economics of serving each particular cluster.

6
7 Optional Cap on Distribution Investment: The HM 5.0a also incorporates an
8 optional, user-adjustable "cap" on distribution investment per customer at the
9 request of the Federal Communications Commission. This cap is structured
10 to reflect the potential substitution of the most cost efficient to two types of
11 wireless distribution technologies (point - point or broadcast) for a wireline
12 distribution network in high cost, low customer density areas (ref. MD 6.3.4
13 and IP 2.11).

14
15 Other local loop models also employ such "caps" on distribution investment;
16 however, they offer only vague references as to the alternative wireless
17 technology. In sharp contrast, HM 5.0a provides descriptions of two
18 alternative wireless technologies and dynamically selects the most cost
19 efficient for each particular customer geographical area.

20
21 Feeder Route Steering: At the user's option, the HM 5.0a "steers" feeder
22 routes toward the preponderant location of main clusters within a given wire
23 center quadrant. This, too, permits HAI 5.0a to model outside plant the way
24 an OSP engineer would. Importantly, the HAI 5.0a feeder route steering
25 algorithm exhibits two key characteristics necessary to model accurately the

1 efficiencies achievable through feeder steering in the real world. First, when
2 this steering is invoked, the user may also apply an adjustable route-to-airline
3 distance multiplier to the amounts of cable placed along these "steered"
4 feeder routes (ref. MD 6.3.6). Use of a route-to-airline multiplier recognizes
5 the fact that rarely can an OSP engineer deploy cable facilities directly from
6 point to point. Generally, an OPS engineer will follow public rights-of-way
7 or encounter obstacles requiring detours necessitating increased route
8 distance. Second, HM 5.0a recognizes that the true efficiencies obtainable
9 from feeder steering occur when the main feeder is steered to minimize the
10 distance from the main feeder to the carrier serving areas associated with that
11 feeder, thereby minimizing the costs of expensive subfeeder connections.

12
13 Increased Costs for Placing Manholes in Water: HM 5.0a increases manhole
14 placement costs by a user-specified amount whenever the local water table
15 depth is less than the user-specified threshold to more accurately reflect the
16 higher costs associated with such placements.

17
18 New Indoor NID: HM 5.0a more accurately models the indoor Network
19 Interface Device (NID) at the customer demarcation point in high rise
20 building environments. Previous releases of the Hatfield Model provided an
21 outdoor interface enclosure with station protection at these locations. The
22 model now more realistically designs station protection cost at the building
23 entrance terminal through increased cost for the indoor Serving Area
24 Interface (SAI) (ref. IP 2.1).

1 Station Protection at the Entrance of Multi-Tenant Buildings: In HM 5.0a the
2 station protection for multi-tenant buildings is more accurately and cost-
3 effectively modeled as multi-station protection at the building entrance
4 terminal (i.e., indoor SAI). In previous versions of the Hatfield Model,
5 station protection had been costed individually for each customer location in
6 a building (ref. MD 6.3.8 and IP 2.9).

7
8 Increased Riser Cable Costs: The engineered, furnished and installed (EF&I)
9 cost for riser cable has been increased by approximately 25% because
10 ongoing validation efforts identified previous cost to be understated. In most
11 states riser cables are the responsibility of the ILEC as the provider of last
12 resort. If riser cable is not the responsibility of the ILEC, then the HAI
13 Model will overstate loop cost in urban service environments and some loop
14 cost adjustments may need to be applied (ref. IP 2.3.3).

15
16 Defined Clusters Instead of Census Block Groups: Knowledge of customer
17 locations is essential to an accurate, cost-efficient design of outside plant.
18 AT&T witness Don Wood addresses in his testimony the HM 5.0a model
19 enhancement to customer location and the modeling of distribution plant to
20 those locations.

21
22
23 **VI. OSP INPUT VALUES**

24 **Q. WHAT ARE OSP INPUT VALUES, AND HOW ARE THEY**
25 **DETERMINED?**

1 A. Once the OSP modeling methodology has been determined and the
2 mathematical formulas developed, the HAI Model needs input values along
3 with demographic data to determine local loop costs for a specific area. OSP
4 input values include such items as material costs, labor rates, quantities, fill
5 factors, plant mix, etc. The HM 5.0a default OSP input values have been
6 determined by the HAI Model OSP Engineering Team based on our
7 collective knowledge and experience and subsequent validation efforts.
8 Descriptions of and supporting information for the OSP input values are
9 contained in the HAI Model Release 5.0a Inputs Portfolio (IP), which is
10 attached to the Direct Testimony of Mr. Wood. As noted above, application
11 of engineering team expertise and judgment is critical to the formation of
12 credible universal service cost proxy model OSP inputs.

13
14 **Q. PLEASE EXPLAIN IN MORE DETAIL HOW THE OSP**
15 **ENGINEERING TEAM DETERMINED APPROPRIATE INPUT**
16 **VALUES.**

17 A. The input values to the HAI Model were derived directly from the judgment
18 of the OSP Engineering Team. The highly experienced members of the HAI
19 Engineering Team gave their collective expert judgment on what they
20 perceived to be cost effective, forward-looking costs that could be reasonably
21 achieved, and these judgments were then used to determine the default values
22 in the model. Each of the team members then used a variety of methods to
23 perform their own validation of the default values.

24

1 Perhaps an analogy would best illustrate how the HAI Model Outside Plant
2 Engineering Team considers a HM 5.0a input value or modeling assumption
3 to be "reasonable:"

4
5 Suppose, for example, that my wife and I decide to buy a car for our
6 teenage daughter. Based solely on our experience and knowledge of
7 basic requirements for safe, reliable transportation and current
8 automobile prices, we determine that \$15,000 is a reasonable amount
9 for us to budget. Our daughter, however, says that we "just don't
10 understand," and that \$15,000 is unreasonable because "everybody
11 else's parents are spending more for their sons' and daughters' cars."

12
13 First we discuss with her and come to a clear understanding of what the
14 basic requirements are by including anti-lock brakes and airbags and
15 eliminating the moon roof, CD player and a few other amenities. Then
16 we say, "Let's go look around and just see what cars that meet these
17 requirements cost these days." We find one for \$12,000, two for about
18 \$14,000, several in the range of \$15,000 - \$18,000 and even more in
19 the \$20,000 - \$25,000 range. The average cost comes out to be
20 \$20,000. "See," she says, "you have underestimated the amount;" and
21 furthermore, she claims that we have not included some of her really
22 desirable cars, which are over \$30,000 and would raise the average
23 amount even higher.

24

1 We say no; that we have been "reasonable" because there are indeed
2 three cars for less than \$15,000 that satisfy the requirements, and if she
3 wants a nicer car, the extra costs will have to come out of her pocket.
4

5 This illustration is intended to show how the HM 5.0a outside plant
6 engineering assumptions and input values have been developed and validated
7 by the HAI OSP Engineering Team. HM 5.0a input values are generally
8 lower than average costs because the modeling criteria are to be "least-cost."
9 However, they are certainly not the absolute lowest cost obtainable from any
10 source.
11

12 **Q. WHAT HAS BEEN DONE TO VALIDATE INPUTS AND**
13 **ASSUMPTIONS PERTAINING TO THE OSP PORTION OF THE**
14 **HAI MODEL?**

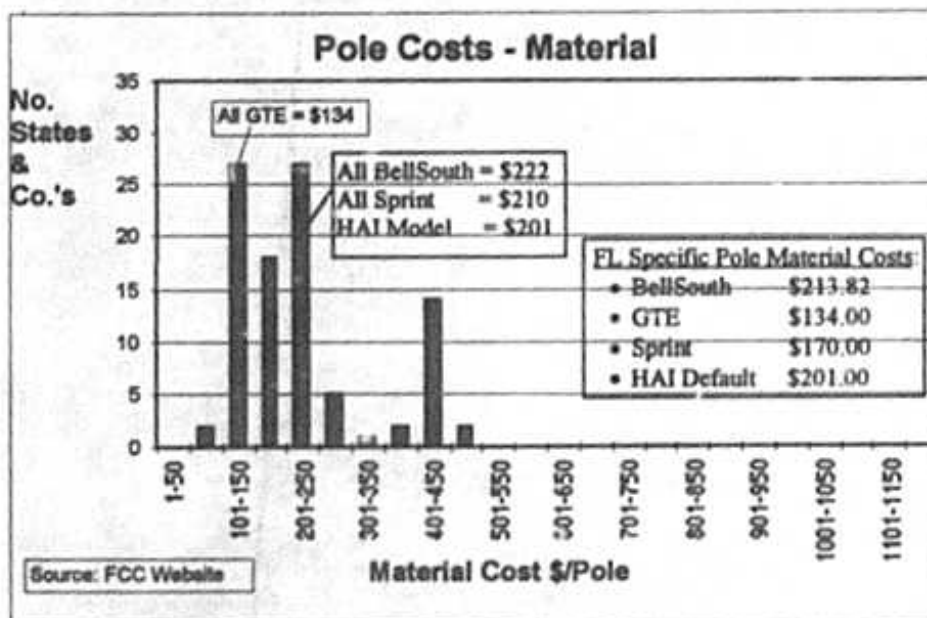
15 **A.** A considerable amount of validation of the OSP portion of the HAI Model
16 has taken place, which includes the following:

- 17 • Pole costs have been validated via comparison to ILEC pole cost data
18 gathered by the Federal Communications Commission (FCC).
- 19 • Other input values have been validated by contacting a variety of
20 material vendors and contractors of OSP services.
- 21 • Assumptions and input values have been compared to those of the
22 ILECs by members of the OSP Engineering Team who have been
23 permitted to review proprietary ILEC cost data.
24

1 Q. HOW WAS FCC DATA USED TO VALIDATE THE INPUT VALUES
2 FOR POLE COSTS IN THE HAI MODEL?

3 A. ILEC pole cost data was obtained from the FCC's Internet Site
4 ([http://www.fcc.gov/Bureaus/Common_Carrier/Comments/da971433_data_](http://www.fcc.gov/Bureaus/Common_Carrier/Comments/da971433_data_request/datareq.html)
5 [request/datareq.html](http://www.fcc.gov/Bureaus/Common_Carrier/Comments/da971433_data_request/datareq.html)). In August 1997, the FCC issued a data request
6 regarding pole costs to the major telephone companies. Part of the
7 information provided in response to that data request was the material and
8 installation cost of a 40-foot Class 4 Pole, which is included as Exhibit ____
9 (JWW-2) to this testimony. A histogram appears below for pole material
10 costs.

11



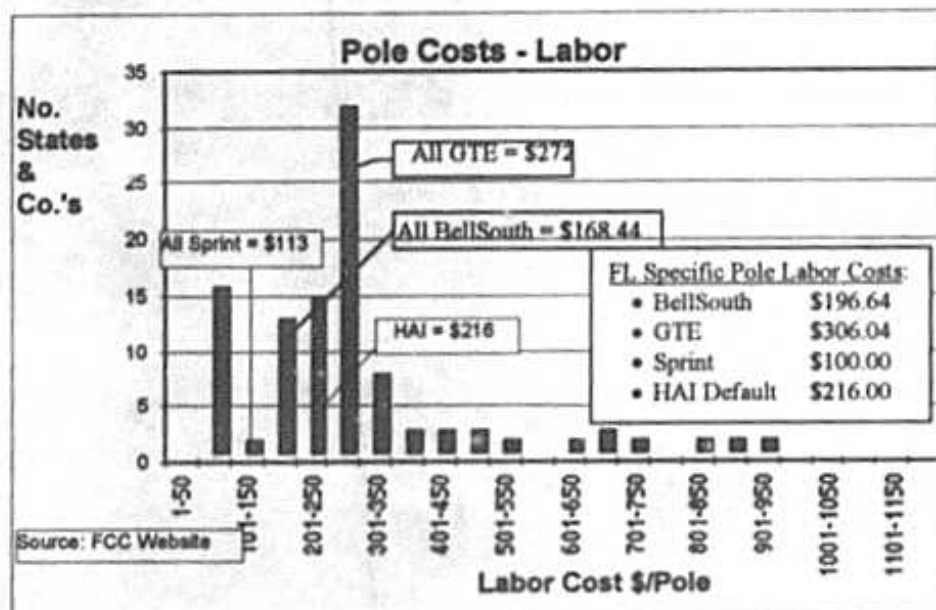
12

13

1 This information validates that the default pole material cost employed by the
 2 HAI Model is indeed reasonable for Florida because it falls within the range
 3 of the costs of the three ILECs. A more thorough review of the data reveals
 4 that the costs within an individual company can vary significantly.

5
 6 **Q. WHAT DOES THE FCC DATA REVEAL ABOUT POLE LABOR COSTS?**

7
 8 **A.** Compared to the results observed for pole material costs, there is an even
 9 wider range in values for pole labor costs. There is no clear productivity
 10 advantage shown by larger companies, and geographical differences do not
 11 correlate with the large variation. The following histogram illustrates labor
 12 productivity.

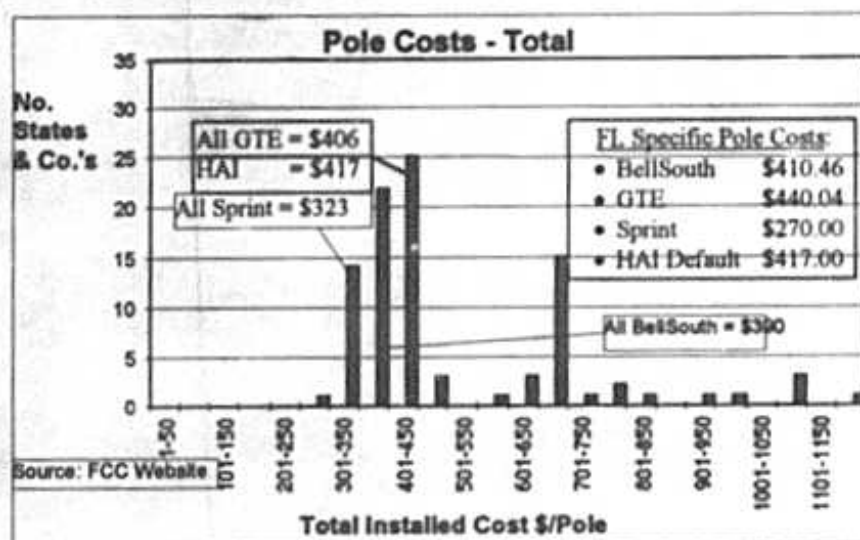


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 16

1 This information validates that the default pole labor cost employed by the
 2 HAI Model is reasonable for Florida because it once again falls within the
 3 range of values for the three ILECs.

4
 5 **Q. WHAT DO THE INSTALLED TOTALS OF MATERIAL PLUS
 6 LABOR REVEAL?**

7 **A.** Once again, the data reveal a very wide range of ILEC costs and confirm that
 8 the default input value for installed pole cost employed by the HAI Model is
 9 valid for Florida, as illustrated below:



11
 12
 13 **Q. IN YOUR OPINION, WHAT SHOULD BE DONE WITH REGARD
 14 TO THE WIDE RANGE IN ILEC COSTS FOR THE INPUT VALUES
 15 TO LOCAL LOOP COST MODELS?**

16 **A.** The relevant criterion for these cost models is "least-cost." Therefore, cost
 17 modelers should employ a very common approach used in business -

1 especially large business - called "best in class" analysis, which essentially
2 says that an organization should review performance data, and set a
3 reasonable benchmark based on "best in class." For example, if Sprint has the
4 lowest forward looking pole costs, then other companies should review
5 Sprint's methods and procedures to emulate them, and even better them. The
6 data show that the best price quoted in response to the FCC data request on
7 pole costs was \$270 for a 40 foot Class 4 pole by Sprint-Florida, while the
8 highest was \$1,161 for a 40 foot Class 4 pole by Bell Atlantic-Massachusetts.
9 This rather astoundingly shows the potential for cost improvement and the
10 fallacy of simply accepting ILEC cost data from their embedded network.
11

12 **Q. HOW DOES THIS RELATE TO THE DEFAULT VALUES FOR**
13 **POLES IN THE HAI MODEL?**

14 **A.** Instead of using average costs, the HAI Model OSP Engineering Team has
15 reviewed ranges of costs and recommended default values that can
16 reasonably be expected to be realized by a cost efficient telephone company
17 on a large project basis. The wide variance in pole values demonstrates that
18 it is inappropriate and inaccurate to use average cost information in order to
19 develop a least-cost, most-efficient model. The HAI Model approach
20 produces accurate results from a least-cost, most-efficient perspective. The
21 default values recommended in the HAI Model are not the lowest costs
22 available, but are deemed readily achievable in practice.
23

1 Q. HOW CAN THE USE OF HAI MODEL NATIONAL DEFAULT OSP
2 INPUT VALUES PRODUCE RESULTS APPROPRIATE FOR
3 FLORIDA?

4 A. The way that the HAI Model utilizes the national default OSP input values
5 produces results that are very specific to Florida at the customer geographic
6 level for the following reasons:

- 7 • First of all, the labor content of the national default value is adjusted by
8 a factor of .68 to reflect appropriate labor costs adjusted for Florida
9 (ref. IP 7.0).
- 10 • Secondly, structure costs are increased as appropriate to account for
11 the terrain characteristics of each Census Block Group in Florida.
- 12 • Next, the customer location and clustering methodologies of the HAI
13 Model determine cable lengths and sizes specific to customers in
14 Florida.
- 15 • Fourth, the dynamic selection algorithms of the HM 5.0a exercise sound
16 OSP Engineering judgment in selecting copper versus fiber feeder and
17 aerial versus buried structure.
- 18 • And finally, no one seriously could argue that material costs in today's
19 economy are unique to a specific state, region of a state or company.
20 All companies today buy nationally, if not internationally. Therefore,
21 material prices clearly are national in scope.

22
23 Q. DID THE HAI MODEL OUTSIDE PLANT ENGINEERING TEAM
24 ALWAYS USE THE LOWEST DEFAULT INPUT VALUES?

1 A. Absolutely not. Some have wrongly accused the HAI Model OSP
2 Engineering Team of using unrealistically low default input investment costs,
3 but that is just not the case. The proof of the reasonableness of the team's
4 judgment is evident by looking at the validation numbers obtained by Mr.
5 Dean Fassett, a member of the team, who contacted a number of suppliers
6 and contractors. The information obtained by Mr. Fassett is summarized in
7 Exhibit ___ (JWW-3) and is also displayed in the HAI Model Release 5.0a
8 Inputs Portfolio (IP), attached to the testimony of Mr. Wood, in the form of
9 bar charts that show the range of values obtained in Mr. Fassett's validation
10 efforts. As the following information shows, of the 30 charted ranges of
11 validation values in the HAI Inputs Portfolio binder, 28, or 93% of the
12 default values recommended by the Engineering Team for the HAI Model,
13 are not the lowest validation number obtained. In fact, the default values in
14 the model average 81% higher than the lowest validation numbers. Any
15 statement that the HAI Model OSP Engineering Team routinely took the
16 lowest number is simply contrary to the evidence.

1

HAI Model OSP Input Values Validation Numbers

	Item	High	Low	Default	% High to Low
1	Residential NID Without Protector	\$11.90	\$6.85	\$10.00	46%
2	NID Protector Block per Line	\$4.80	\$3.05	\$4.00	31%
3	Business NID (6 Pair) without Protector	\$28.65	\$23.44	\$25.00	7%
4	Business NID Protector Block per Line	\$4.80	\$3.05	\$4.00	31%
5	Rural Buried Drop Excavation/ft.	\$1.75	\$0.55	\$0.60	9%
6	Suburban Buried Drop Excavation/ft.	\$2.10	\$0.63	\$0.75	19%
7	Aerial Strand Mounted Block Terminal	\$72.15	\$58.55	\$60.00	2%
8	Buried Pedestal Block Terminal *	\$93.00	\$39.61	\$90.00	127%
9	2 Pair Aerial Drop Wire Material/ft.	\$0.113	\$0.095	\$0.095	0% ←
10	3 Pair Buried Drop Wire Material/ft.	\$0.197	\$0.140	\$0.140	0% ←
11	Pole Material, 40 ft. Class 4 *	\$402	\$134	\$201	50%
12	Pole Labor: Rural *	\$902	\$150	\$216	44%
13	Pole Labor: Suburban *	\$902	\$170	\$216	27%
14	Pole Investment: Total *	\$1161	\$170	\$417	145%
15	Duct Material/ft.	\$0.648	\$0.515	\$0.600	17%
16	Rock Saw / Trenching Ratio *	4.6	1.3	3.5	169%
17	Manhole Material *	\$4,720	\$1,700	\$2,340	38%
18	MH Excavation/Backfill: Rural	\$4,000	\$850	\$2,800	229%
19	MH Excavation/Backfill: Suburban	\$4,500	\$1,250	\$3,500	180%
20	MH Excavation/Backfill: Metro	\$8,500	\$1,700	\$5,000	194%
21	Normal Trench/ft. with Backfill: Rural: 24" depth *	\$5.00	\$2.00	\$2.89	45%
22	Normal Trench/ft. with Backfill: Rural 36" depth *	\$6.00	\$1.50	\$2.89	45%
23	Normal Trench/ft. with Backfill: Suburban: 24" depth *	\$11.00	\$2.40	\$3.35	40%
24	Normal Trench/ft. with Backfill: Suburban: 36" depth *	\$15.00	\$2.00	\$3.35	75%
25	Trench/ft. in Pavement w/ Restoral: Metro: 24" depth *	\$60.00	\$7.50	\$31.22	316%
26	Trench/ft. in Pavement w/ Restoral: Metro: 36" depth *	\$63.00	\$7.40	\$31.22	322%
27	Plow Cable/ft.: Rural: 24" depth *	\$1.50	\$0.40	\$0.80	100%
28	Plow Cable/ft.: Rural: 36" depth *	\$2.00	\$0.50	\$0.80	60%
29	Plow Cable/ft.: Suburban: 24" depth *	\$3.50	\$0.85	\$1.20	41%
30	Plow Cable/ft.: Suburban: 36" depth *	\$4.00	\$0.90	\$1.20	33%
	Average % above lowest quote (# at lowest of 30 items)				81% (2)

2

1 Q. WHAT IS THE PURPOSE OF VALIDATION AS USED BY THE HAI
2 MODEL OSP ENGINEERING TEAM?

3 A. The primary reasons for validation by the HAI Engineering Team are to
4 determine that the input values are reasonable and to continually review and
5 improve the model.

6
7 Q. DID THE HAI MODEL OSP ENGINEERING TEAM FIND ANY
8 SIGNIFICANT FLAWS AS A RESULT OF ITS VALIDATION
9 EFFORTS?

10 A. No. In several cases we found that some of our assumptions used in the past
11 were too conservative. For example, in the past, we used the common
12 planning assumption that the installed cost of copper cable is a linear "a + bx"
13 type of straight line. After examining a variety of validation values and
14 listening to concerns that the model produced high costs for larger cables, the
15 OSP Engineering team members came to realize that it did not take 42 times
16 as long to engineer a 4200 pair cable than to engineer a 100 pair cable.
17 Therefore, appropriate changes were made.

18
19 Q. DID EACH MEMBER OF THE HAI MODEL OSP ENGINEERING
20 TEAM PARTICIPATE IN THE VALIDATION PROCESS, AND DID
21 THEY EACH DO IT THE SAME WAY?

22 A. Yes, each member participated, but not in the same way. It is significant to
23 note the depth and breadth of experience and knowledge of the members of
24 this team as detailed in Exhibit ___ (JWW-1). Each member of the team used

1 different approaches to validate the HAI Model OSP methodology,
2 assumptions and input values.

3

4 Mr. Fassett took the lead since he had a large number of successful contacts
5 with vendors and contractors. The information he obtained is extensive, and
6 is reproduced in Exhibit ___ (JWW-3).

7

8 Among his many areas of OSP expertise, Mr. Riolo is eminently qualified to
9 address the pricing of poles and cable. For eight years he was responsible for
10 purchasing all poles and all outside plant cable for the New York Telephone
11 Company.

12

13 Mr. Donovan has attended trade shows, questioned exhibitors, and called
14 vendors for detailed price and technical information. In addition, Mr.
15 Donovan has a wide range of experience that includes negotiating contracts
16 for millions of dollars worth of contract labor, including excavation, pole
17 placing, electronic equipment installation, cable placing, and splicing. He is
18 eminently qualified to address electronic costs. In his last ILEC employment,
19 he was responsible for purchasing over one million dollars per day in
20 electronic equipment for the entire NYNEX Company. Other work included
21 the design of construction job pricing methods and procedures.

22

23 Besides an extensive outside plant career in Bell Canada, after retiring as a
24 General Manager, Mr. Carter did detailed engineering design of Digital Loop
25 Carrier Systems for a major RBOC. He has exceptional depth of knowledge

1 in detailed engineering aspects of IDLC as used in the HAI Model. He has
2 validated prices in the HAI Model based on his recent experience, and has
3 contacted a number of vendors to obtain detailed technical and costing
4 information that confirms the default values in the model.

5
6 I have had a variety of OSP experiences with BellSouth and AT&T and have
7 extensively reviewed ILEC modeling methodology, assumptions and input
8 values in fourteen USF and UNE dockets as detailed in Exhibit ___ (JWW-
9 4). My contribution to the validation effort involved the detailed design of
10 ten Census Block Groups in Georgia to validate the accuracy of the
11 distribution plant design for Hatfield Model Releases 3.1 and 4.0.

12
13 Perhaps the most credible form of validation has been the numerous
14 comparisons of HAI OSP input values to those of the ILECs. The members
15 of the HAI OSP Engineering Team have been witnesses in approximately fifty
16 USF and UNE hearings in the past two years. We have seen (under non-
17 disclosure agreements) literally thousands of ILEC OSP input values, often
18 from two or more ILECs in the same docket. Comparisons have consistently
19 shown the HAI Model input values to be "reasonable."

20
21 The discussion above is intended to highlight the fact that there are many
22 ways to validate expert opinion. The HAI Model OSP Engineering Team has
23 done a more thorough job than any other model proponent in documenting
24 assumptions and validating input values against least-cost benchmarks based
25 on currently available technology.

1

2 **VII. CONCLUSION**

3 **Q. HOW WOULD YOU SUMMARIZE YOUR TESTIMONY**
4 **CONCERNING HAI'S COST MODELING OF OUTSIDE PLANT**
5 **FOR THE LOCAL LOOP?**

6 **A.** The HAI Model Release 5.0a correctly employs outside plant design
7 methodology, assumptions and input values that reflect how an outside plant
8 engineer should design a local loop network employing the following FCC
9 criteria:

- 10 • a network based upon least-cost, most-efficient, reasonable technology
11 that is currently being deployed,
- 12 • existing wire center locations, wire center line counts and average loop
13 length, and
- 14 • local loop network transmission standards and design practices.

15

16 Therefore, I recommend the Florida Public Service Commission adopt the
17 HAI Model Release 5.0a as the appropriate local loop cost basis for
18 determining Universal Service Funding.

19

20 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

21 **A.** Yes.

22

23

BEFORE THE

FLORIDA PUBLIC SERVICE COMMISSION

REBUTTAL TESTIMONY OF

JAMES W. WELLS, JR.

ON BEHALF OF

MCI TELECOMMUNICATIONS CORPORATION

Docket No. 980696-TP

September 2, 1998

(REDACTIONS REVISED 10/1/98)

1 I. INTRODUCTION

2 Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

3 A. My name is James W. Wells, Jr., and my office address is 5280 Laithbank Lane,
4 Alpharetta, GA 30022

5

6 Q. BY WHOM AND IN WHAT CAPACITY ARE YOU EMPLOYED?

7 A. I am the President of J. W. Wells, Inc. In this proceeding, I am providing
8 consulting expertise in telecommunications Outside Plant ("OSP") infrastructure
9 planning, design and construction, including costing aspects of the local loop.

10

11 Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

12 A. I am testifying on behalf of MCI Telecommunications Corporation.

13

14 II. PURPOSE

15 Q. WHAT ARE THE PURPOSES OF YOUR TESTIMONY?

16 A. The purposes of my testimony are to:

- 17 • analyze the OSP input values of the Incumbent Local Exchange Carriers
18 ("ILECs") in comparison to those of AT&T/MCI,
19 • examine the OSP modeling methodology and assumptions of the
20 Benchmark Cost Proxy Model Release 3.1 ("BCPM 3.1") in comparison
21 to those of the HAI Model Release 5.0a ("HM 5.0a"), formerly known as
22 the Hatfield Model, and
23 • rebut specific OSP portions of the direct testimonies of the ILEC
24 witnesses.

1

2 Q. HAVE YOU PROVIDED OTHER TESTIMONY IN THIS
3 PROCEEDING?

4 A. Yes. I filed direct testimony in this proceeding.

5

6 **III. QUALIFICATIONS AND EXPERIENCE**

7 Q. PLEASE STATE YOUR EDUCATIONAL BACKGROUND AND OSP
8 WORK EXPERIENCE.

9 A. I have Bachelor of Engineering (Electrical Engineer'ng) and Master of Business
10 Administration degrees and certification as a Project Management Professional. I
11 have gained OSP experience in the following assignments with:

- 12 • South Central Bell Telephone Company (now BellSouth) in Birmingham,
13 AL: OSP Construction Foreman - 1 year; OSP Facilities Engineer - 4
14 years, OSP Planning Engineer - 2 years,
- 15 • Western Electric and AT&T Network Systems (now Lucent
16 Technologies): Technical Representative for OSP Products - 5 years and
17 District Manager - OSP Engineering and Construction - 5 years,
- 18 • AT&T Local Infrastructure and Access Management: District Manager
19 OSP Engineering and Construction - 1 year,
- 20 • AT&T Local Services Division: District Manager Outside Plant Cost
21 Engineering - 1 year, and
- 22 • J. W. Wells, Inc.: OSP Consultant - 2 months.

23

24 **IV. SYNOPSIS**

1 Q. HOW DOES YOUR TESTIMONY FIT INTO THE OVERALL CASE?

2 A. My area of expertise is the OSP portion of the local loop, which is the network
3 infrastructure from the main distributing frame in the wire center to the network
4 interface device at the customer's premise. My testimony is complemented by the
5 testimonies of:

- 6 • Mr. Don Wood, which addresses the HM 5.0a methodology, design and
7 several of the inputs, and
- 8 • Mr. Brian Pitkin, which addresses the overall BCPM 3.1.

9
10 Q. WOULD YOU PLEASE PROVIDE AN OVERVIEW OF YOUR
11 CONCERNS REGARDING THE BCPM 3.1?

12 A. I have reviewed the OSP portions of the prefiled direct testimonies of the ILEC
13 witnesses in this proceeding and the BCPM 3.1 Model Methodology (April 30,
14 1998 Edition). I have also participated in workshops where ILECs have
15 presented the BCPM. In Release 3.1, the BCPM modelers have taken steps to
16 evolve their model by incorporating several of the concepts of earlier releases of
17 the Hatfield Model plus some additional ideas to improve the accuracy and cost
18 efficiency of their local loop model. However, upon thorough investigation, I
19 have found that in the actual implementation of these ideas the BCPM 3.1 still
20 falls well short of being the least-cost, most-efficient, forward-looking and
21 reasonable local loop cost model based on currently available technology in the
22 following ten areas:

- 23 • The input values filed by BellSouth, GTE and Sprint vary widely, and in
24 numerous instances the ILECs have utilized unreasonable OSP input

1 values. The OSP input values filed by AT&T/MCI for the HM 5.0a in
2 this proceeding will be shown to be reasonable by comparison.

- 3 • The ILEC witnesses make misleading claims of superior transmission
4 quality based on adhering to the constraints of the Carrier Serving Area
5 ("CSA") Concept. However, BCPM 3.1 very clearly does not adhere to
6 those constraints. Both models appropriately design distribution to a
7 maximum length of 18,000 feet from the Digital Loop Carrier Remote
8 Terminal ("DLC RT") by employing range extension cards as required.
- 9 • BCPM 3.1 now models customer locations to the much smaller Census
10 Block ("CB") level instead of the Census Block Group ("CBG") level.
11 However, the HM 5.0a employs a superior customer location
12 methodology to BCPM 3.1 in that it models most customer locations
13 (70% for Florida) far more precisely by latitude and longitude geocoding
14 of their addresses. The remaining customers are located by HM 5.0a at
15 the CB level of precision, which is the maximum level of precision that
16 BCPM 3.1 attains for any customer. More precise customer location
17 produces a more accurate and cost efficient network design.
- 18 • BCPM 3.1 arbitrarily segments natural clusters of customers (i.e.,
19 customers located in the same neighborhood or town) based on a fixed
20 grid overlay. However, HM 5.0a clusters customers based on their
21 proximity to each other and transmission design rules, which is what an
22 OSP Engineer would realistically do in designing a least-cost local loop
23 network.
- 24 • The BCPM 3.1 overstates costs because it models an excessive number of
25 DLC RTs in locations serving geographical areas and numbers of

1 customers that are far too small for a least-cost model. DLC RT
2 locations are costly, and thus it is more cost effective to fully utilize the
3 capacity and transmission capabilities of currently available DLC systems,
4 which is exactly what HM 5.0a does.

- 5 • BCPM 3.1 does not perform a quality check to determine if a loop
6 exceeds 18,000 feet in length from the DLC RT. This is important
7 because when a loop exceeds 18,000 feet, the quality of voice grade
8 becomes substandard. In Florida and other states, the BCPM 3.1 has
9 indeed modeled customer locations that are more than 18,000 feet from
10 the DLC RT. By way of comparison, HM 5.0a performs a quality test to
11 assure that none of the loops it models exceed this limit.
- 12 • BCPM 3.1 uses a fixed copper/fiber breakpoint and also automatically
13 deploys fiber feeder and DLC for grids where customer demand exceeds
14 the capacity of a single copper cable. However, fiber with DLC is clearly
15 not the economical alternative to copper feeder cables for short loops.
16 HM 5.0a methodology is far superior in its use of dynamic selection of
17 copper versus fiber feeder based upon comparative life cycle economics
18 of these two alternatives.
- 19 • BCPM 3.1 still overstates distribution cable length and cost by modeling
20 square lots even though it is clearly more economical and realistic for
21 cities and subdivisions to be modeled based on rectangular lots. The HAI
22 Model has always been more real world and cost efficient in its modeling
23 of 1 wide by 2 deep rectangular lots.
- 24 • The BCPM 3.1 modeling methodology oversizes distribution cables by:

- 1 1. first sizing for the ultimate demand by providing up to two copper
2 cable pairs to all houses, including empty houses;
 - 3 2. then increasing the ultimate number of pairs required by a cable
4 sizing factor; and
 - 5 3. finally rounding up this double inflated pair requirement to the
6 next largest discrete cable size.
- 7 • The BCPM 3.1 has three significant, but rather arbitrary, OSP network
8 design assumptions which cannot be readily subjected to sensitivity
9 analysis because they are only user adjustable via the cumbersome and
10 time consuming preprocessing application. These assumptions are:
 - 11 1. The maximum threshold of 999 lines for determining Carrier
12 Serving Area size.
 - 13 2. The distance of 10,000 feet from the wire center in every feeder
14 route in the state of Florida as being the appropriate distance
15 where it is economical and feasible to split a feeder route. Also,
16 this is the arbitrary distance from every wire center where the
17 spacing of lateral subfeeder routes suddenly goes from
18 approximately every 1,600 feet to approximately every 13,000
19 feet.
 - 20 3. The sizing of the road reduced area in the distribution quadrant
21 based on a 500-foot buffer along each side of the roads within that
22 distribution quadrant.
- 23

1 As will be demonstrated in much greater detail in the remainder of this rebuttal
2 testimony, the HM 5.0a is clearly the most appropriate model for determining the
3 cost of the local loop network in Florida based on the relevant criteria of being:

- 4 • reasonable,
- 5 • least-cost,
- 6 • most-efficient, and
- 7 • based on currently available technology.

8
9 **V. CONCERNS REGARDING THE OSP PORTION OF BCPM 3.1**

10 **Q. WHAT CONCERNS DO YOU HAVE REGARDING THE OSP INPUT
11 VALUES FILED BY THE ILECs?**

12 **A.** My analysis of the OSP input values filed by BellSouth, GTE, Sprint and
13 AT&T/MCI in this proceeding contradicts the following three representations
14 generally promoted by the ILECs:

- 15 1. The ILECs somehow possess the only true knowledge of local loop
16 network costs in Florida and have also figured out how to appropriately
17 apply their cost data to a bottoms-up model.
- 18 2. Because an input value reflects the ILEC's actual experience in its service
19 territory, it is therefore indisputably the least-cost, most-efficient input
20 value.
- 21 3. HM 5.0a is populated with unrealistic and low input values because the
22 HAI OSP Engineering Team developed these input values on a national
23 basis.

1 ILECs have been building local loop networks for decades and do indeed have a
 2 great deal of data and experience with studies that perform top-down allocations
 3 of the embedded costs in their local loop networks which have been deployed
 4 under rate base regulation. However, BellSouth, GTE and Sprint are clearly
 5 grappling with how to utilize a bottoms-up, forward-looking, least-cost, most-
 6 efficient model for a local loop network based on currently available technology
 7 under a "scorched node" assumption.

8
 9 **Q. HAVE YOU COMPARED THE INPUT VALUES PROPOSED BY THE**
 10 **ILECs FOR BCPM 3.1 WITH THOSE OF HM 5.0a?**

11 **A.** Yes. This docket has created yet another opportunity for a side-by-side
 12 comparison of input values for the same model in the same state in the same time
 13 frame from three independent ILECs. The following analysis will once again
 14 show that:

- 15 • There are a number of significant differences among the input values of
- 16 the three ILECs for the same item.
- 17 • ILECs have adopted the BCPM national default input values for several
- 18 items rather than determine their Florida-specific input values.
- 19 • In many areas there is a great deal of consistency between the input
- 20 values of the ILECs and AT&T/MCI.
- 21 • In several instances, the input values of AT&T/MCI to HM 5.0a are
- 22 significantly more costly than the same input value for the ILECs to
- 23 BCPM 3.1 because they reflect real world OSP Engineering judgment.
- 24 • There are several major differences between the input values of
- 25 AT&T/MCI to HM 5.0a and the input values of the ILECs to BCPM 3.1

1 in those areas where there are significantly differing modeling
2 assumptions.

- 3 • There are numerous examples of ILEC incorrect and illogical input values
4 having been derived by top-down accounting methods absent direction, or
5 at least a reasonableness check, by OSP Engineers.
- 6 • There appears to be no consistent patterns in these differences.

7
8 Thus, there is no substantiation to representations that ILEC input values are
9 always the correct values and HM 5.0a input values always drive unreasonably
10 low costs. My conclusions are based on a side-by-side comparison of the
11 national default input values for the BCPM 3.1, with the BCPM 3.1 input values
12 filed by BellSouth, Sprint and GTE on August 3, 1998, and the AT&T/MCI
13 input values to the HM 5.0a in this proceeding. This comparison is detailed in
14 the attached Exhibit ___(JWW-4). The following are examples of some of the
15 analyses of these input values by category:

16
17 Pole Costs: The input value comparison for the per unit installed cost of a pole
18 with anchors and guys in density zone 650 - 850 is:

19
20

21	BCPM 3.1				
	<u>Default</u>	<u>BellSouth</u>	<u>Sprint</u>	<u>GTE</u>	<u>HM 5.0a</u>
22	\$775.20	\$406.77	\$596.14	\$801.11	\$417.00

23

24 There is no explanation as to why GTE's input value is 96.9% higher than
25 BellSouth's for Florida-specific installed pole cost. GTE used a mix of 30-foot

1 non-shared poles and 40-foot shared poles. However, Sprint appears to have
2 used only 45-foot poles, which are too tall and much too costly, especially for
3 approximately half of the poles that Sprint does not share. There are obviously
4 major inconsistencies among the ILECs on how to properly model and cost poles
5 using BCPM 3.1.

6
7 The relevant question is "What is a reasonable input value in Florida for pole
8 costs?" For a benchmark, the Federal Communications Commission ("FCC") has
9 gathered pole cost data from the ILECs regarding material and labor costs for
10 40-foot class 4 poles, which is summarized in Exhibit ____ (JWW-2) of my Direct
11 Testimony in this proceeding. Even though it adds costs, HM 5.0a utilizes only
12 40-foot class 4 poles in order to accommodate sharing on any pole. However,
13 there is very little supporting documentation to ascertain the size and class of the
14 pole(s) being modeled by the ILECs or any underlying data regarding how pole
15 costs were derived or may have been validated.

16
17 The total pole costs submitted to the FCC for Florida were BellSouth - \$410.46,
18 Sprint - \$270.00 and GTE - \$440.04. Note that the input values filed by Sprint
19 and GTE in this proceeding are considerably higher.

20
21 The unweighted arithmetical mean of the FCC pole cost data is \$500.75
22 nationwide and \$373.49 for the three Florida ILECs. The nationwide median
23 cost is \$422.14. Therefore, my conclusion is that the input value for pole costs
24 for HM 5.0a of \$417.00 (even though it is indeed a national default value) is

1 actually quite reasonable for Florida based on the ILEC data collected by the
2 FCC and the Florida-specific costs filed by BellSouth.

3
4 Buried Distribution Structure: The input value comparisons for normal buried
5 distribution structure cost in density zone 0 - 5, which is the most rural and
6 therefore most critical in this Universal Service Fund (USF) case, and the most
7 urban density zone of 10,000 + are:

Density Zone	BCPM 3.1 Default	BellSouth	Sprint	GTE	HM 5.0a
0 - 5	\$ 1.47	\$ 3.19	\$ 2.31	\$1.47	\$ 1.77
10000+	\$ 8.84	\$ 7.77	\$ 2.85	\$8.84	\$45.00

8
9
10
11
12
13
14 GTE has utilized BCPM national default values rather than its Florida-specific
15 costs for burying cable, even though it is local contractors that typically bury
16 cables. BellSouth's buried distribution structure cost in the lowest density zone
17 (0 - 5), where USF funding is most applicable, is overstated by at least 75%.

18
19 BellSouth has not figured out how to, or for other reasons has chosen not to,
20 differentiate buried cable structure costs by type for input into the BCPM 3.1
21 bottom-up model. Specifically, BellSouth has filed the same cost of \$3.06 per
22 foot for plow, rocky plow, trench and backfill, rocky trench, backhoe trench and
23 hand dig for each density zone. This is simply wrong. It cost much less per foot
24 to plow cable than it does to trench and backfill.

1 Sprint has also made this same erroneous simplification in Florida, though it was
2 able to provide costs specific to each type of buried cable trench in another state.
3 However, it should be possible to derive these differing costs by type of buried
4 structure from the ILEC's contracts.

5
6 The consequences of this inability, or refusal, of the ILECs to differentiate their
7 buried structure costs are profound in the most rural density zone where the USF
8 Fund would be applied. The reason is that the predominant method of burying
9 cable in rural areas is plowing (e.g., 96% in BellSouth's filing, Bates Stamp
10 000196), and plowing is by far the least costly of the BCPM 3.1 buried structure
11 types. Thus, ILEC buried cable structure costs are substantially overstated in
12 rural areas because the average cost for buried cable structures of all types of
13 placing methods has been used as the input value.

14
15 Note that the HM 5.0a input value in this comparison is inside the range of the
16 ILECs in the lowest density zone. However, in the most urban density zone, the
17 HM 5.0a input value is far more costly than the three ILECs. This is because the
18 HAI Model OSP Engineering Team has more reasonably determined that there
19 are much higher costs for burying cable when the density is more than 10,000
20 lines per square mile. This is just one clear demonstration that the HM 5.0a input
21 values are more realistic and have not been derived to produce unreasonably low
22 costs for the local loop network.

23
24 Further analysis of the ILEC input values for below ground structure shows that
25 BellSouth's buried and underground structure costs in density zone 10,000+ are

1 illogically lower than the same costs in density zones 2,550 – 5,000 and 5,000 –
 2 10,000. It certainly appears that BellSouth has made input value entry errors
 3 which overstate structure costs in density zones 2,550 – 5,000 and 5,000 –
 4 10,000. Also, Sprint's underground structure costs are approximately 10% less
 5 than its buried structure costs in each density zone. This is illogical because a
 6 conduit trench is wider than a buried cable trench, and the trench depth should be
 7 comparable.

8
 9 These few examples clearly demonstrate that the ILECs are using accountants to
 10 unrealistically spread ILEC top-down cost data for input into the bottom-up
 11 BCPM 3.1 without applying the judgment of OSP Engineers. Furthermore, it is
 12 apparent that even with access to the same pool of OSP Contractors in Florida
 13 that Sprint models buried cable structure at less than half the cost of BellSouth.

14
 15 Underground Feeder Structure: The input value comparisons for underground
 16 feeder structure cost in density zone 0 - 5 and the two most urban density zones
 17 are:

Density Zone	BCPM 3.1 Default	BellSouth	Sprint	GTE	HM 5.0a
0 - 5	\$ 2.76	\$ 8.51	\$ 2.02	\$ 2.76	\$10.29
5000 -10000	\$ 8.22	\$16.51	\$ 2.58	\$ 8.22	\$50.10
10000+	\$ 8.84	\$14.88	\$ 2.58	\$ 8.84	\$75.00

23
 24 Since the ILECs have access to the same pool of contractors in Florida who
 25 place underground structure, why would BellSouth's costs for placing

1 underground structure in the most rural density zone be more than four times that
2 of Sprint? In going from the 5,000 - 10,000 density zone to the 10,000+ density
3 zone, the HM 5.0a input value increases by 49.7%, GTE's input value (i.e., the
4 BCPM national default value) increase by 7.5%, Sprint's input value remains
5 constant, but the BellSouth input value inexplicably drops by 9.9%.
6 Unfortunately, there is no supporting ILEC documentation (e.g., the HM 5.0a
7 Inputs Portfolio) that would help to explain such huge discrepancies.

8
9 The HM 5.0a input values in the urban area are far more costly compared to
10 those of the three ILECs. This is because the HAI Model OSP Engineering
11 Team has more reasonably determined that there are extra costs for placing
12 conduit when the density is more than 5,000 lines per square mile. This clearly
13 shows again that the HM 5.0a inputs have been derived from realistic OSP
14 Engineering judgment and certainly do not produce unreasonably low costs.

15
16 Note also that GTE's input values for both buried cable and for underground
17 conduit structure in the three highest density zones are identical to each other
18 (Exhibit ___ (JWW-4), Pg. 1). However, the cost for underground conduit
19 structure should definitely be higher than for buried structure because it takes a
20 wider trench for conduit placement, plus several other cost in general.

21
22 Conduit: The input value comparison for the material cost of 4-inch conduit is:

23
24 BCPM 3.1
25 Default BellSouth Sprint GTE HM 5.0a

1 \$0.83 \$2.24 \$0.73 \$1.39 \$0.60

2

3 The HM 5.0a Inputs Portfolio shows validation data ranging from \$0.52 to
 4 \$0.65, which supports the HM 5.0a input value of \$0.60. However, BellSouth's
 5 input value of \$2.24 per foot for 4-inch conduit purchased in large quantities is at
 6 least 150% too high. Once again, however, there is no ILEC supporting
 7 documentation to explain why Sprint can obtain 4-inch conduit at a much more
 8 reasonable cost than BellSouth or GTE in Florida.

9

10 Structure Sharing (% Paid by Telco) - Aerial: The input value comparisons for
 11 the sharing of aerial structure (after weighting for poles, anchors and guys) in the
 12 most rural and most urban density zones are:

13

14 Density	BCPM 3.1					HM 5.0a
15 Zone	Default	BellSouth	Sprint	GTE		Model
16 0 - 5	56.45%	45.70%	46.89%	55.11%		50.00%
17 10000+	60.53%	49.60%	55.48%	55.11%		25.00%

18

19 There is consistency among all input values in the most rural density zone.
 20 However, HM 5.0a shows considerably more structure sharing (i.e., a lower
 21 percentage paid by the telephone company) in the urban area than in the rural
 22 area. This is because there are, and certainly will be in the future, more utilities
 23 to share with in the urban area than in the rural area. The ILECs, on the other
 24 hand, have modeled little difference in the sharing in the urban area than the rural

1 area. There is no supporting documentation to explain the ILEC's modeling
2 logic, which appears lacking in sound OSP Engineering judgment.

3
4 Structure Sharing (% Paid by Telco) - Buried Distribution Cable and
5 Underground Feeder Conduit: The input value comparisons for the percentage
6 paid by the telephone company for underground feeder structure in the most
7 urban density zones are:

9	Type of	Density	BCPM 3.1				
10	<u>Structure</u>	<u>Zone</u>	<u>Default</u>	<u>BellSouth</u>	<u>Sprint</u>	<u>GTE</u>	<u>HM 5.0a</u>
11	Buried Dist	10000+	80.0%	96.0%	99.9%	100.0%	33.00%
12	UG Feeder	10000+	85.0%	99.0%	95.0%	97.2%	33.00%

13
14 These input values represent a most significant difference of OSP Subject Matter
15 Expert opinion regarding least-cost, most-efficient, forward-looking modeling of
16 the local loop network. In the most urban areas for below ground structures, the
17 forward-looking view of the HAI Model OSP Engineering Team is that the
18 telephone company will be able to share underground costs with two other
19 utilities on the average (HM 5.0a IP, App. B).

20
21 In sharp contrast, BellSouth, GTE and Sprint foresee virtually zero amounts of
22 sharing. However, the Lucent (formerly AT&T) OSP Engineering Handbook
23 that "reflects standard engineering guidelines" supposedly modeled by BCPM 3.1
24 (Bowman Direct, Pg. 7) states that "[i]n areas where both power and telephone

1 utilities plan to bury their facilities, a joint trench is usually advantageous”
 2 (Bowman Direct, Exhibit RMB 3, Pg. 5).

3
 4 The ILECs' viewpoint in regards to virtually zero below ground structure sharing
 5 is based on backward-looking, embedded network experience and is totally
 6 unreasonable for a least-cost, most-efficient, forward-looking model. In a
 7 competitive environment, telephone companies will seek to lower their costs by
 8 sharing structure costs with other utilities. In a forward-looking environment,
 9 there will also be additional utilities out there that will be more willing to share
 10 structure costs.

11
 12 Pole Spacing: The input value comparisons for pole spacing in the most rural
 13 and urban density zones are:

14

15 Density 16 Zone	BCPM 3.1 Default	BellSouth	Sprint	GTE	HM 5.0a
17 0 - 5	250	250	250	175	250
18 10000+	150	150	150	175	150

19

20 There is total agreement between the HM 5.0a, the BCPM national default values
 21 and two ILECs on these input values and on virtually all of the pole spacing input
 22 values in the intermediate density zones. GTE has determined that its Florida-
 23 specific pole spacing is 175 feet. However, in typical top-down accounting
 24 fashion, GTE used the same 175-foot pole span input value in all density zones,
 25 even though it is common knowledge that poles are further apart in rural areas.

1 This demonstrates an appalling lack of OSP Engineering oversight. This also
 2 results in GTE's cost for aerial plant in rural areas to be overstated because too
 3 many poles are modeled per aerial cable route distance.

4
 5 Copper Cable: BellSouth, GTE and Sprint all have input values for 3000, 3600
 6 and 4200 pair 24 gauge cables. However, 24 gauge cables are simply not
 7 manufactured in sizes larger than 2400 pairs. Therefore, it is rather obvious that
 8 the ILECs are not using the actual existing prices that they pay for specific size
 9 cables, since they could not possibly have purchased these particular cables for
 10 which they have provided input values. Again, it is obvious that accountants are
 11 determining the BCPM 3.1 input values for the ILECs without the input or
 12 oversight of competent OSP Engineers.

13
 14 The comparisons of the total cost input values for the smaller sizes of 24 gauge
 15 buried cables, which would be used extensively in rural areas, are:

17	Cable	BCPM 3.1				
18	Size	Default	BellSouth	Sprint	GTE	HM 5.0a
19	200 pair	\$4.45	\$4.35	\$4.51	\$4.35	\$4.42
20	50 pair	\$2.50	\$1.30	\$2.55	\$1.89	\$1.70
21	25 pair	\$2.08	\$0.78	\$2.27	\$1.41	\$1.24
22	12 pair	\$2.05	\$0.78	\$1.98	\$1.39	\$0.79
23	6 pair	\$1.97	\$0.78	\$1.73	\$1.34	\$0.66

24

1 HM 5.0a models 6 and 12 pair 24 gauge cables when they satisfy cable size
2 requirements because they represent currently available technology alternatives
3 that have lower installed cost and are more efficient in terms of cable utilization
4 than 25 pair cables. BellSouth has defaulted to the 25 pair cable costs for 6 and
5 12 pair cable sizes. The rationale is that current (i.e., BellSouth's embedded)
6 operating practices do not allow these small cables in their inventories.

7
8 The relevant criteria for determining USF support are least-cost and most-
9 efficient based on currently available technology. The latest input values filed by
10 BellSouth in the BCPM 3.1 for 6 and 12 pair 24 gauge cable does not satisfy
11 these relevant criteria. Furthermore, the greatest manifestation of this excessive
12 cable costing will be in the most rural areas where the smallest cables are more
13 prevalent and where the USF support will be most required. BellSouth should
14 provide appropriate input values for 6 and 12 pair 24 gauge copper cables in
15 BCPM 3.1 for the purpose of determining appropriate local loop costs for USF
16 support, which is what Sprint and GTE have done.

17
18 BellSouth utilizes the same copper cable prices for feeder and distribution cable
19 applications. However, BellSouth's cable prices include cable terminals via a
20 loading factor (BellSouth's Model Inputs and Assumptions, Bates Stamp
21 000157). Feeder cables simply do not have cable terminals, yet BellSouth's
22 feeder cable costs obviously include a loading factor for terminals. This is a
23 prime example of misapplying top-down costing principles in a bottom-up
24 costing model without OSP Engineering judgment direction or oversight.

1 Another seemingly illogical phenomenon of BellSouth's cable costing is that its
 2 26 gauge aerial cable costs are higher than its 24 gauge buried cable cost for each
 3 pair size. Also, BellSouth's cost for 25 pair 26 gauge aerial and buried cables are
 4 higher than for the same cables in 24 gauge. Because 26 gauge copper
 5 conductors are smaller than 24 gauge, 26 gauge cables are less costly than 24
 6 gauge cables in the same pair size for the same application.

7
 8 For some unexplained reason, Sprint's underground cable costs (i.e., without
 9 structure) are significantly higher than its aerial and buried cable cost for the
 10 same pair size and gauge of cables. This contradicts the appropriate relationship
 11 demonstrated by the comparable input values for HM 5.0a and the other ILECs.

12
 13 Fiber Cable: The input value comparisons for aerial fiber cable total costs are:

15	Fiber	BCPM 3.1				
16	<u>Strands</u>	<u>Default</u>	<u>BellSouth</u>	<u>Sprint</u>	<u>GTE</u>	<u>HM 5.0a</u>
17	144	\$9.85	\$9.96	\$7.82	\$10.33	\$9.50
18	48	\$5.27	\$3.71	\$4.15	\$4.37	\$4.70
19	12	\$3.04	\$1.37	\$2.83	\$1.90	\$2.90

20
 21 Thus, the HM 5.0a fiber cable costs are shown to be very reasonable. Also, HM
 22 5.0a has a maximum size fiber cable of 216 strands versus 288 strands for the
 23 BCPM 3.1 and the three ILECs. Thus, HM 5.0a will incur even higher fiber
 24 cable costs than BCPM 3.1 when the fiber strand requirements exceed 216

1 because HM 5.0a will place an additional fiber cable with supporting structure at
 2 multiples of 216 required strands instead of at multiples of 288 required strands

3
 4 Serving Area Interface ("SAI", also known as Feeder Distribution Interface):

5 The input value comparison for the installed (i.e., material and installation) cost
 6 of a 3600 pair indoor SAI is:

8	BCPM 3.1				
9	<u>Default</u>	<u>BellSouth</u>	<u>Sprint</u>	<u>GTE</u>	<u>HM 5.0a</u>
10	\$19,605	\$73,534	\$32,175	\$19,605	\$4,928

11
 12 There are obviously incredible differences. The HM 5.0a input value is described
 13 in Section 2.9 of the HM 5.0a Inputs Portfolio. There is no similar
 14 documentation to explain the ILEC's costs. The material components consist of
 15 a plywood backboard, modular protector units, connecting blocks and jumper
 16 wire. BellSouth's cost level could cover several weeks of engineering and labor
 17 plus \$14,418 in supply costs, all of which are exorbitant. Note that GTE has
 18 defaulted to the BCPM national input value rather than ascertain its Florida-
 19 specific costs.

20
 21 Only BellSouth furnished detailed SAI costs (Exhibit ___ (JWW-4), Pg. 15 -
 22 18). Note how the "engineering" costs have been applied linearly based on the
 23 pair count of the SAI. For example, BellSouth has costed \$312.66 to engineer a
 24 100 pair indoor SAI and \$13,131.68 to engineer a 4200 pair indoor SAI (i.e., 42
 25 times more). However, real world engineering costs for an indoor SAI vary little

1 by pair size. This is an example of the top-down accounting application of ILEC
 2 cost data without OSP Engineering judgment.

3
 4 Drop Wire Placement – Aerial and Buried: The comparisons of ILEC input
 5 values for the aerial and buried total drop wire costs are:

7	Drop	Density	BCPM 3.1				
8	Type	Zone	Default	BellSouth	Sprint	GTE	HM 5.0a
9	Aerial	0 - 5	\$ 0.77	\$ 0.26	\$ 0.80	\$0.62	\$0.26
10	Aerial	10000+	\$ 0.77	\$ 0.26	\$ 0.80	\$0.62	\$0.33
11	Buried	0 - 5	\$ 0.77	\$ 0.70	\$ 0.74	\$0.62	\$0.74
12	Buried	10000+	\$ 0.77	\$ 0.70	\$ 0.74	\$0.62	\$5.14

13
 14 HM 5.0a appropriately reflects the real world by modeling higher drop costs for
 15 the urban versus rural areas, 27% higher for aerial drops and 595% higher for
 16 buried drops. The ILECs model the same cost per foot in all density areas by
 17 drop type. This shows a lack of OSP Engineering judgment and also results in
 18 higher drop costs in rural areas because the average drop cost is being applied.

19
 20 Drop costs have a major impact on total loop costs because they represent a
 21 significant amount of investment that occurs at virtually each customer location.
 22 The impact of inappropriate drop costing on a per foot basis is even more
 23 profound in rural areas because of generally longer drops lengths.

1 Buried drops simply cost more than aerial drops. Note that BellSouth more than
 2 doubles its installed cost for buried drops versus aerial drops, while HM 5.0a
 3 increases range from 184% to 1458%. In contrast, Sprint's costing of aerial
 4 drops higher than buried drops is astonishingly illogical.

5
 6 Note that GTE's buried and aerial drop input values (i.e., the BCPM 3.1 national
 7 default values) are the same, and they are at the much higher buried drop cost
 8 level. This is because GTE is modeling 100% buried drop costs, which cost
 9 more than aerial drops. This is a clear violation of the FCC Criteria No. 1 that the
 10 model be "reasonable" and "least-cost" based on currently available technology.

11
 12 The drop wire input values of the HM 5.0a are clearly realistic and reasonable
 13 compared to those of the ILECs. Furthermore, in urban density zones, the HM
 14 5.0a drops costs are significantly higher. This reflects sound OSP Engineering
 15 judgment of real world higher costs that has been consistently incorporated into
 16 the HM 5.0a input values as appropriate.

17
 18 Network Interface Device ("NID"), Protector and Interface: The input value
 19 comparison for the total costs of NID, Protector and Interfaces is:

20

21	NID	BCPM 3.1				
22	Type	Default	BellSouth	Sprint	GTE	HM 5.0a
23	Residential	\$30.73	\$56.61	\$58.95	\$29.49	\$29.00
24	Business	\$30.73	\$56.61	\$99.85	\$29.49	\$44.00

25

1 BellSouth and GTE utilize the same cost for residential and business NIDs,
 2 whereas Sprint and HM 5.0a appropriately reflect lower cost for residential
 3 NIDs. Why are Sprint's business NID costs so much higher? HM 5.0a costs are
 4 within the range of the ILEC costs.

5
 6 Digital Loop Carrier: The comparisons of ILEC input values for digital loop
 7 carrier costs are:

9	Cost	Line	BCPM 3.1				
10	Type	Size	Default	BellSouth	Sprint	GTE	HM 5.0a
11	Fixed	25	\$19,204	\$ 19,204	\$ 23,159	\$ 23,754	\$18,300
12	Fixed	673	\$96,859	\$ 96,859	\$128,569	\$113,125	\$88,500
13	Per Line	0 - 192	\$94.00	\$94.00	\$98.59	\$72.39	\$100.00
14	Per Line	192 - 2016	\$89.11	\$89.11	\$68.02	\$72.39	\$ 77.50

15
 16 Why does GTE input the same cost for low density and high density line cards?
 17 The ILEC's fixed costs for DLC RT locations are extremely high considering
 18 that these locations would be generally much smaller than 999 lines, the BCPM
 19 3.1 threshold. In other words, the smaller size DLC RTs modeled by BCPM 3.1
 20 should be housed predominantly in cabinets and not require more expensive huts
 21 or controlled environment vaults ("CEVs"). It appears that ILEC accountants
 22 have loaded DLC RT site input values reflecting the embedded network
 23 investment including huts and CEVs. There is no supporting documentation that
 24 would reflect appropriate OSP Engineering judgment.

1 Why are high density DLC system costs per line significantly less for Sprint and
2 GTE than for BellSouth? The conclusion of the Staff of the Louisiana Public
3 Service Commission was that the BCPM inappropriately modeled the expensive
4 REUVG range extension line card for high density DLC systems (Louisiana
5 Staff's Final Recommendation, Docket No. U-20833, March 27, 1998, Pg. 14).
6 BellSouth has adopted the BCPM national default value that still includes the
7 exorbitant REUVG range extension line cards; whereas, Sprint and GTE appear
8 to have made the appropriate adjustment to the lower cost RUVG2 range
9 extension line card.

10
11 HM 5.0a models sufficient costs for range extension line cards as required. For
12 the CSAs requiring low density DLC Systems, HM 5.0a models the Advanced
13 Fiber Systems UMC 1000. HM 5.0a has costed these systems with 100%
14 utilization of UMC Remote Terminal Range Extension RST POTS Channel Units
15 (R-EPOTS or simply EPOTS), even though the less expensive standard RPOTS
16 card is sufficient for loops up to 12,000 feet from the DLC RT. Note that this is
17 reflected in the HM 5.0a low density per line costs, which are higher than those
18 of the ILECs.

19
20 For high density CSAs, HM 5.0a models the DSC Litespan 2000 DLC System.
21 HM 5.0a incorporates costs for the DSC Litespan 2000 RPOTS channel unit for
22 customers served by large DLC RT units to a distance of 17,600 feet. DSC
23 recommends the use of the RUVG2 card for those customers exceeding 17,600
24 feet in distribution length. Since the maximum distribution length is limited to

1 18,000 feet in HM 5.0a, the number of customers requiring this card from a high
2 density DLC system is de minimis.

3
4 To add some further perspective to the debate over range extension requirements
5 and appropriate costs, BCPM 3.1 recommends range extension only for loops
6 exceeding 13,600 feet from the DLC RT (BCPM 3.1 Description, Pg. 55).
7 According to Mr. Brian Pitkin, an AT&T/MCI Witness in this proceeding, the
8 HM 5.0a network designed for Florida has less than 0.05% of its loops exceeding
9 13,600 feet in distribution length from the DLC RT. Furthermore, most of these
10 loops will be served by low density DLC systems, which have 100% range
11 extension line cards in HM 5.0a. My conclusion is that HM 5.0a models more
12 than sufficient costs for the required range extension line cards.

13
14 Fiber/Copper Breakpoint: The input value comparison for the fiber/copper
15 breakpoint is:

16	BCPM 3.1				
17	<u>Default</u>	<u>BellSouth</u>	<u>Sprint</u>	<u>GTE</u>	<u>HM 5.0a</u>
18	12,000	12,000	12,000	12,000	9,000
19					
20					

21 The explanation for the 3,000 foot difference between BCPM 3.1 modeled by the
22 ILECs and HM 5.0a is that BCPM 3.1 is measuring the longest total loop length
23 in a CSA whereas HM 5.0a is measuring the feeder distance from the wire center
24 to the Feeder Distribution Interface ("FDI"). The overall impact of this
25 difference in modeling methodologies is not that significant. However, the latest
26 dynamic copper versus fiber feeder selection methodology employed by the HM

1 5.0a (HM 5.0a Methodology, Sec. 4.5) is the one that replicates the process
 2 utilized by a real world OSP Engineer.

3
 4 Plant Mix - Distribution: The input value comparisons for the percentage of
 5 distribution plant are:

6	7	Density	BCPM 3.1				
8	Type of Plant	Zone	Default	BellSouth	Sprint	GTE	HM 5.0a
9	Underground	10000+	90.00%	90.00%	1.50%	1.96%	10.00%
10	Buried	0 - 5	60.00%	60.00%	87.50%	78.11%	75.00%
11	Aerial	10000+	0.00%	0.00%	13.20%	73.90%	5.00%

12
 13 BellSouth has adopted the BCPM 3.1 national default input values for all of its
 14 plant mix inputs because it cannot ascertain from its own Florida-specific data the
 15 appropriate mix of plant in Florida. There are huge differences among the ILEC
 16 input values.

17
 18 The BCPM 3.1 national default input, which BellSouth has adopted, is 90%
 19 underground distribution plant in the 10000+ density zone. However, in this
 20 most urban, high density zone, most feeder cables go into buildings, and most of
 21 the distribution cables are either inside of or attached to buildings or placed in
 22 ducts provided by property owners. Thus, when BellSouth models 90% of the
 23 distribution plant as underground, it is adding substantial costs for underground
 24 conduit and manholes that are simply not required.

1 In sharp contrast, HM 5.0a has a more reasoned input value of 10% as described
 2 in the HAI Model Release 5.0a Inputs Portfolio Section 2.5. Also, note that
 3 Sprint and GTE have even smaller input values of less than 2.0% for
 4 underground distribution plant in urban areas.

5
 6 Another example of flawed modeling logic is the fact that BellSouth, again using
 7 the BCPM national default input value, shows 0.00% for aerial plant in the most
 8 urban density zone. Moreover, Sprint has modeled 83.5% of its distribution
 9 cables in the highest density zone as buried plant, which would be cost
 10 prohibitive, if not impossible, to place in a congested urban area. Neither of
 11 these ILEC input values reflects sound OSP Engineering judgment.

12
 13 Plant Mix – Fiber Feeder: The input value comparisons for the percentage of
 14 fiber feeder plant are:

16		Density	BCPM 3.1				
17	<u>Type of Plant</u>	<u>Zone</u>	<u>Default</u>	<u>BellSouth</u>	<u>Sprint</u>	<u>GTE</u>	<u>HM 5.0a</u>
18	Underground	0 - 5	10.00%	10.00%	23.50%	86.91%	5.00%

19
 20 GTE's high input value of 86.91% for underground fiber feeder percentage in the
 21 rural areas is simply ridiculous. Feeder routes in rural areas consist of only one
 22 fiber cable that will never need to be reinforced. Such situations clearly call for
 23 less costly buried or aerial plant. No cost-efficient telephone company would
 24 incur the exorbitant cost of building a conduit and manhole system for 86.91% of
 25 its fiber feeder in rural areas. This is an even more profound issue given that the

1 BCPM 3.1 also models excessive fiber feeder to far too many DLC RT locations
2 (detailed elsewhere in this testimony). The impact of this egregious error in plant
3 mix is to greatly inflate GTE's rural costs, which results in an artificially high
4 Universal Service Fund.

5
6 Investment Loop Cap: BCPM 3.1 employs an investment loop cap to allow for a
7 maximum individual loop investment based on either potential regulatory policy
8 or a wireless technology alternative (BCPM Methodology, Pg. 56). The default
9 value is \$10,000, which has been commonly accepted in numerous proceedings
10 by all parties. In this proceeding however, BellSouth has filed an Investment
11 Loop Cap of only \$4,350, without any explanation or supporting documentation.

12
13 BellSouth's In-Plant Loading Factors: BellSouth's engineering and labor costs
14 are derived from BellSouth's in-plant loading factors that convert the material
15 prices to an installed investment. Having analyzed BellSouth's in-plant loading
16 factors in UNE Cost Dockets in eight states, including Florida, I believe that
17 BellSouth's OSP loadings are not forward-looking and, instead, are utilized to
18 recover the costs of BellSouth's embedded methods of operation. I have several
19 concerns with BellSouth's cost modeling methodology base on its use of top-
20 down loading factors.

21
22 BellSouth applies a material loading factor to the inflated (Caldwell Direct, Pg. 9)
23 direct material cost for copper and fiber cables in its OSP Field Reporting Codes.
24 These material loading factors are modeled primarily to recover
25 telecommunications engineering and labor, vendor engineering and installation,

1 exempt (i.e., minor) material, and sales tax (Caldwell Direct, Pg. 11). BellSouth's
2 methodology is to calculate a ratio of these associated expenses to its non-
3 exempt (i.e., major) material investments for the year 1995, and then multiply this
4 ratio by the inflated direct cable material cost.

5
6 I do not believe that BellSouth's ratio of material loading expenses to cable
7 investment in 1995 should be considered least-cost, most-efficient, or forward-
8 looking based on currently available technology. Mr. William Zarakas,
9 BellSouth's Cost Modeling Witness in the UNE Cost Dockets, stated in his
10 deposition in Louisiana that, "our assumption there would be that *the cost of*
11 *installing a pole in the future would basically be the same as it was in the past,*
12 *because we see no change in the technology. And we did that for each*
13 *individual factor or loading"* (Zarakas Deposition, LA Docket U-22022/U-
14 22093, 8/19/97, Pg. 110, with italics added for emphasis). However, the BCPM
15 proponents contradict this statement by saying that "the Model does not rely
16 upon embedded costs for facilities, functions or elements" (BCPM Methodology,
17 Pg. 12).

18
19 Going beyond the fundamental methodology question and looking into the data
20 provided on the material loading factors raises additional questions. These
21 material loading factors for cable are huge contributors to the total loop
22 investment. The following examples of these in-plant loadings will demonstrate
23 how they are used to drive enormous underlying costs that make up BellSouth's
24 input values to the BCPM 3.1:

- 1 • A prime example of the impact of these loadings can be found in the
2 BellSouth's application of in-plant loading factors to SAIs. In BellSouth's
3 costing of a 4200 pair indoor SAI, \$13,689 worth of material becomes
4 \$85,789 in installed costs. Thus, the in-plant loading factors account for
5 84% of the total costs.
- 6 • ILEC Engineering and placing costs have been allocated based on cable
7 size or material costs. For example, BellSouth's placing input values for
8 24 gauge underground cable are \$1.03 for 100 pair and \$22.96 for 2400
9 pair. Likewise, BellSouth's engineering input values for these same
10 cables are \$0.15 and \$3.37. It simply does not cost 22 times as much to
11 engineer or place a 2400 pair underground cable than a 100 pair
12 underground cable. In reality, there is very little difference in the costs to
13 engineer and place an underground copper cable based on its pair size.
- 14 • BellSouth has double counted placing costs for buried copper and fiber
15 cables because it zeroed out the splicing column instead of the placing
16 column in its buried cable tables. Buried cable placement costs are
17 appropriately included in the buried structure costs and should not be
18 included in the cost of the buried cables themselves. Furthermore, based
19 on a comparison of these additional buried placement costs to the splicing
20 cost for aerial and underground cables, this double-counting does not
21 seem to have been a simple matter of BellSouth putting its splicing costs
22 in the placing costs column. Thus, BellSouth's installed buried cable
23 costs are overstated.

- 1 • There are a significantly higher supply costs for aerial versus buried and
2 underground copper cables of the same gauge and pair count as shown in
3 the following table:

4 BellSouth's Copper Cable Supply Costs

5

6

7 Size/ 8 Type	9 <u>24 Gauge Cables</u>			10 <u>26 Gauge Cables</u>		
11 Pairs	12 <u>4200</u>	13 <u>900</u>	14 <u>25</u>	15 <u>4200</u>	16 <u>900</u>	17 <u>25</u>
18 Aerial	19 \$22.64	20 \$4.87	21 \$0.30	22 \$19.72	23 \$4.50	24 \$0.34
25 Buried	26 \$13.32	27 \$2.86	\$0.13	\$12.70	\$2.81	\$0.17
UG	\$18.21	\$5.63	\$0.12	\$16.68	\$4.02	\$0.11

13

14 The explanation cannot be that BellSouth includes terminal costs as a
15 cable loading factor because there are no comparable supply costs for
16 buried cables that also have terminals. Furthermore, comparable supply
17 costs have been applied to the larger size cables, which rarely have
18 terminals. Also, the explanation cannot be due to strand and pole line
19 hardware costs because there are no comparable supply costs for aerial
20 fiber cables?

- 21 • BellSouth's costs for splicing aerial cables are unrealistically higher than
22 splicing costs for underground cables of the same pair size and gauge.
- 23 • BellSouth's filing also shows that it is more costly to place 26 gauge
24 underground cables than larger and heavier 24 gauge cables of the same
25 pair size.
- 26 • BellSouth's engineering costs vary considerably between 24 and 26 gauge
27 cables of the same pair size and type of plant.

1 • Furthermore, since fiber cable sheaths are the virtually the same
2 regardless of fiber count, there is no rationale for BellSouth to model a
3 much higher cost to place a fiber cable of higher fiber count. This
4 discrepancy causes BellSouth's fiber cable placement costs for larger fiber
5 cables to be overstated.

6
7 These are but a few examples where BellSouth has taken an illogical, top-down
8 accounting approach to deriving input values that simply contradict real world
9 OSP Engineering. BellSouth's filing shows a lack of OSP Engineering judgment
10 in the determination or review its cable input values. Noteworthy is the
11 observation that GTE and Sprint simply did not file the underlying costing details
12 for their cable input values for analysis.

13
14 Drop Wires: Responses to Data Requests in this proceeding show that ILECs
15 serve fewer than xxx lines per residence. Yet, BCPM 3.1 assumes five-pair
16 buried drops for both residences and businesses. While ILECs can certainly
17 choose to invest in five-pair buried drops to every residence to preclude ever
18 having to reinforce any of them, it does not seem reasonable that the Universal
19 Service Fund should fully support the excessive spare capacity. Furthermore, the
20 availability of two-channel DSL Systems provides a viable alternative for up to
21 four subscriber lines on a two-pair buried drop for those residential customers
22 who may someday require more than two lines. My recommendation, for the
23 purpose of USF costing, is that all residence buried drops should be two pair.

24

1 Lack of Real World Variation in Input Values: The ILECs have filed in BCPM
2 3.1 input values in a manner that totally disregards clearly understood differences
3 by density zone. There is no appropriate variation in many of the ILEC input
4 values by density zone for such input values as pole structure sharing, aerial and
5 buried drop costs, or distribution fill factors. The following examples will further
6 illustrate the lack of OSP Engineering judgment in deriving ILEC input values:

- 7 • BellSouth utilizes the same costs per foot for conduit installation and cost
8 per foot for buried cable installation for each trenching method: Trench
9 and Backfill, Rocky Trench, Backhoe Trench and Hand Dig Trench.
10 Sprint does likewise. Furthermore, BellSouth does not vary its buried
11 cable trenching costs for differing terrain conditions of normal, soft rock
12 and hard rock.
- 13 • Sprint even uses the same base cost per foot installed for both conduit
14 and cable placement for all methods, all soil types, and all density zones.
15 Sprint's explanation is that "the contract does not differentiate among
16 these activities" (Sprint's Response to AT&T's First Set of
17 Interrogatories, Att. 24). As an OSP Engineer, I find that statement
18 rather amazing. As an example of the impact of these simplified input
19 values, For Hard Rock - Feeder Conduit Trench and Backfill, BellSouth
20 has filed a base cost per foot installed of \$60.98 compared to Sprint's
21 filing of \$1.90, a difference of 3,209%. This contradicts real world OSP
22 costing, because trench costs vary considerably by method, density zone
23 and type of soil condition.

1 BCPM 3.1 contains extensive input value tables that have been developed to
2 appropriately differentiate pole, buried cable and underground conduit placement
3 costs by type of method, by density zone, and by soil conditions. The ILECs may
4 rationalize that by populating these input tables with average values that "it all
5 averages out." However, the abject failure of the ILECs to populate the cells of
6 these input value tables with realistic costs raises considerable doubt regarding
7 the validity of BCPM 3.1 output in any particular density zone.

8
9 Contract Prices: Ms. Caldwell states that "BellSouth's structure placement costs
10 (contractor costs) for placing conduit, trenching/plowing buried cable, and
11 placing poles are based on an average of the ten existing BellSouth contracts with
12 outside plant contractors in Florida" (Caldwell Direct, Pg. 9). ILECs use such
13 "Master Contracts" to award day-to-day small-scale routine work and smaller-
14 scale projects. However, in accordance with the "least-cost, most-efficient"
15 assumptions of FCC Criterion 1, the appropriate contractor costs for these
16 models should be lower than these averages to reflect only large-scale projects
17 that are put out for competitive bids. This would produce more appropriate
18 contractor costs consistent with the underlying "scorched node" assumption of
19 these models.

20
21 The supposedly proper application of the "scorched node" assumption by BCPM
22 3.1 has been testified to by Dr. Staihr when he stated that, "the BCPM 3.1 model
23 assumes *that the entire network is built at a single point in time*. This allows the
24 service provider to *realize certain 'efficiencies' and 'economies of scale' that*
25 *could not have been realized historically'*" (Staihr Direct, Pg. 7 with italics added

1 for emphasis). The averaging of Master Contract costs by the ILECs to
2 determine input values to BCPM 3.1 does not conform with this very key
3 assumption.

4
5 Summary Regarding Input Value Comparisons: These input value comparisons
6 are rather clear examples of the ILECs having the data but not seeming to know
7 how to identify and/or correctly apply their data as input values into a bottom-up,
8 least-cost model. It is also apparent that the ILEC OSP input values for many
9 items have been derived via accounting methods that have not been subjected to
10 a reasonableness check by OSP Engineers.

11
12 Some BCPM witnesses have frankly admitted this. One stated that, "GTE does
13 not necessarily maintain data that can be easily translated into all of the input
14 values for the BCPM or HAI models" (Robinson Direct, NC Docket P-100, SUB
15 133b, 12/10/97, Pg. 5). Another ILEC witness has testified that "it is difficult
16 and time consuming to make all model default inputs company-specific.
17 Therefore, in producing costs using a cost proxy model, GTE must rely on many
18 default inputs" (Collins Direct, TX Docket 18515, 2/17/98, Pg. 4).

19
20 It is indeed difficult for the ILECs to properly define and properly apply OSP
21 input values, even though they have volumes of state-specific cost data. On the
22 other hand, HM 5.0a employs national default input values developed by the HAI
23 OSP Engineering Team that work within the HM 5.0a to produce Florida-
24 specific outputs because:

- 1 • The labor content of OSP costs are reduced from national levels by a
- 2 Florida-specific factor of 68% (HM 5.0a IP, Sec 7.)
- 3 • Placing costs are increased appropriately for difficult terrain, surface
- 4 texture, rock depth, rock hardness and water depth statistics that are
- 5 Florida-specific at the CBG level.
- 6 • Customer and wire center locations are Florida-specific at the individual
- 7 location level.
- 8 • Material costs for a least-cost model representing large ILECs should not
- 9 vary significantly from nationwide material costs.

10

11 **Q. HAS THE BCPM 3.1 ACHIEVED THE MOST REALISTICALLY**

12 **ATTAINABLE LEVEL OF ACCURACY FOR IDENTIFYING**

13 **CUSTOMER LOCATIONS?**

14 A. No. One of the primary goals of a superior local loop model is precise customer

15 location because this is the basis for accurate and cost-efficient network design.

16 The BCPM 1.0 and the Hatfield Model up through Release 4.0 located or

17 assigned customers at the CBG level. The BCPM 2.0 and now BCPM 3.1 use

18 housing and business line data at the CB level to better locate customers. On

19 average, there are about 30 CBs per CBG (BCPM 3.1 Description, Pg. 6).

20 However, the HM 5.0a is much more precise in locating customers through

21 latitude and longitude geocoding to six decimal places of the customer's

22 addresses (HM 5.0a Description, Sec. 5.4.3).

23

24 The overall geocoding success rate for HM 5.0a, as calculated by Mr. Pitkin, was

25 70% of the Florida customers in this proceeding. It is higher in the urban areas

1 because customer locations have more geographically definite addresses and
2 lower in rural areas for the opposite reason.

3
4 BCPM 3.1 does not actually locate any customers. In essence, it locates roads
5 and then assumes that customers in the CB are uniformly distributed along those
6 roads (Duffy-Deno Direct, Pg. 3). The testimonies of Messrs. Pitkin and Wood
7 critique the BCPM 3.1 grid based customer location methodology in detail.

8
9 **Q. HOW WELL DOES THE BCPM 3.1 GROUP CUSTOMERS AS AN OSP**
10 **ENGINEER WOULD IN DESIGNING A LOCAL LOOP NETWORK?**

11 **A.** Not nearly as well as HM 5.0a. The BCPM 3.1 translates the CB level customer
12 information into a microgrid that has its boundaries based on fixed latitude and
13 longitude lines. As these microgrids are subsequently combined into ultimate
14 grids, or CSAs, for the purpose of modeling the OSP network, their boundaries
15 are still arbitrarily fixed. The BCPM 3.1 CSAs are then divided into four
16 Distribution Area ("DA") quadrants.

17
18 One unintended consequence of this BCPM 3.1 modeling methodology is that
19 some natural clusters of customers (e.g., a small town or subdivision) will be
20 arbitrarily segmented into different DAs, CSAs or feeder routes in contradiction
21 to the way that they would in reality be engineered. As an OSP Engineer, I thus
22 take exception to the assertion that "BCPM designs a network the way actual
23 telephone companies design networks" (Bowman Direct, Pg. 6). Furthermore,
24 the current FCC Public Notice states that, "we consider a model platform that
25 groups customers using a clustering approach because it appears to have

1 advantages over gridding approaches" (FCC Public Notice DA 98-1587, 8/7/98,
2 Pg. 4).

3
4 The BCPM 3.1 road-reduced DA (BCPM 3.1 Methodology, Pg. 49) is based on
5 two questionable assumptions:

- 6 1. That simply designating "a 500 foot buffer along each side of the roads
7 within the distribution quadrant" in all density zones will model the
8 correct size DA for distribution cable design. Because the arbitrariness of
9 this assumption can result in oversizing the DA, the BCPM 3.1 has had to
10 add a check to constrain the area of the DA so that it does not exceed the
11 actual area of the microgrid itself (BCPM 3.1 Methodology, Pg. 49,
12 Footnote 36).
- 13 2. The center of each quadrant's DA should be placed at the road centroid
14 of the quadrant because customers are uniformly distributed along the
15 roads. While this is an improvement over locating them at the centroid of
16 a CBG, in reality the road centroid could be in the middle of a lake, on
17 top of a mountain, or in any number of inaccessible places.

18
19 On the other hand, HM 5.0a clusters its more precisely located customers like an
20 OSP Engineer would do in designing a local loop network (HM 5.0a Description,
21 Sec. 5.5) based on:

- 22 • assuring a reasonable proximity of the customer locations to each other
23 (i.e., two miles),

- 1 • maximizing the copper distribution length up to 18,000 feet from the
- 2 DLC RT based on fully utilizing the capabilities of currently available
- 3 technology,
- 4 • maximizing the customer line size of the DLC RT up to 1,800 lines based
- 5 on 90% utilization of a 2,016 line DLC system,
- 6 • designing the shortest distance between customer clusters (however,
- 7 based on right angle routing to assure sufficient cable length), and
- 8 • efficiently linking "outlier clusters" to main clusters.

9

10 "One of the major challenges of building a proxy model is clustering customers in

11 a fashion that integrates engineering practices based on this CSA approach"

12 (BCPM 3.1 Methodology, Pg. 24). I certainly agree, and conclude that the HM

13 5.0a methodology of grouping customer locations into clusters based on OSP

14 Engineering principles is clearly superior to the BCPM 3.1 methodology of

15 assembling and dividing grids with fixed boundaries at various latitude and

16 longitude lines.

17

18 **Q. DOES EITHER BCPM 3.1 OR HM 5.0a ACTUALLY DESIGN**

19 **DISTRIBUTION CABLES TO EACH AND EVERY CUSTOMER**

20 **LOCATION?**

21 **A.** No. Each model sizes and centers its DAs using different methodologies. Each

22 model then effectively lays out a grid of backbone and branch distribution cables

23 to serve the defined DAs areas from the defined DA centers. However, "[t]he

24 [BCPM 3.1] road-reduced area is *not used to locate customers*, but as a

25 *modeling tool to determine likely cable distances required to serve customers in*

1 the distribution quadrant" (BCPM 3.1 Methodology, Pg. 20, with italics added
2 for emphasis). Dr. Duffy-Deno helps to further clarify the BCPM 3.1 distribution
3 cable modeling methodology by stating:

4 It is important to make clear that *BCPM does not locate customers within*
5 *the road-reduced areas. Estimated customer locations* reside in the
6 microgrids and *are not "moved"* to the road-reduced areas. Rather, the
7 road-reduced area is used as a *tool to estimate the amount of cable*
8 *needed to serve the estimated customer locations* that reside within the
9 microgrids in populated distribution quads (Duffy-Deno Direct, Pg. 20,
10 with italics added for emphasis).
11

12 Claims that either model "moves customers" or "comes up short" of reaching a
13 particular customer location must be evaluated with the above understanding of
14 what these two models do, and do not do, in regards to distribution cable
15 modeling. For example, the BCPM 3.1 Model Methodology makes the following
16 false and very misleading statement when it states that, "*BCPM places cable to*
17 *the actual customer locations, rather than moving the customers to some*
18 *hypothetical distribution cable network*" (BCPM 3.1 Methodology, Pg. 34, with
19 italics added for emphasis). The truth is that neither model designs a distribution
20 cable to each and every precise customer location, and neither model physically
21 "moves customers."
22

23 The relevant issue then is to determine which model has the most accurate, most
24 reasonable, least-cost, most-efficient methodology based on currently available
25 technology for modeling sufficient distribution cable and structure investment to
26 serve all of the customers located in the CSA/DA. The relevant evaluation
27 criteria are:

- 28 • precisely locating customers,

- 1 • clustering customers into CSA/DAs in a manner consistent with that of an
- 2 OPS Engineer,
- 3 • cost-effectively sizing the CSA/DAs,
- 4 • realistically shaping the CSA/DAs,
- 5 • determining the center of the CSA/DAs relative to the customer
- 6 locations,
- 7 • determining the number of FDIs needed,
- 8 • laying out the distribution cable grid in realistic and cost-efficient
- 9 configuration (e.g., rectangular lots),
- 10 • sufficiently sizing the distribution cables to serve existing customers only
- 11 with appropriate administrative and maintenance spare capacity, and
- 12 • conforming to transmission requirements for loop resistance and loss.

13

14 The CSA/DA modeling methodology, assumptions and input values of HM 5.0a
15 are superior to those of BCPM 3.1 in regards to each of the above criterion.

16

17 **Q. DOES THE BCPM 3.1 METHODOLOGY FOR MODELING CSAs**
18 **PRODUCE THE LEAST-COST, MOST-EFFICIENT, FORWARD-**
19 **LOOKING AND REASONABLE LOCAL LOOP MODEL BASED ON**
20 **CURRENTLY AVAILABLE TECHNOLOGY?**

21 **A.** Absolutely not. There are two major shortcomings in the BCPM 3.1
22 methodology for modeling CSAs that result in an overestimate of network costs
23 with an excessive number of DLC RT locations. The BCPM 3.1 CSAs are:

- 1 • too small geographically because they are designed far beneath the
2 maximum distribution cable distance reachable with currently available
3 technology, and
- 4 • too small in terms of the number of customers served because the
5 maximum line threshold for an ultimate grid CSA is well below the
6 capacity of the DLC RT to serve customers in a CSA.

7

8 There is a major difference between HM 5.0a and BCPM 3.1 regarding the
9 design of distribution cable lengths from the DLC RT. The ILEC proponents
10 incorrectly emphasize that BCPM 3.1 designs an outside plant network that
11 maximizes loop lengths for copper at 12,000 feet. For example, the BCPM 3.1
12 proponents make the following partially true statements (with italics added for
13 emphasis):

14 The engineering protocols most central to the design of this model
15 include a *maximum* loop length for each CSA that is *less than 12,000*
16 *feet. To ensure attainment of this standard*, the maximum ultimate grid
17 size is typically constrained to 1/25th of a degree of latitude and
18 longitude... (BCPM 3.1 Description, Pg. 42).

19

20 BCPM 3.1 *constrains* the size of the ultimate grids to be no larger than
21 approximately 12,000 feet by 14,000 feet. The *rationale for this*
22 *constraint* on the ultimate grid size is to *limit copper loop lengths from*
23 *the DLC to the farthest customer to approximately 12,000 feet* (Bowman
24 Direct, Pg. 4).

25

26 By utilizing the DSC architecture and the *maximum 12 Kft copper loop*,
27 BCPM3 *assures* that the requirements for advanced telecommunications
28 service access for remote rural customers is reasonably comparable to the
29 enjoyed by urban customers, as mandated by the 1996 Act (Bowman
30 Direct, Exhibit RMB 3, Pg. 9).

31

32 The whole truth in regards to this matter is that BCPM 3.1 routinely designs
33 copper loops in excess of 12,000 feet in length from the DLC RT because it adds
34 partial grids to the 12,000 x 14,000 foot ultimate grids. This is quite evident

1 from the following statements from the BCPM 3.1 Model Methodology itself

2 (with italics added for emphasis):

3 BCPM 3.1 - *Tends to limit average copper loop lengths from the DLC to*
4 *the customer by generally limiting the maximum ultimate grid size to*
5 *12,000 feet by 14,000 feet, latitude and longitude. If copper cable*
6 *lengths from the DLC to the customer exceed 12,000 feet, the cable*
7 *gauge is reduced to 24 gauge cable and extended range plug-ins are*
8 *installed on loops extending beyond 13,600 feet. The ultimate grids are*
9 *designed such that copper loop lengths from the DLC to the customer are*
10 *unlikely to exceed 18,000 feet. (BCPM Description, Pg. 125).*

11
12 The design of the ultimate grids *ensures that the maximum copper loop*
13 *length from the DLC site to the customer for any individual customer*
14 *should not exceed 18,000 feet. (BCPM 3.1 Description, Pg. 42)*

15
16 Thus, BCPM 3.1 clearly allows for copper loops of up to 18,000 feet, and
17 occasionally even further, from the DLC RT in its distribution network. It is an
18 indisputable fact that currently available DLC technology will support
19 distribution cable lengths up to 18,000 feet from the DLC RT. And, both HM
20 5.0a and BCPM 3.1 design loops to this limit.

21
22 The telling difference is that HM 5.0a designs up to 18,000 foot copper loops
23 purposefully because it conforms to network transmission design standards and
24 produces a least-cost network design. On the other hand, BCPM 3.1 designs up
25 to 18,000 foot copper loops on an exception basis due to the arbitrarily fixed
26 dimensions of its grid structure.

27
28 **Q. DOES BCPM 3.1 "ENSURE" SUPERIOR TRANSMISSION QUALITY**
29 **AND "ASSURE...ADVANCED TELECOMMUNICATIONS SERVICES"**
30 **BY "CONSTRAINING" COPPER LOOPS TO 12,000 FEET?**

1 A. No. Not only has this been incorrectly stated by the ILEC proponents, but it
2 begs a question regarding the quality of service the proponents of BCPM 3.1
3 believe they would be providing to those customers who are actually modeled by
4 BCPM 3.1 to be more than 12,000 feet from the DLC RT.

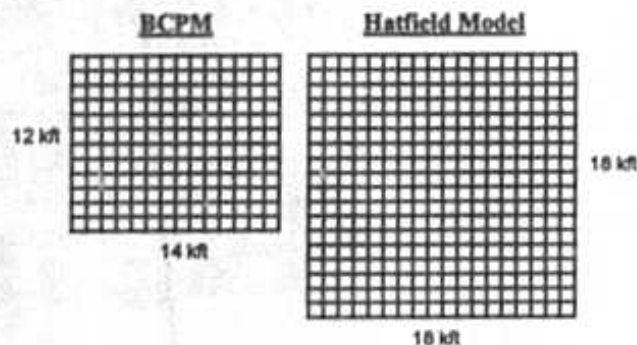
5
6 BCPM 3.1 states as an objective the minimization of the distribution portion of
7 the plant (BCPM 3.1 Methodology, Pg. 24), which is contrary to a least-cost,
8 most-efficient network design. On the other hand, HM 5.0a seeks to maximize
9 the distribution portion of the plant in order to minimize the number of costly
10 DLC RT locations and the additional subfeeder cable and structure required to
11 reach them. Sensitivity runs of HM 5.0a with the maximum distribution cable
12 length constrained to 12,000 feet have actually produced higher loop costs. This
13 is because the expected reductions in distribution cable investment are more than
14 offset by increased investments in feeder cable and structure and additional DLC
15 RT sites.

16
17 It is commonly understood in the local loop telecommunications industry that the
18 ultimate minimization of distribution cable length is achieved by putting fiber
19 feeder further into the network and closer to the customer in what is known as
20 Fiber-to-the Curb ("FTTC") architecture. However, ILECs have not deployed
21 FTTC on a wide scale basis for the simple reason that it is a very costly network
22 architecture. This is even more true for the basic types of narrowband services to
23 be supported by these networks, especially in rural areas.

24

1 OSP Engineering design guidelines typically state limits that assure
2 quality transmission performance of the network. Both BCPM 3.1 and HM 5.0a
3 agree that the maximum limit for copper distribution cable is 18,000 feet from the
4 DLC RT. HM 5.0a very purposefully designs non-loaded copper distribution
5 loops out to 18,000 feet from the DLC RT and models subsidiary remote
6 terminals on T1 extensions to "outlier clusters" on copper cable far beyond
7 18,000 feet (HM 5.0a Description, Sec. 6.2 and HM 5.0a, IP, Sec. 2.8) because
8 this is the least-cost, most-efficient network design utilizing currently available
9 technology.

10
11 The following diagrams compare the geographical coverage of just the copper
12 distribution cables for these two differing modeling assumptions:
13



14
15 Furthermore, the effective geographical area covered from a single DLC RT by
16 the HM 5.0a is actually even more than 93% greater than the 12 Kft x 14 Kft
17 CSA of the BCPM 3.1 (as illustrated above) when the road cables on the T1
18 extensions to "outlier clusters" are taken into consideration.
19

1 The conclusion from these diagrams is that the BCPM 3.1 must model many
2 more CSAs to cover the same geographical area. The consequences of this
3 aspect of the BCPM 3.1 modeling methodology are excessive fixed investments
4 and recurring operations and maintenance cost for many more DLC RTs. These
5 costly consequences are even more profound in the extensive rural geographical
6 areas, which are the primary areas for support from the Universal Service Fund.

7

8 **Q. HOW DOES THE BCPM 3.1 ASSUMPTION LIMITING THE**
9 **MAXIMUM NUMBER OF LINES SERVED IN EACH CSA TO 999**
10 **RESULT IN EXCESSIVE COSTS?**

11 **A.** The second costly flaw in the CSA modeling methodology of BCPM 3.1 is that
12 the maximum number of lines modeled for each CSA is simply too few based on
13 the most economic application of currently available technology. The BCPM 3.1
14 preprocessing program limits ultimate grids (i.e., CSAs) to a maximum of 999
15 lines (BCPM 3.1 Description, Pg. 119).

16

17 A BCPM 3.1 witness states that "a Carrier Serving Area *typically* contains no
18 more than 1,000 living units, while a Distribution Area *typically* contains 200 to
19 600 living units" (Bowman Direct, Pg. 6 with italics added for emphasis). This
20 statement clearly shows that the BCPM 3.1 modeling methodology for sizing
21 CSAs and DAs is based on the backward-looking inefficiencies of the embedded
22 network in violation of the long-run, least-cost principles in the FCC guidelines
23 for these models. This preprocessing assumption drives excessive costs into the
24 BCPM 3.1 network because it models many more CSAs and with excessive fixed

1 investments and recurring operations and maintenance cost for many more DLC
2 RTs than does HM 5.0a.

3
4 A "least-cost, most-efficient" network design based on "currently available
5 technology" would seek to maximize the utilization of the 1,800 line capability
6 (i.e., 90% of 2,016 line capacity) of the DLC RT serving a CSA without
7 exceeding the limitation of 18,000 feet of copper distribution cable. The BCPM
8 3.1 modelers do support a DLC RT site capable of 2,016 lines and do agree that
9 2,016 line DLC systems optimize the utilization of fiber feeder cables (BCPM 3.1
10 Description, Pg. 49). However, BCPM 3.1 has a maximum threshold of 999
11 lines per CSA, which is far below the "most-efficient" 2,016-line capacity of a
12 DLC RT site. Thus, the BCPM 3.1 modeling assumption of a 999 line maximum
13 CSA results in a network design that is certainly not "least-cost, most-efficient."

14
15 All of the unnecessary additional DLC RT sites modeled by the BCPM 3.1 drive
16 excessive costs, because each one has incremental investment associated with:

- 17 • site acquisition and preparation,
- 18 • cabinetry (or perhaps huts and CEVs),
- 19 • common equipment,
- 20 • standard and emergency power source,
- 21 • additional strands in the main fiber feeder cables,
- 22 • subfeeder fiber cables with associated structure
- 23 • and optical patch panel.

24

1 According to Mr. Pitkin, the BCPM 3.1 networks modeled by the ILECs for
 2 Florida in this proceeding include 223 CSAs that have only one customer
 3 location. Thus, BCPM 3.1 models each of these customer locations with the
 4 exorbitant costs of its own dedicated feeder fibers and its own dedicated DLC
 5 RT. The cost-effective HM 5.0a alternative for narrowband services is to model
 6 isolated individual and tiny groups of customers as "outlier clusters" on T1 road
 7 cables from a "main cluster" CSA. BCPM 3.1 is definitely not the "least-cost,
 8 most-efficient" network model for isolated customer locations based on
 9 "currently available technology," and thus it inflates the loop cost basis for the
 10 Universal Service Fund.

11
 12 Furthermore, there are greater operational expenses resulting from having a
 13 larger number of DLC RT sites (e.g., maintaining service during a power failure).
 14 Thus, the BCPM 3.1 does not use the forward-looking, least-cost, most-efficient
 15 engineering design for determining the number of CSAs and DAs, particularly
 16 when compared to HM 5.0a.

17
 18 CSAs and DAs in a forward-looking model should be modeled based on:

- 19 • clustering customer locations that are within reasonable proximity to one
- 20 another,
- 21 • keeping natural clusters of customers together,
- 22 • utilizing the transmission design capabilities of currently available
- 23 technology, and
- 24 • allowing the cost-efficient utilization of the maximum size of IDLC
- 25 system (2,016 lines) and FDI (7,200 pairs).

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The CSA/DA modeling methodology, assumptions and input values of HM 5.0a are superior to those of BCPM 3.1 in regards to the above criteria.

Q. WHAT IS THE CARRIER SERVING AREA CONCEPT?

A. The CSA Concept is an OSP Engineering guideline that was formulated around 1980 and has been documented as a part of the record for this proceeding (Bowman Direct, Exhibit RMB 3, Pg. 6). The source document for the CSA design criteria used by the BCPM modelers is the Lucent Technologies (formerly AT&T) Outside Plant Engineering Handbook (BCPM 3.1 Description, Pg. 18). Incidentally, I was a member of the AT&T OSP organization that did the 1994 update of the handbook. The relevant parts of the CSA Concept for this proceeding are (with italics added for emphasis):

- No loop can exceed 900 ohms of resistance, which generally equates to:
 - *9,000 feet of 26 gauge copper cable or*
 - *12,000 feet of 24 gauge copper cable. [Note: cables with 26 gauge copper conductors are smaller, less costly and have greater resistance and loss than 24 gauge cables.]*
- *Extended range line cards are available which extend the range of the DLC remote terminal beyond 12,000 feet.*

Q. DOES BCPM 3.1 CONFORM TO THE CSA CONCEPT?

A. No. The ILEC proponents have incorrectly implied that BCPM 3.1 is designed around and conforms to the CSA Concept as evidenced by the following statements (with italics added for emphasis):

1 *CSA engineering guidelines do not recommend copper loop lengths*
2 *greater than 12,000 feet...The 26/24 gauging used in the distribution*
3 *takes into account the industry standard 900 ohm Carrier Serving Area*
4 *(CSA) design criteria of no more than 12,000 feet of copper regardless*
5 *of gauge. (BCPM Description, Pg. 18)*
6

7 *These engineering constraints conform to the specifications of a*
8 *forward-looking, efficient network design. That efficient network is*
9 *based on the designation of a Carrier Serving Area. A Carrier Serving*
10 *Area is a standard telephone design concept that consists of a geographic*
11 *area that can be served by a single digital loop carrier (DLC) site.*
12 *(Bowman Direct, Pg. 4)*
13

14 *The Carrier Serving Area (CSA) concept was specifically designed to*
15 *allow for access to advance telecommunications services within the*
16 *context of an efficient local exchange distribution network. (Bowman*
17 *Direct, Exhibit RMB 3, Pg. 7)*
18

19 Yet, the truth is that the BCPM 3.1 does not conform to the "constraints" of the
20 CSA Concept as evidenced by the following enlightening statements from the
21 ILEC testimonies (with italics added for emphasis):

22 *BCPM 3.1 uses 24 gauge cable only when the copper loop from the DLC*
23 *to the furthest customer exceeds 11,100 feet. This distance is based on*
24 *complying with engineering standards for the maximum dB loss*
25 *permissible to maintain adequate service quality. An extended range line*
26 *card is included for loops that extend beyond 13,600 feet from the DLC*
27 *to the customer. This also is an engineering standard, but is a user*
28 *adjustable input in the model. (Bowman Direct, Pg. 5)*
29

30 *BCPM 3.1 uses 26/24 gauge cable in distribution. 12,000 ft of 26 gauge*
31 *copper has resistance value of 999.6 ohms (83.3 ohms per thousand feet*
32 *@ 68deg.), well within the 1500 ohm supervisory limit of today's digital*
33 *switches. The 26/24 gauging used in the distribution takes into account*
34 *the industry standard 900 ohm Carrier Serving Area (CSA) design criteria*
35 *of no more than 12,000 feet of copper regardless of gauge. In the few*
36 *cases where BCPM 3.1 finds grid Quadrants with copper loops greater*
37 *than 12,000 and up to 18,000 feet in the distribution network, it uses the*
38 *Extended CSA (ECSA) design with 24 gauge cable throughout that*
39 *quadrant. Extended range line cards are used to serve all customers in*
40 *the distribution area (Grid quadrant) for distribution distances over*
41 *13,600 feet. (BCPM 3.1 Methodology, Pg. 18 - 19)*
42

43 *Within a grid, if the length of copper from the DLC to the last lot in a*
44 *quadrant is less than 11,100 feet, 26 gauge cable is used to serve all*
45 *customers. In those circumstances where the distance from the DLC to*
46 *the last lot is greater than 11,100 feet, 24 gauge wire is used in all cables*

1 to and within the quadrant. Where distances exceed 13,600 feet,
2 *extended range plug-ins are installed on lines that exceed 13,600 feet.*
3 (BCPM 3.1 Methodology, Pg. 54 - 55)
4

5
6 Thus, BCPM 3.1 clearly violates the CSA Concept in the following four ways:

- 7
- 8 • BCPM 3.1 models 26 gauge cable out to 11,100 feet from the DLC RT,
9 which clearly exceeds the 9,000 foot limit on 26 gauge cable of the CSA
10 Concept. The 9,000 foot CSA Concept limit on 26 gauge cable is based
11 on cable loss, not 900 ohms of resistance. Therefore, BCPM 3.1 would
12 appear to be modeling customers that are located 9,000 to 11,100 feet
13 from the DLC RT with excessive loss and thus poor quality service.
14 There is no BCPM 3.1 supporting documentation (like the HAI 5.0a
15 Inputs Portfolio) that explains how or why the BCPM developers
16 changed the CSA Concept maximum loop distance for 26 gauge
17 distribution cable from the DLC RT from 9,000 feet to 11,100 feet.
 - 18 • BCPM 3.1 models loops between 12,000 and 13,600 feet from the DLC
19 RT without range extension line cards in violation of the CSA Concept
20 requirement that all loops in excess of 12,000 feet should have range
21 extension line cards. Do these particular BCPM 3.1 customers have
22 substandard quality service and/or impeded access to advanced services
23 on a reasonably comparable basis? Again, there is no BCPM 3.1
24 supporting documentation for this deviation from the CSA Concept.
 - 25 • BCPM 3.1 actually models the Extended (or Expanded) CSA Concept,
26 which supports the design of loops out to 18,000 feet from the DLC RT.
 - 27 • BCPM 3.1 allows the distance at which the extended range line cards are
applied to be a user adjustable input, instead of conforming to the CSA

1 Concept requirement of 12,000 feet or any particular standard. The
2 statement is made that the 13,600 foot distance to begin employing range
3 extension cards "also is an engineering standard." but there is no
4 supporting documentation for this deviation from the CSA Concept.

5
6 **Q. DOES BCPM 3.1 MODEL DISTRIBUTION CABLE REALISTICALLY**
7 **AND COST-EFFECTIVELY?**

8 A. No. When a single lot in a DA exceeds 11,100 feet distance from the DLC RT,
9 BCPM 3.1 then designs all of the distribution cables to and within the DA from
10 26 gauge to more costly 24 gauge conductor cables. This is a grossly
11 oversimplified and needlessly costly modeling assumption. In the real world,
12 OSP Engineers do not simply increase the gauge of every single cable in a DA to
13 satisfy the transmission requirements of the longest loop when only a few
14 customers exceed the limit for 26 gauge cables. In the real world of OSP
15 Engineering, the larger distribution cables closer to the DLC RT would remain
16 26 gauge, and the smaller cables closer to the customer would be 24 gauge such
17 that the combined 26/24 gauge loop resistance and loss would be within
18 transmission limits.

19
20 In comparison, HM 5.0a models 24 gauge copper conductors for cables less than
21 400 pairs and 26 gauge conductors for cables 400 pairs and larger (HM 5.0a IP,
22 2.3.2). Since distribution cable loops more than 9,000 feet from a DLC RT of no
23 greater than 1,800 line capacity will invariably be less than 400 pairs, HM 5.0a
24 does satisfy the CSA Concept constraint on 26 gauge cable distance.

1 Furthermore, HM 5.0a does this in a "least-cost" manner that is consistent with
2 real world OSP Engineering practice.

3
4 **Q. WHAT CSA DESIGN STANDARD DOES HM 5.0a EMPLOY?**

5 **A.** The more cost-efficient design employed by HM 5.0a conforms to OSP
6 transmission requirements for acceptable loop loss of 8.5 dB from the DLC RT
7 based on currently available technology. OSP Engineering guidelines are always
8 subject to "engineering judgment", and currently available technology continually
9 drives the evolution of such guidelines. For example, when the CSA design
10 concept was originally formulated around 1980, ISDN was then limited to less
11 than 12,000 feet on copper. Such service is now routinely guaranteed to any
12 subscriber served on copper cable within 18,000 feet of their serving wire center.

13
14 The realistic and cost-effective gauging of the copper distribution cables by HM
15 5.0a has been described above. For its Integrated DLC systems, HM 5.0a uses
16 two types:

- 17 • Low density DLC system applications are based on the Advanced Fiber
18 Communications UMC 1000A.
19 • High density DLC system applications are based on the DSC
20 Communications Litespan-2000.

21
22 The line cards costed for each of these DLC systems allows for the utilization of
23 extended range line cards as required to support distribution cable lengths out to
24 18,000 feet from the DLC RT. The low density DLC system, which is more
25 likely to be deployed in rural areas, actually uses the cost for UMC Remote

1 Terminal Extended Range RST POTS Channel Units (R-EPOTS) for all channel
2 units. The high density DLC system uses its "regular" R-POTS channel unit to
3 meet transmission requirements for loops up to 17,600 feet from the DLC RT
4 (Exhibit ___ (JWW-5)). Should there be any instances of customers between
5 17,600 to 18,000 feet from a high density DLC system, the Litespan-2000
6 RUVG2 card is utilized.

7
8 In the USF Hearings in Louisiana (Docket U-20883), the Staff's Final
9 Recommendation dated April 3, 1998, reported on page 15 (with italics added
10 for emphasis) that, "Dr. Bowman did concede that Hatfield's [i.e., *HAI 5.0a's*]
11 *use of 18,000 feet for copper cable beyond the DLC remote terminal would*
12 *provide quality telecommunications services, as long as the proper electronics*
13 *were installed in those instances."* HM 5.0a does indeed use the proper
14 electronics, which are the range extension line cards described above.

15
16 Moreover, the Louisiana Staff also found (pages 17 - 18) that "the BCPM
17 overstates cost because the input for extended line range cards are for the more
18 expensive REUVG card." For comparison, the RUVG2 card, used by HM 5.0a
19 for any customers located between 17,600 and 18,000 feet from a high density
20 DLC RT, is approximately 25% more than the standard RPOTS card. However,
21 the REUVG card used by BCPM 3.1 for customers between 13,600 and 18,000
22 feet is twice as expensive as the standard RPOTS card.

23
24 **Q. WHAT IS THE COST COMPARISON BETWEEN MODEL RUNS**
25 **BASED ON 12,000-FOOT GRIDS VERSUS 18,000-FOOT GRIDS?**

1 A. The ILEC proponents claim that "the 12,000-foot grids result in lower per-line
2 loop cost than the 18,000-foot grids." (Bowman Direct, Pg. 5) This claim is not
3 surprising, nor particularly persuasive, given that:

- 4 • BCPM 3.1 defaults to all 24 gauge cable when any customer in a DA is
5 beyond 11,100 feet from the DLC RT.
- 6 • BCPM 3.1 greatly exaggerates the cost of range extension line cards by
7 utilizing the very expensive REUVG card beyond 13,600 feet when the
8 RPOTS card, at half the cost, is good out to 17,600 feet. At the very
9 least, BCPM 3.1 should be costing the RUVG2 card, which is only 25%
10 more expensive than the standard RPOTS card.

11

12 Sensitivity runs of HM 5.0a with the maximum distribution cable length
13 constrained to 12,000 feet have actually produced higher loop costs. This is
14 because the expected reductions in distribution cable investment are more than
15 offset by increased investments in feeder cable and structure and additional DLC
16 RT sites.

17

18 **Q. DO YOU HAVE OTHER TRANSMISSION CONCERNS REGARDING**
19 **THE BCPM 3.1?**

20 A. Yes. There is no explicit test in BCPM 3.1 to ensure that customers do not
21 exceed 18,000 feet in loop length from the DLC RT. The BCPM 3.1 Model
22 Methodology states that "ultimate grids are designed such that loop lengths from
23 the DLC to the customer are *unlikely* to exceed 18,000 feet" (BCPM 3.1
24 Description, Pg. 125, with italics added for emphasis). However, BCPM 3.1
25 does indeed model customers more than 18,000 feet from the DLC RT, and Mr.

1 Pitkin has determined that BellSouth, GTE and Sprint have all modeled loops
2 exceeding 18,000 feet from the DLC RT in this proceeding. By comparison, the
3 HM 5.0a explicitly tests to ensure that no copper loops exceed the 18,000 feet
4 limit from the DLC RT.

5
6 The reason that this is important is that copper loops in excess of 18,000 feet
7 require load coils to meet transmission requirements for quality voice grade
8 service. However, load coils are unacceptable in these models because they
9 would inhibit the provisioning of advanced services per FCC Criterion No. 1. On
10 the other hand, non-loaded copper loops longer than 18,000 feet from the DLC
11 RT would violate network design standards and result in poor quality service to
12 those customers.

13
14 **Q. DO YOU HAVE A CONCERN WITH THE BCPM 3.1 MODELING**
15 **METHODOLOGY THAT PLACES FIBER FEEDER CABLE TO LARGE**
16 **CAPACITY GRIDS BY DEFAULT?**

17 **A.** Yes. The BCPM 3.1 deploys DLC systems for voice grade services rather than
18 analog copper facilities when demand within a particular grid "exceeds the user
19 designated capacity of the largest copper distribution cable" (BCPM 3.1
20 Methodology, Pg. 19). I have serious engineering and economic concerns
21 regarding this modeling assumption because no consideration is given to the
22 distance of the particular grid from the wire center. Consequently, BCPM 3.1
23 will uneconomically deploy fiber and DLC to a large apartment/office building
24 directly across the street from the wire center.

25

1 This is not an acceptable assumption for a "least-cost" local loop network. The
2 reason is that there are insufficient savings realized in the substitution of fiber
3 feeder cable for copper feeder cable to offset the additional cost of the DLC
4 electronics for loops generally less than 12,000 feet in total length from the wire
5 center, which is the BCPM 3.1 copper to fiber breakpoint. So, this particular
6 BCPM 3.1 modeling assumption is an unreasonable cost adder to the network
7 and thus unreasonably increases the cost of an average loop.

8
9 The justification offered by the BCPM proponents is that this modeling
10 assumption "avoids the typical duct congestion in urban rights of way where
11 utilities and urban services vie for below ground space" (BCPM 3.1
12 Methodology, Pg. 19). That is a backward-looking justification based on the
13 ILEC's embedded network and is inconsistent with the "long-run, forward-
14 looking cost" economic assumptions applicable to these models per FCC
15 Criterion 3. In other words, in accordance with the "scorched node" assumption,
16 a conduit system would need to be installed anyway with sufficient 4-inch ducts
17 to handle whatever copper and fiber feeder cables might be required. So,
18 BCPM3.1's uneconomic substitution of one fiber cable with substantial DLC
19 system costs instead of placing two, more economical copper cables, saves only
20 the minimal cost of one duct and certainly avoids no congestion.

21
22 HM 5.0a, on the other hand, performs a life cycle cost analysis of fiber versus
23 copper feeder on the route to determine if fiber with DLC is the more economical
24 alternative (HM 5.0a Description, Sec. 6.3.5). Thus, the HM 5.0a model

1 methodology again more realistically represents the decision process of an OSP
2 Engineer in designing a feeder route.

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**Q. DOES BCPM 3.1 SYSTEMATICALLY OVERSTATE THE AMOUNT OF
DISTRIBUTION CABLE REQUIRED BECAUSE IT MODELS SQUARE
LOTS?**

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A. Yes. The BCPM 3.1 developers continue to assert the assumption that customer locations should be modeled as square lots. This is not only unrealistic; it results in the modeling of excessive distribution cable and associated structure investment. HM 5.0a makes a much more realistic assumption that lots are rectangular based on observations of a number of zoning maps and field experience.

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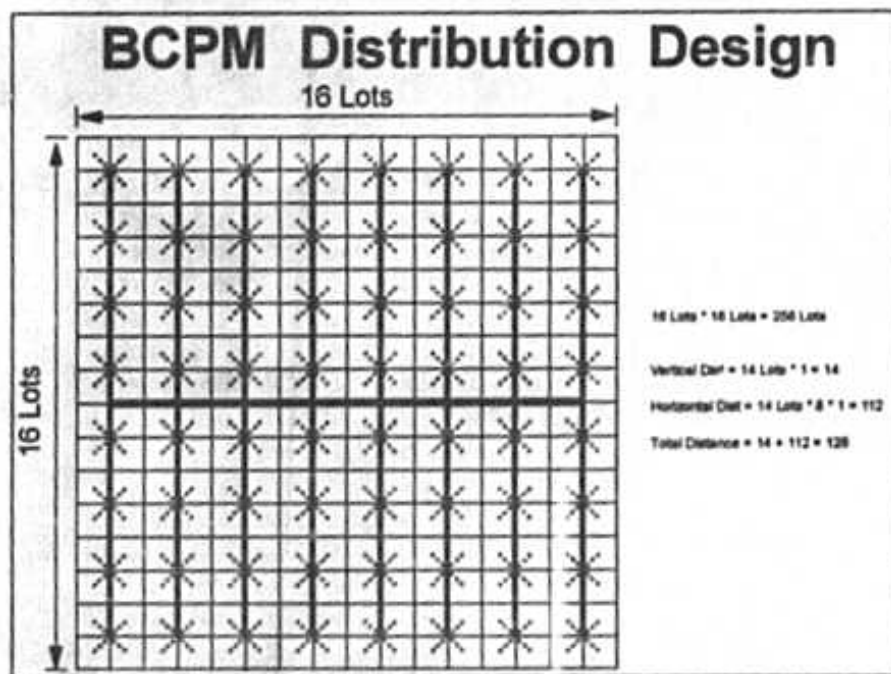
Furthermore, as will be detailed below, city and subdivision planners know that any given geographical area can be served with fewer streets, sidewalks, sewers, streetlights, etc. if the lots are rectangular rather than square. Since utilities typically follow the streets or rear lot lines, it follows that rectangular lot layouts are also more efficient and less costly for the power, water, cable and telecommunications utilities to serve their customers as illustrated by the diagrams in Exhibit ___ (JWW-6).

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The square lot assumption that has been perpetuated in BCPM 3.1 results in more distribution cable than would be necessary with rectangular lots. Let's consider two generic examples. Assume there are 256 households within a DA.

1 The square DA in the BCPM 3.1 will have 256 square lots, or 16 by 16 as can be
 2 seen below.

3



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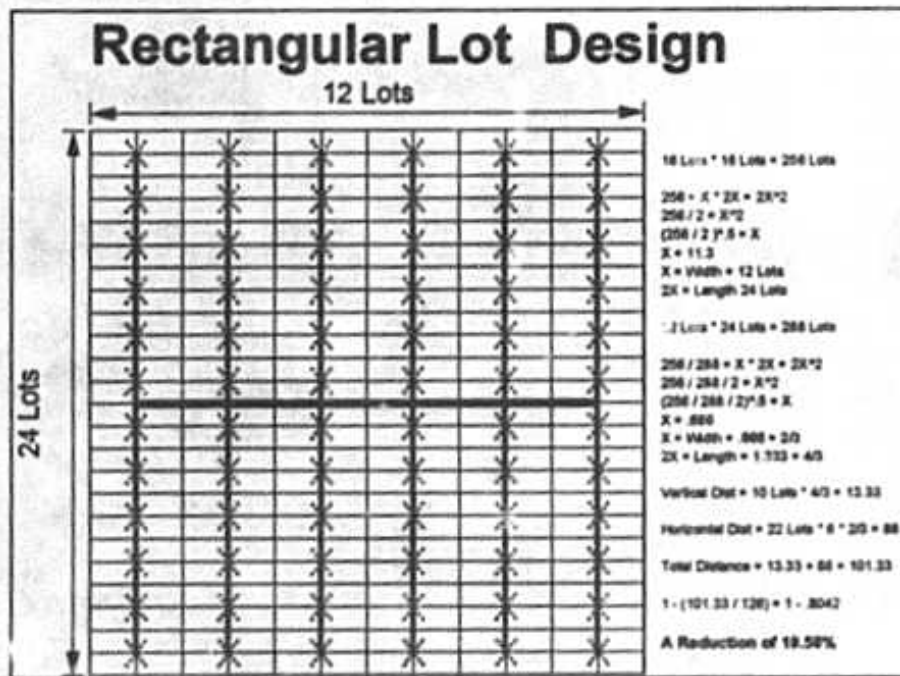
6 Each square lot represents a customer location with a drop going to it (dotted
 7 line). The thicker lines represent the distribution cable needed to reach each
 8 customer location. For simplicity sake let's assume the area of each lot is one.
 9 This means each side of a lot has a length and a width of one. Thus, from the
 10 diagram one can see that the amount of distribution cable needed by the BCPM
 11 3.1 in this example is enough to run past 126 lots.

12

13 Now consider the next diagram, which roughly represents the way rectangular
 14 customer locations could be distributed within the same DA. The total DA
 15 remains the same; however, in order to fit this into a square serving area that is
 16 somewhat similar, I have taken the liberty of using 288 lots to avoid rounding

1 problems. Again, to be conservative, we will assume that the HAI Model will
 2 design the distribution cable to reach all 288 lots in this DA, and that none are
 3 empty. Refer to the following figure to see how the HAI Model designs the
 4 distribution plant.

5



6

7

8 Recall the BCPM 3.1 DA was 256 lots. The area of each lot in BCPM 3.1 was
 9 1. The area of each lot in the HAI Model is the distribution area divided by the
 10 number of lots, $256/288 = 8/9$. Since the length of a lot is twice its width in HM
 11 5.0a, the width must be $2/3$. You can see that this is correct by multiplying the
 12 width times twice the width, $2/3 * (2 * 2/3) = 8/9$. Now all we need to do is to add
 13 up the cable used by the HAI Model, which equals 101.33 to serve 288
 14 rectangular lots. Now, compare this number to the BCPM 3.1 design, which
 15 needed cable for a distance of 126 to serve only 256 square lots.

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The amount of distribution cable needed for the same distribution area as modeled by the HM 5.0a is 19.58% less than that modeled by the BCPM 3.1 — a significant difference that also reflects the reality of city and subdivision planning. BCPM 3.1 consistently models excessive distribution cable length to serve a modeled area of customers occupying lots of identical area.

Q. DOES BCPM 3.1 HAVE TO LIMIT THE AMOUNT OF CABLE THAT CAN BE MODELED WITHIN A DISTRIBUTION QUADRANT?

A. Yes. As an indication of just how seriously BCPM 3.1 overstates total distribution cable length, there is a check that had to be built into the BCPM 3.1 that “constrains the total length of cables (including the backbone, branch, vertical and horizontal connecting cables) within a distribution quadrant to not exceed the length of the road network in that distribution quadrant (BCPM 3.1 Methodology, Pg. 54). According to Mr. Pitkin, over half of the distribution quadrants have to invoke this constraint in order to limit the amount of excessive distribution cable otherwise modeled by BCPM 3.1 based on the square lot assumption.

This difference in modeling assumptions between the HAI Model and the BCPM is further accentuated when the distance from the center of the street to the front of the lot is taken into consideration. The 1 x 2 rectangular lots of the HAI Model and the 1 x 1 square lots of the BCPM include the entire area being modeled and thus go to the center of the street or road. When the distance from the center of the road to the actual front of the lot, which is typically 25 - 30 feet,

1 is subtracted, the HAI Model still has a rectangular lot where the depth is greater
2 than its width. However, the BCPM is now left with a rectangular lot where the
3 width is greater than the depth with the distribution cables having to traverse the
4 longer width. This further elucidates just how unrealistic it is for BCPM 3.1 to
5 model square lots.

6
7 **Q. DOES BCPM 3.1 OVERSIZE DISTRIBUTION CABLES?**

8 **A.** Yes. In regards to distribution cable sizing, the BCPM 3.1 Model Methodology
9 states the following:

- 10 • "Branch cables are sized to the number of pairs for housing units and
- 11 business locations. This calculation takes the number of housing units
- 12 times pairs per housing unit and the greater of actual business pairs per
- 13 location or business locations times pairs per location." (BCPM 3.1
- 14 Methodology, Pg. 55)
- 15 • "The Model default inputs assume two pairs for a resident unit and six
- 16 pairs for a business unit." (BCPM 3.1 Methodology, Pg. 56)
- 17

18 These "default minimums" in BCPM 3.1 are based on a guideline from the
19 outdated practice on Detailed Distribution Area Planning (DDAP) for a minimum
20 of two pairs per ultimate living unit and five pairs per small business, which may
21 be modified based on the judgment of the engineer (BSP 901-350-250, Pg. 20-
22 21). However, technological advances have superseded these "minimum" values.
23 For example, two-channel DSL Systems have become a viable means of rapidly
24 providing additional lines for loops up to 18,000 feet. A primary advantage of
25 incorporating these systems into local loop distribution planning for additional
26 lines is that the investment in two-channel DSL Systems is only needed if, when,
27 and for as long as the additional customer demand is there.

28

1 There is excessive cost in oversizing copper distribution cables based on
 2 historically low utilization rates that can no longer be justified. The ILECs like
 3 to raise a big scare over the time, expense and disruption of digging up streets
 4 and yards to place a second distribution cable or drop to serve additional
 5 customer demand. With the widespread use of two-channel DSL Systems, the
 6 addition of a second cable is no longer the primary alternative. Thus, the ILECs
 7 can no longer justify exorbitant levels of spare cable pairs by using their
 8 historically low average distribution cables utilization, typically in the 40% range
 9 (Dickerson Direct, Pg. 11). Indeed, GTE's deployment practice prescribes
 10 distribution cable fills in excess of xxx% based on the planned selective
 11 utilization of two-channel DSL Systems. ILEC cable utilization rates should be
 12 rising from their historical levels.

13
 14 In regards to these historically embedded distribution cable fills, BellSouth
 15 testifies that, "These *[distribution cable sizing] factors* are designed to produce a
 16 *fill representative of BellSouth's projection of actual fill, based on experience*
 17 *over time, for Florida*" (Caldwell Direct, Pg. 12 with italics added for emphasis).
 18 However, in response to AT&T's First Set of Interrogatories, Item No. 26,
 19 which tried to ascertain the historical utilization of distribution cables, BellSouth
 20 responded that, "No record is kept of distribution cable status on statewide
 21 basis." Thus, BellSouth could not produce any distribution cable "actual fill,
 22 based on experience over time, for Florida", and BellSouth's interrogatory
 23 response appears to contradict Ms. Caldwell's testimony.

24

1 Similarly, Sprint testifies it "calculated *actual feeder fill* based on working pairs
2 (cable pairs in service) divided by total pairs available *as tracked in the Customer*
3 *Loop Assignment System, Sprint's internal system for maintaining cable pair*
4 *inventory*" (Dickerson Direct, Pg. 10 with italics added for emphasis). However,
5 in response to AT&T's First Set of Interrogatories, Item No. 26, which tried to
6 ascertain the historical utilization of feeder cables, Sprint responded that,
7 "Without waiving its objection, Sprint states that the information requested does
8 not exist." Thus, Sprint's interrogatory response appears to contradict Mr.
9 Dickerson's testimony.

10
11 From other proceedings that I have participated in, I know that BellSouth has
12 reduced its distribution cable sizing guidelines for pairs per house, or living unit.
13 BellSouth, GTE and Sprint have filed 2.0 pairs per housing unit in this
14 proceeding. However, I recommend that the BCPM 3.1 input value for
15 distribution pairs per residential housing unit for the ILECs should be reduced to
16 1.5.

17
18 BCPM 3.1 takes the greater of actual business pairs per location or business
19 locations times the input value for business pairs per location. Based on data
20 from several other dockets, I know that the number of business lines per small
21 business location is definitely less than 3.0. However, BellSouth, GTE and
22 Sprint all have filed input values of 6.0 pairs per business location. This is much
23 too high given that the actual number of lines are modeled for large businesses.
24 Therefore, I recommend that the input value for the minimum number of pairs
25 per business location should be reduced from 6 to 3.

1
2 BCPM 3.1 utilizes distribution cable sizing factors to increase the demand
3 numbers that are already based on the ultimate pair requirements. In addition,
4 there is one more step of rounding up to the next discrete cable size, which is
5 necessary, but in the case of the BCPM 3.1 is based on already overinflated pair
6 requirements as detailed above. Interestingly, the ILECs have begun to realize
7 the excess that has been built into the BCPM 3.1 distribution cable sizing
8 methodology and have more appropriately filed distribution cable sizing factors
9 ranging from 98.0% to 100.0% in this proceeding. Nevertheless, the resulting
10 distribution cable fills are still aimed at maintaining historical embedded
11 utilization levels rather than "least-cost, most-efficient, forward-looking" cable
12 fills based on "currently available technology."
13

14 **Q. IS THERE ANY EMPIRICAL EVIDENCE THAT ILEC COPPER**
15 **CAP' E UTILIZATION RATES BEING MODELED ARE TOO LOW?**

16 **A.** Yes. I believe that ILEC historical copper utilization rates, the basis upon which
17 ILEC copper cable fills for BCPM 3.1 have been developed, can be shown to be
18 low based on empirical evidence. This is because an excessive defective pair rate
19 can be attributed in large part to excessive spare capacity, which reduces the
20 incentive to clear defective copper cable pairs.
21

22 The cost of a loop is being estimated by the ILECs in this proceeding to be
23 approximately \$1,300 per loop. The ILEC cost to clear a defective pair is \$xxxx-
24 \$xxxx per pair (ILEC Responses to AT&T's First Set of Interrogatories, Item
25 No. 33). Thus, there should be ample economic incentive to clear defective cable

1 pairs and keep the cable pair inventory in high working order, unless there was an
2 excessive surplus of spare cable pairs.

3

4 An acceptable defective copper pair rate in the industry is 2% - 3%. AT&T's
5 First Set of Interrogatories, Item No. 25 requested data on defective pair rates.
6 GTE's defective pair rate was reported to be within industry standards.
7 Furthermore, there were practices and data produced that indicate that GTE
8 makes clearing defective pairs and effectively managing the defective pair rate a
9 priority.

10

11 However, BellSouth's defective pair rate is more than xxxx times the industry
12 standard, and growing. Furthermore, in response to AT&T's First Set of
13 Interrogatories, Item No. 33, BellSouth responded that, "No data is kept on the
14 quar. % and percentage of copper pairs and fiber stands cleared."

15

16 Also interesting is Sprint's response that, "Without waiving its objection, Sprint
17 states that the information does not exist." However, in response to AT&T's
18 First Request for Production of Document, Item No. 12, Sprint furnished an
19 extensive practice on its "Defective Cable Identification and Prioritization
20 Process" that appeared to include a statistical reporting system.

21

22 It is difficult for me to believe that an ILEC would not keep track of and try to
23 effectively manage its defective pair rate. Unless, however, that ILEC had such a
24 large surplus of spare cable pairs that it was actually uneconomical to expend
25 resources to reclaim even excessive numbers of defective pairs.

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Q. DOES THE EMPLOYMENT OF THE TIGER ROAD NETWORK BY THE BCPM 3.1 MAKE THE MODEL MORE REALISTIC?

A. Not really. This is another modeling idea that sounds good at first, but when its implementation in BCPM 3.1 is investigated reveals a number of concerns and uncovers just how shallow the perceived benefits really are.

BCPM 3.1 relies on a straightforward premise that households and business typically reside near roads (Duffy-Deno Direct, Pg. 16). However, it is the converse of this premise upon which the BCPM 3.1 really operates. The actual modeling premise being that the presence of a road ensures the uniform distribution of households and businesses along that road. As stated in the BCPM Model Methodology, "[c]ustomers, assigned to microgrids within distribution quadrants, are subsequently placed *uniformly* in Road Reduced Areas BCPM 3.1 Methodology, Pg. 122 with italics added for emphasis). This is simply not the best premise for modeling customer locations.

Indeed, there are many roads that have no households or businesses, and many roads along which customers are not uniformly distributed. In rural areas, customers tend to be more concentrated at the end of their road, which may traverse several grids without any customer locations, before it gets to them. These models are supposed to design a network to serve all of the customer locations, not all of the roads.

1 However, if a model accurately locates the customers, then it can be reasonably
2 assumed that roads exist to reach those customers without having to identify
3 particular roads from a separate database. This is the modeling premise of HM
4 5.0a.

5
6 The BCPM 3.1 Model Methodology states another simple fact that "rights of
7 way for provisioning telecom cables are most frequently found along roadways"
8 (BCPM 3.1 Methodology, Pg. 6). Once again, if a model such as HM 5.0a
9 locates customers, then it can be reasonably assumed that roads exist with rights
10 of way for cables to reach those customer locations. BCPM 3.1 thus has no
11 claim to any superiority in the matter of rights of way. Furthermore, BCPM 3.1
12 makes absolutely no use of the road network information to determine pathways
13 that engineers would use to place facilities.

14
15 On the contrary, the need for road right of way actually indicts another
16 assumption in the BCPM 3.1 in that it is necessary to model sufficient route
17 distance to allow for the meandering of the road network. Typically, this is done
18 in HM 5.0a and the BCPM 3.1 via right angle, or rectilinear, routing of the
19 cables. However, in BCPM 3.1 the split, or angled, feeder route appears to take
20 a direct route towards "the population centroid of the entire feeder quadrant"
21 (BCPM Methodology, Pg. 43). If no allowance is made for conversion of
22 "airline" route to "road" route distances, as is done in HM 5.0a, then the BCPM
23 3.1 will not model sufficient investment for the split feeder route to reach its
24 destination.

1 Any perceived added value of applying the road network to locate customers
2 below the CB level is suspect. As an example of how the road network is used
3 to allocate customers from CBs to microgrids, the BCPM 3.1 Model
4 Methodology (Pg. 30) uses an illustration of 20 miles of roads traversing a
5 microgrid. However, a microgrid is only 1,500 feet by 1,700 feet and could not
6 realistically contain a even minuscule fraction of 20 miles of roads.

7
8 **Q. DO YOU HAVE CONCERNS WITH THE OSP SENSITIVITY**
9 **ANALYSIS CAPABILITY OF THE BCPM 3.1?**

10 **A.** Yes. The BCPM 3.1 has two major, rather arbitrary, OSP network design
11 assumptions which cannot be readily subjected to sensitivity analysis because they
12 are only user adjustable via the cumbersome and time consuming one day
13 preprocessing application. These two assumptions are:

- 14 1. The preprocessor has a maximum threshold of 999 lines (or households plus
15 business lines) for determining if microgrids are re-aggregating to form
16 CSAs. As detailed earlier in my testimony, I believe that the BCPM 3.1
17 models far too many DLC RT sites because the number of lines modeled in
18 its CSAs and DAs is well below capacity. It is very difficult to run a
19 sensitivity analysis in the BCPM 3.1 to verify this and develop a more cost-
20 efficient alternative threshold because it is only changeable in the one day
21 preprocessing cycle.
- 22 2. The preprocessing routine has a fixed distance of 10,000 feet from every wire
23 center as the appropriate distance where it is economical and feasible to split
24 a feeder route. This is also the fixed distance where the spacing of lateral
25 subfeeder routes suddenly goes from roughly every 1,600 feet to roughly

1 every 13,000 feet (BCPM 3.1 Methodology, Pg. 46). The BCPM Model
2 Methodology rationale is "that within 10,000 feet [of the wire center],
3 customers are generally located within the perimeter of a town and that the
4 town has some sort of gridded street complex" (BCPM 3.1 Methodology,
5 Pg. 43).

6
7 BCPM 3.1 then applies this questionable fixed assumption to every feeder
8 route in every wire center in every geographical area in Florida. Furthermore,
9 there is no economic justification offered by the BCPM modelers that 10,000
10 feet is the realistic or least-cost, most-efficient distance for any feeder route,
11 much less for every feeder route in every wire center. This number needs to
12 be more easily adjustable for sensitivity testing. Furthermore, this assumption
13 should be variable (perhaps in a look-up table) that is based on the size of the
14 wire center and/or the density of customers along the feeder route.

15
16 **VI. OTHER CRITICISMS REGARDING THE HAI MODEL**

17 **Q. WOULD YOU PLEASE RESPOND TO ANY OTHER BCPM 3.1**
18 **CLAIMS OR HM 5.0a CRITICISMS REGARDING OSP?**

19 **A. Yes. There are six.**

- 20
21 1. The BCPM 3.1 alleges superiority in sizing distribution cables based on
22 ultimate pairs per house instead of current households. There is no
23 shortcoming of HM 5.0A in this regard. The distribution cable fill factors in
24 HM 5.0a are more than adequate to serve the number of empty houses that
25 may exceed the number of households in an area, even though this is not a

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requirement of the model. Furthermore, the BCPM 3.1's modeling of distribution cables sized specifically to serve empty houses has been rejected (Staff's Final Recommendation, LA Docket U-20833, 3/27/98, Pg. 16).

2. The BCPM 3.1 Model Methodology still continues show the Hatfield Model Release 4.0 ("HM 4.0") methodology for distribution road cables in rural areas. This methodology has been totally superseded by the clustering algorithms of HM 5.0a. Furthermore, BCPM 3.1 continues to misrepresent the road cables of HM 4.0 as two cables running in a straight line from the center to opposite corners of the quadrant (BCPM 3.1 Methodology, App. A, Ex. 2). What HM 4.0 did with road cables was model road cable investment based on twice the rectilinear distance from the centroid to the corner of the occupied area of the quadrant. The relevant points being that there could be more than two cables within the modeled total length and the total distance modeled is significantly understated in the BCPM 3.1 illustration.

3. The BCPM proponents are also still making outdated and totally irrelevant assertions in regards to 85% of the rural customers modeled as being in towns and served via a distribution cable grid on maximum three acre lots in HM 4.0 (BCPM 3.1 Methodology, Pg. 24). For many months, HM 5.0a has modeled main and outlier clusters in a way that is more precise and representative of the way that local loop networks are designed. (A description of the OSP enhancements of HM 5.0a is covered in the direct testimony that I filed in this proceeding.)

1 4. The BCPM proponents cite a study of five states performed for the FCC that
2 concludes that 12,000-foot grids result in lower per-line loop costs than
3 18,000-foot grids (Bowman Direct, Pg. 5). I have little doubt regarding the
4 reported results given the longer loop cost inefficiencies inherent in the
5 BCPM 3.1. Specifically, the previously documented excessive costs of the
6 REUVG range extension card for all loops in excess of 13,600 feet in length
7 and the use of 24 gauge cable only for the entire CSA when the copper loop
8 to any customer in the CSA exceeds 11,100 feet. If this study had been
9 conducted using the HM 5.0a assumptions of less costly RUVG2 range
10 extension card and 24 gauge for cables less than 400 pairs, the results would
11 no doubt have been markedly different.

12
13 5. In regards to the sharing of buried cable trenching , it has been written that,
14 such proposals [for sharing buried cable trenches in the future] conveniently
15 overlook the fact that GTE's network is in place today....With respect to
16 buried cable, these parties [i.e., AT&T and MCI] apparently believe that GTE
17 will dig up its existing cable in order to immediately rebury in a shared
18 trench" (Tucek Direct, Pg. 8). These statements reflect a serious lack of
19 understanding of the "scorched node" assumption that is to be applied to
20 these models. As stated very clearly by another ILEC witness, "the BCPM
21 3.1 model assumes that the entire network is built at a single point in time"
22 (Staihr Direct, Pg. 7).

23
24 6. The BCPM sponsors have unilaterally declared that "data transmission over a
25 28.8 Kbps modem" constitutes "access to advanced services" for the purpose

1 of implementing FCC Criterion 1 (Bowman Direct, Exhibit RMB 3, Pg. 2).

2 The FCC Criterion actually states that, "[t]he loop design incorporated into a

3 forward-looking economic cost study or model should not impede the

4 provision of advanced services. For example, loading coils should not be

5 used because they impede the provision of advanced services." (FCC Report

6 and Order, May 8, 1997, Paragraph 250, Criterion 1). While the FCC does

7 not specifically define "advanced services," its use of the words "not impede"

8 and the example of "load coils," which would actually preclude the

9 transmission of digital signals, does provide ample guidance in this matter.

10

11 My understanding of "impeding advanced services" in regards to the issue

12 raised in Exhibit RMB 3 would be to deny modem access to rural customers,

13 which the existing ILEC networks certainly do today. The attempt by the

14 BCPM sponsors to declare 28.8 Kbps modem access as the standard for

15 advanced services (as opposed to say 14.4 Kbps or 56 Kbps) is blatantly self-

16 serving and misleading.

17

18 Proponents of BCPM have noted a Bellcore Technical Memorandum TM-

19 25704 as support for why the Hatfield Model will not support modem speeds

20 of 28.8 Kbps (Bowman Direct, Exhibit RMB 3, Pg. 10). This TM is not a

21 transmission standard and was specifically developed as a worst-case

22 scenario. Mr. John Donovan, the leader of the HAI OSP Engineering Team

23 has reviewed this TM, talked with its author and makes the following

24 observations, which I support:

1 A close reading of the TM indicates exactly what I have been saying
2 regarding the inexactness of analog modem performance. Worthy of note
3 is page 12 of that TM, which tabulates the actual experiments performed.
4 The purpose of the tests was not to validate the transmission
5 characteristics of either the BCPM or Hatfield Models, but to examine
6 worst-case scenarios. In fact the worst case is so bad, that none of the
7 loops used in experiment meet tariff requirements, since all loops exceed
8 the 8.5 dB maximum for POTS loops. Since other empirical data is not
9 readily available on short notice, however, we can make certain
10 observations about the data. First of all, I personally spoke with Rick
11 Perez, the Bellcore author. He told me that the worst-case test loops had
12 many gauge changes and many splices. This would cause high reflection
13 losses in each splice, and is the most likely cause of the abnormal dB
14 losses at the standard test frequency of 1004 Hz.

15
16 Test loop number 1 was 18,000 feet with no bridge tap. It supported
17 24.0 kbps on a 28.8 modem, but had a horrendous loss of 14.3 dB, 5.8
18 dB above the maximum allowed by tariff. Since each 3dB attenuation
19 halves the signal strength, this means that the signal on this loop was at
20 about 1/4 or 25% of the strength it should be at 8.5 dB. The next longest
21 loop was test loop number 6 which was 17,500 feet with 1,000 feet of
22 bridge tap. Yet this loop still had 12.8 dB of loss, or about 3/8ths of the
23 signal strength the Hatfield Model would provide at 8.5 dB. Still, this
24 loop readily supported 26.4 kbps with a 28.8 kbps modem.

25
26 As one would surmise from the Bellcore Technical Memorandum, determining
27 predicted modem speeds is not an exact science. The HAI OSP Engineering
28 Team has estimated that the HM 5.0a will support minimum modem speeds of 21
29 - 24 Kbps for any loop, and 28.8 Kbps, or better, for most loops. I believe that
30 this level of performance more than complies with a reasonable interpretation of
31 the FCC requirement to provide access to "advanced telecommunications and

1 information services that are reasonably comparable to those services provided in
2 urban areas.”

3
4 The conclusion of this exhibit stated that, “[b]y utilizing the DSC architecture
5 and the *maximum 12 Kft copper loop*, BCPM3 assures that the requirements for
6 *advanced telecommunications service access* for remote rural customers is
7 reasonably comparable to that enjoyed by urban customers, as mandated by the
8 1996 Act” (Bowman Direct, Exhibit RMB 3, Pg. 9, with italics added for
9 emphasis). In this testimony it has been shown that the BCPM 3.1 clearly
10 designs copper loops out to 18 Kft and even beyond. Not only is the conclusion
11 statement above rather questionable, but any undue concern raised by Exhibit
12 RMB 3 regarding modem speed is applicable to BCPM 3.1.

13
14 **VII. SUMMARY**

15 **Q. WOULD YOU PLEASE SUMMARIZE YOUR TESTIMONY?**

16 A. I recommend that the Commission adopt the HM 5.0a as the most appropriate
17 model for determining the local loop cost of basic local exchange service in
18 Florida. In Release 3.1, the BCPM modelers have taken steps to evolve their
19 model by incorporating several of the concepts of the Hatfield Model plus some
20 additional ideas to improve the accuracy and cost efficiency of the local loop
21 model. Most of the evolutionary changes in this particular release of the BCPM
22 have the initial conceptual appearance of being cost improvements. However,
23 upon investigation, I have found that in the implementation of these ideas the
24 BCPM 3.1 still falls well short of being the least-cost, most-efficient, forward-

1 looking and reasonable local loop cost model based on currently available
2 technology, particularly in comparison to the HAI Model Release 5.0a.

3

4 Second, I recommend that many of the OSP input values proposed by BellSouth,
5 GTE and Sprint be rejected, since these inputs contain numerous fallacies and are
6 not the least-cost, most-efficient and forward-looking set of input values that are
7 required in this proceeding. The HAI Model 5.0a and the input values proposed
8 by AT&T and MCI for OSP are more appropriate to use in this proceeding for
9 determining the cost of the local loop network in Florida in order to size the
10 Universal Service Fund.

11

12 Q. DOES THIS CONCLUDE YOUR TESTIMONY?

13 A. Yes.

<p>ahead [R] 8:23 13:14 32:6 33:16 45:6 50:20 52:10 72:18 aid [R] 43:2,5 48:1 air [I] 118:20 algorithm [R] 25:19 28:8 algorithms [I] 28:18 allocate [R] 9:11 10:2 allow [I] 29:12,16,25 43:14 47:15 67:10 85:2 89:1,17,22 94:17 allowed [I] 101:2 allows [R] 20:22 99:14 alluded [I] 10:19 almost [I] 11:5 15:4 22:13 47:9 alphabet [I] 116:16 alphabetical [I] 116:12,14,18,23 already [I] 12:11 18:9,22 19:1 20: 5,7,8 28:12 31:5 38:12 70:13 82: 18 alternative [R] 42:17,21 although [R] 67:3 86:14 among [I] 62:18 amount [I] 42:12 43:24 67:9,12,13 68:4 113:25 amounts [R] 38:23 65:10 68:5 113: 11 analog [I] 20:18 analysis [R] 14:25 15:1 31:23 48: 20 46:1 62:14,15 102:22 104:2 annual [R] 43:21,22,25 another [I] 47:25 50:8 106:19 109: 25 answer [R] 16:18 18:17 30:7,19 31:5 44:11 48:5 71:11 72:4,9,17, 19 73:4 75:14 76:10,14 83:16 84: 23,25 85:1,2 87:1 88:1,18,21,22 89:2,19 93:13 94:19 95:22 98:7, 12 97:13,17,18,20 98:1,17 99:19, 21 100:13,20 101:6 102:12 108:14 116:3 117:18,21 118:8 120:12 answered [I] 37:3 76:3,4 82:17 84:14,17,19 88:7,9 89:9 111:23 answering [I] 88:13 answers [R] 53:22 84:22 97:15 anticipated [I] 33:14 anybody [I] 100:11 anyway [I] 65:1 apart [I] 10:14 apologize [I] 76:16,19 98:11 appalling [I] 81:23 apparently [R] 88:6,23 108:23 119: 14 appear [I] 45:21 appearances [R] 1:20 2:1 56:4 appearing [R] 2:5 58:8 appears [R] 44:23 46:3,17 applicable [R] 91:17 115:15 applied [I] 21:5 28:10,16,19 44:10 103:21 105:6 applies [R] 28:8 103:5 apply [R] 12:4,12 35:8 48:14 91:19 98:19 applying [I] 105:11 approach [R] 11:16 12:2 21:9 23:5 24:5 35:12 74:22 79:12 approached [I] 31:8 appropriate [R] 6:1,10 11:10 18:6 60:18 63:16 64:14 68:15 109:17 appropriately [I] 98:25 approximately [I] 32:5 arbitrarily [I] 66:9 area [R] 6:23 14:25 40:11 41:14 46:9 63:14 66:3 77:25 87:3,15 89: 5 90:7 91:20 93:20 97:10 98:12, 18,23 103:2 109:4 areas [I] 7:9,13,14 44:4 46:6 63:3,</p>	<p>12,18 67:3 77:19 83:16 113:15 117:7 aren't [I] 15:14 46:25 91:15 113:3 arithmetic [I] 104:10 armis [I] 20:21 around [I] 68:17 arranged [I] 116:15 arrived [R] 70:22 71:22 assessment [R] 22:4 60:19 73:18 assigned [R] 6:10 105:6 assignments [I] 60:13 associate [I] 26:4 associated [I] 12:3 14:17 15:4 37: 3 38:13,14 69:23 associates [I] 69:23 assume [I] 21:21 26:8 103:7 105: 14 109:21,22,23,25 110:2 111:10 113:5 120:7 assumed [R] 19:11 25:13 113:4 assumes [I] 68:5,7 103:11 112:2 assuming [I] 100:8 assumption [R] 24:17 66:17 77:2 68:21 110:5 113:20,20,22 assumptions [R] 63:19 85:8 74:5 79:6 113:3 assure [I] 113:13 at&t [I] 9:17 24:22 60:12 63:5 88: 1,16,19 90:25 92:1,9,19 93:4,9,11, 14,15,21 118:14 at&t's [R] 35:15 87:12 attach [I] 24:14 attached [R] 38:8 97:24 114:15 attachment [I] 82:25 attain [I] 18:17 attempt [I] 103:25 attempted [I] 5:12 attempting [I] 18:2 attention [I] 115:5 attorney [I] 78:14 attract [I] 38:11 attributable [I] 8:12 au, a [I] 31:20 53:7 authorized [R] 48:7,9 automated [R] 19:17,18 available [R] 6:21 7:1,2 19:7 27:9, 10 31:16,22 60:25 61:13 65:15 67: 12,24 68:8,21 74:17 87:16,24 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