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November 2, 1998

Mrs. Blanca S. Bayó
Director, Division of Records and Reporting
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850

Re: Docket No. 980696-TP

Dear Ms. Bayó:

Enclosed are an original and fifteen copies of BellSouth Telecommunications, Inc.'s Brief of the Evidence. Please file these documents in the captioned matter.

A copy of this letter is enclosed. Please mark it to indicate that the original was filed and return the copy to me. Copies have been served to the parties shown on the attached Certificate of Service.

Sincerely,

J. Phillip Carver (hw)

J. Phillip Carver

Enclosures

cc: All parties of record
A. M. Lombardo
William J. Ellenberg II (w/o enclosures)

12226

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Determination of the Cost	)
of Basic Local Telecommunications	) Docket No.: 980696-TP
Service, pursuant to Section 364.025,	)
Florida Statutes	)
______________________________	) Dated: November 2, 1998

BELLSOUTH TELECOMMUNICATIONS, INC.
BRIEF OF THE EVIDENCE

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STATEMENT OF THE CASE

In Chapter 98-277, General Laws of Florida, which became law on May 28, 1998, the Florida Legislature directed the Florida Public Service Commission ("Commission") to conduct a number of studies to be submitted to the Legislature by February 15, 1999. One study requires the Commission to determine and report the total forward-looking cost of providing basic local telecommunications services on a geographic basis no larger than a wire center, using a cost proxy model to be selected by the Commission after notice and opportunity for hearing. This docket was initiated to make that determination.

A formal hearing was held on October 12-16, 1998. At this hearing, BellSouth submitted the direct and rebuttal testimony of Dr. Kevin Duffy-Deno, Peter F. Martin, Dr. Robert M. Bowman, D. Daonne Caldwell, and the rebuttal testimony of Dr. William E. Taylor and a panel composed of the members of the Georgetown Consulting Group (Jamshed K. Madan, Michael B. Dermeier, and David C. Newton). Other intervenors presented the live testimony of a total of 21 witnesses. Also, the testimony of a total of 14 witnesses was stipulated into the record, including the testimony of BellSouth witnesses, G. David Cunningham and Dr. Randall S. Billingsley. The hearing produced a transcript of 3014 pages and 97 exhibits.

The Brief is submitted in accordance with the post-hearing procedures of Rule 25-22.056, Florida Administrative Code. A summary of BellSouth's position on each of the issues to be resolved in this docket is set forth in the following pages and marked with an asterisk. In some instances, the discussions of more than one issue are consolidated to avoid repetition.

STATEMENT OF BASIC POSITION

The Commission should adopt for submission to the Legislature a cost proxy model that engineers a forward looking network that is capable of actually transmitting telephone calls in a quality manner and that is based on realistic inputs. Only the selection of a model that meets these criteria will ultimately result in a sustainable and sufficient universal service fund as required by the Telecommunications Act of 1996. BellSouth's proposed universal service model meets these criteria. The Benchmark Cost Proxy Model ("BCPM") Version 3.1 advocated by BellSouth is the most appropriate proposed cost model for determining the total forward-looking cost of providing basic local telecommunications service. The BCPM 3.1 model contains an accurate method of locating customers in all areas of Florida, most notably the high cost rural areas in greatest need of universal support. BCPM 3.1 also designs a quality network to serve these customers based upon accepted engineering practices. Finally, BellSouth proposes that Florida specific inputs that reflect the provisioning practices and costs in Florida of BellSouth, the largest local provider in the state, be adopted for use in the model. BellSouth further proposes that the model be run initially on a wire center basis, with the goal of moving the support calculations from a wire center basis to that of a smaller geographic area when it is feasible to do so.

STATEMENT OF POSITIONS ON THE ISSUES

Issue 1: What is the definition of the basic local telecommunications service referred to in Section 364.025(4)(b), Florida Statutes?

**Position: Section 364.025(4)(b) refers to "basic local telecommunications service" as that term is defined in Section 364.02(2), Florida Statutes.

The answer to the question of what constitutes basic local service as that term is used in Section 364.025(4)(b), Florida Statutes is provided expressly in the Statutes. In Section 364.025(4)(b), the legislature directs the Commission "to recommend to the legislature what the Commission determines to be a reasonable and fair mechanism for providing to the greatest number of customers basic local telecommunications service at an affordable price." The phase "basic local telecommunications service" is defined in 364.02(2) as follows:

> "Basic local telecommunications service" means voice-grade, flat-rate residential, and flat-rate single-line business local exchange services which provide dial tone, local usage necessary to place unlimited calls within a local exchange area, dual tone multifrequency dialing, and access to the following: emergency services such as "911," all locally available interexchange companies, directory assistance, operator services, relay services, and an alphabetical directory listing. For a local exchange telecommunications company, such term shall include any extended area service routes, and extended calling service in existence or ordered by the commission on or before July 1, 1995.

The statute is clear, and its interpretation requires nothing more than simply reading the language that appears in the statute.

Nevertheless, two witnesses in this case—Joseph Gillan on behalf of FCCA and Richard Guepe on behalf of AT&T—take the position that the Statute should be construed to say something other than what is suggested by its plain language. Their agenda in making this argument is fairly obvious. Neither AT&T, nor the other members of FCCA, currently serve local residential customers in rural high cost areas, the precise customers that would benefit most from a universal service fund. Accordingly, each party wishes to ensure that the fund is as small as possible—and if possible, nonexistent. AT&T and FCCA have pursued this goal in two ways. One, they argue that the definition of basic local service should be treated as if it encompasses all residential services. (See Generally, Tr. 607-13; Tr. 683-85). This allows the level of revenue that is ostensibly available to support basic local service to be artificially raised, which would, in turn, reduce the size of any subsequently created fund. They also argue (in the context of Issue 3) that high cost and low cost areas should be averaged statewide, which would, of course, reduce the size of any future fund. (Tr. 621; Tr. 699)

Both of these approaches are inherently nonsensical. The former would maintain the implicit subsidies that the Federal Act has directed must be removed from universal service, and at the same time, reduce the size of the explicit subsidy fund that eventually must be created to support universal service. The latter approach simply flys in the face of the goal of providing universal service to high cost areas by promoting the illogical conclusion that there need be no support for a high cost area if, somewhere else in the State, there is a low cost area that can be mathematically offset against it. This approach amounts to pretending that the competitive environment that the Federal Act is designed to address does not, and will not, exist.

Mr. Martin addresses at length in his testimony the reasons that, even if the AT&T/FCCA approach were sound from a legal or regulatory standpoint, it simply will not work in the developing competitive environment for local service. (Tr. 1122-32). More to the point, these arguments, and the larger policy issues that they raise, should not even be considered in this docket. This Commission's mandate from the Legislature is relatively narrow. This Commission need only determine and report the forward looking cost of providing basic local telecommunications service on a geographic basis no larger than a wire center. There is no need to consider the policy issues that, at some point in the future, may be involved in setting the size of a universal service fund. Nevertheless, AT&T and FCCA have attempted to fashion a sort of "preemptive strike" by arguing that the Commission should go beyond the scope of the issues submitted to it by the legislature to prejudge the result of some universal service case that may (or may not) be before it in the future. This prejudgment of broad policy issues is not only unnecessary, the suggestion that this prejudgment should be made now is flatly wrong.

Finally, even if the arguments of AT&T and FCCA were appropriate in this docket, they are based upon a fundamental mischaracterization of the applicable law. Specifically, Mr. Gillan contends that there is ambiguity in the statute because 364.025(1) states that for the purposes of that particular section, the term "universal service" is defined as "an evolving level of access to telecommunications services . . ." (Gillan Direct, p. 11). The complete definition of universal service that appears in this Section of the Statute is "an evolving level of telecommunications services that, taking into account advances in technology, services and market demand for essential services, the Commission determines should be provided at just, reasonable, and affordable rates to customers, including those in rural economically disadvantaged, and high cost areas." § 364.025(1)). Mr. Gillan wrongly compares a portion of this language to the above-quoted language from § 364.02 and reaches the progressively more tenuous conclusions that, (1) these provisions are in conflict; (2) there is, therefore, an ambiguity; and (3) that this somehow provides an opening for the economic and policy arguments advanced by AT&T.

To the contrary, the two statutory provisions at issue are completely consistent. § 364.02 provides the current definition of basic local service. Section 364.025(1) recognizes that "advances in technology, services, and market demand for essential services", may cause notions of what constitutes basic service to evolve, and that this may prompt the need for future redefinition of basic local service. This authorization for future redefinition, however, in no way contradicts the current, clear definition.

Moreover, even if the argument of Mr. Gillan that there is ambiguity in the statute were well taken, he has still failed to address the issue. The question posed by Issue 1 simply boils down to determining what service(s) constitutes "universal service". In other words, if the goal of universal service is to provide basic, essential, and adequate service to all customers, then what service(s) exactly must be made universally available to all? Mr. Gillan and Mr. Guepe argue that any future fund should be sized by taking into consideration all residential revenues, but neither argues that every residential service must be offered under the rubric of "universal service". Thus, in reality, they are not arguing for an expanded definition of universal service beyond that clearly provided in the statutes. Instead, they are simply looking for a way to shoe horn into this case, an economic and policy argument that (even if we accept the fundamentally wrong-headed premise upon which it is based) does not belong.

The Commission should reject this attempt and, instead, adopt the definition of universal service that is set forth plainly and simply in § 364.02 of the Florida Statutes.

Issue 2: For purposes of determining the cost of basic local telecommunications service appropriate for establishing a permanent universal service mechanism, what is the appropriate cost proxy model to determine the total forward-looking cost of providing basic local telecommunications service pursuant to Section 364.025(4)(b), Florida Statutes?

**Position: The BCPM 3.1 model is the appropriate cost proxy model to determine the total forward-looking cost of providing basic local telecommunications service.

I. BCPM 3.1 IS SUPERIOR TO HM 5.0a

Both BCPM 3.1 and HM 5.0a are "cost proxy models", that is, both are designed to estimate the forward-looking economic cost of providing universal service. In general, cost proxy models are used to provide reasonable cost estimates when it is not possible to specifically identify the cost of serving individual customers. An appropriately constructed cost proxy model should accomplish three fundamental goals. First, a cost proxy model must locate customers as precisely as possible to ensure accuracy in funding the forward looking cost of serving customers. Second, a cost proxy model must efficiently engineer adequate facilities to provide basic service and access to advanced services to customers who live in supported areas. Third, a cost proxy model should permit public examination of the model's data, algorithms and computer code to validate the model's results. BCPM 3.1 is superior to HAI 5.0a in each of these three areas.

A. BCPM 3.1 Accurately Locates Customers in Rural Low Density Areas of Florida

Neither of the two models develop costs to provide network facilities to actual customer locations.[1] Nevertheless, a cost proxy model that estimates the cost to serve high cost areas must be able to approximate the locations of telephone customers within a reasonable degree of accuracy in these areas. BellSouth witness, Dr. Kevin Duffy-Deno, described the superior method by which BCPM 3.1 estimates the locations of customers, as contrasted with HAI 5.0a, in the rural areas that are in greatest need of support. (Tr. 971-73).

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[1] As BellSouth witness, Dr. Kevin Duffy-Deno stated:

> "We must emphasize that there's no database in existence, to my knowledge, that identifies the actual spacial location of housing and business structures in the state or anywhere in the country. So both methodologies [i.e. models] are essentially estimating customer locations." (Tr. 992).

Both BCPM 3.1 and HM 5.0a use the Census Block ("CB") as the starting point for their customer location methodologies. Publicly available census data allows one to determine the number of customers living in any given census block. (Tr. 978). In urban areas, CBs are fairly small. "For example, in a downtown area, they tend to be approximately 0.005 square miles in size. In a typical suburban area, they tend to be in the 0.5 to 1.0 square mile range." (Direct Testimony of Kevin Duffy-Deno, Tr. 979). Thus, in the small—and typically densely populated—urban and suburban Census Blocks customer location is fairly easy. (Tr. 980).

In rural areas, however, CBs tend to be much larger. "CBs as large as 60 square miles are not uncommon, with 20 square miles being more typical." (Testimony of K. Duffy-Deno, Tr. 979-80). Taken together, the two lowest densely populated Census Blocks (i.e., zero to four housing units per square mile and five to nineteen housing units per square mile) constitute only about 5.36% of the total populated Census Blocks in Florida, but span 69% of the total populated land area in Florida. (Tr. 280) Thus, a cost proxy model's customer location methodology for placing customers within a Census Block is much more critical in the larger CBs that occur in rural, low density areas.

The first step in accurately estimating customer locations is the specification of the appropriate wire center boundaries. BCPM 3.1 relies on publicly available wire center boundary data obtained from Business Location Research ("BLR"). (Tr. 983). Next, the BCPM 3.1 customer location algorithm partitions the area of a wire center into "microgrids," which are roughly 1,500 feet by 1,700 feet in size (0.09 square miles). (Tr. 984). As Dr. Duffy-Deno testified, "each CB within the serving wire center is overlaid with microgrids (unless the entire Census Block falls within a single microgrid). In the rural areas of the wire center, the allocation of customer locations is based upon the road network, the location of which is known in every Census Block." (Id.). Because the Census Block road network is known with certainty and people tend to live along roads, Census Block housing units are apportioned to microgrids based on the share of the Census Block's road mileage that occurs in a given microgrid. (*Id.*).

These micrograds are then aggregated into telephone engineered Carrier Service Areas ("CSAs") and Distribution Areas ("DAs"), as appropriate. The CSAs are referred to as "ultimate grids." (Tr. 987). The maximum size of an ultimate grid is constrained to approximately 12,000 feet by 14,000 feet (roughly six square miles) to be consistent with engineering guidelines. (Id.). "BCPM 3.1 does not assume that customers are uniformly distributed within each ultimate grid." (Id.). Rather, each ultimate grid is divided into four distribution quadrants, each of which may contain a distribution area, depending on whether the quadrant has roads located within it. The latitude and longitude coordinates of the distribution quadrants are determined by first establishing the road centroid of the ultimate grid. The distribution quadrants are centered on this road centroid. For those distribution quadrants that do not have any customers assigned to them, no distribution area is designed within the distribution quadrants, thus ensuring that plant is not "built" in non-populated areas. (*Id.*). In sum, BCPM 3.1's customer location algorithm yields an accurate estimation of where telephone customers are actually located in rural areas, which logically are the areas that will most need universal service support.

B. Geocoding in HAI 5.0a Fails to Accurately Locate Customers in Rural Areas of Florida

The use of "geocoding" in HM 5.0a to locate customers within CBs is touted by its developers as a major improvement to the model. The geocoding process is performed by PNR and Associates ("PNR"). PNR obtains customer addresses within a Census Block from

Metromail, Inc., Dunn & Bradstreet, and other commercial providers of mailing addresses and then spatially locates customers on a street map of the Census Block. The PNR database is provided as a finished product to the Hatfield developers, who then run HM 5.0a using the PNR data.[2]

AT&T witnesses stated that, on average, the geocode success rate is 70% statewide, meaning that the geocoding process could spatially locate on a street map about 70% of the customers throughout the State. (Tr. 532, 552). However, the reported geocode success rate is only 34% in the lowest density zone (0-5 customers per square mile) and 62% in the next-to-lowest density zone (5-100 customers per square mile) (Tr. 932). Further, if one looks at the wire centers in Florida by density, the success rates for geocoding are substantially lower. As Dr. Duffy-Deno testified, geocoding is successful in 27.43% of wire centers with less than five customers, 23.30% in the 5-20 customer range and 46.83% in the 20-100 customer range. AT&T witness, Mr. Wood conceded that, generally speaking, these are the areas in which the need for universal service support is greatest (Tr. 781-82).[3]

Customers that cannot be geocoded by their address are arbitrarily placed (*i.e.*, assumed to exist) uniformly along the boundary or perimeter of the Census Block in which they live. (Tr. 930). These customer locations placed on the Census Block boundary are called "surrogate" locations. (Id.). The problem with this approach, however, is that customers tend to live along roads, and roads frequently do not correspond to census block boundaries. For example, Dr. Duffy-Deno testified that for the four lowest density zones in Florida the

[2] This process is described in Section 5.5 of the Hatfield Model documentation (Tr. 945).
[3] Mr. Wood stated that he had not seen any study that indicated where universal support was needed in Florida, but he had no reason to believe that Florida would not follow the general trend noted above (Id.)

percentage of road mileage interior to census blocks is, respectively, 48.2% (less than 5 customers per square mile), 39.5% (5-20), 38.3% (20-100) and 32.7% (100-200). (Tr. 938). Moreover, in two counties in which Dr.. Duffy-Deno geocoded customer locations as part of his analysis, 32% of the actual customers in Levy County and 27% of the customers in Washington were found to live on roads interior to census blocks (Tr. 938).

Thus, the evidence demonstrates that the HAI Model employs a surrogate location process that, in the least dense zones, places as many as 48% of the customers in locations where there are no roads to reach their residences or businesses, i.e., locations that are highly unlikely to correspond to where actual customers live. This Model flaw alone virtually guarantees that the HAI Model's estimation of customer locations will, in many instances, miss the mark by substantial margins—and it will estimate worst in the rural areas where support is needed the most.

Even when customers can be located through geocoding, the precise geocoded locations of customers are not used in HM 5.0a to build telephone plant to serve them. According to the HM 5.0a model description, once customers are geocoded, they are grouped into one of two types of "clusters." A "main cluster" contains the bulk of the customer locations. "Outlier clusters" contain one to four locations, and are connected by network facilities (T1 cable) both to each other and to the main cluster on which all the associated outlier clusters "home." (Tr. 945). For modeling purposes, the original clusters are converted into rectangles that vary in both size and shape. It is these rectangles that HM 5.0a relies upon to "build" outside plant in order to actually serve customers. (Tr. 948-49). After the clusters are formed, the geocoded information is discarded. "HAI 5.0a assumes that customer lots are, essentially, evenly distributed within each cluster." (Testimony of K. Duffy-Deno, Tr. 949-50). As Mr. Wood conceded, the rectangular serving area overlays the cluster in some fashion, but it does not necessarily cover the same area as the original cluster. (Tr. 577-78).[4]

Thus, for all of its claims to use actual customer locations, the reality is that Hatfield takes both the customers who can be located, at least by some standard, as well as those who cannot, and assumes for modeling purposes that they are evenly distributed in a rectangular area that does not cover in many instances the entire original cluster. Given this, it is obvious that Hatfield does not ultimately model (i.e., "build") facilities to any actual customer locations.

C. <u>HAI 5.0a Does Not Make Critical Underlying Data Available to the Commission</u>

FCC criterion No. 8 for appropriate universal service cost studies states:

> The cost study or model and all underlying data, formulae, computations, and software associated with the model must be <u>available to all interested parties for review and comment. All underlying data should be verifiable</u>, engineering assumptions reasonable, and outputs plausible.

(FCC Universal Service Order, ¶ 250 (emphasis added)).

While this criteria is not binding <u>per se</u> on this Commission in its selection of a cost model, it does underscore the importance of having an open model. Clearly BCPM is the more open of the two models under consideration.

Although the Hatfield sponsors claim that their model is open and verifiable, the facts clearly demonstrates otherwise. HM 5.0a contains an enormous amount of pre-processing, *i.e.* information that is compiled and formulated for insertion into the model that is not intended to be user-adjustable. When a user runs the model, the user must accept substantial amounts of

[4] Moreover, the analysis provided in the supplemental rebuttal testimony of Brian Staihr demonstrates the extent to which the serving area rectangles may not even include the customer locations (Ex. BKS-1 to Supplemental Rebuttal Testimony; Ex. 59).

information without supporting evidence. Pre-processed Hatfield data includes a long series of complex computer algorithms, econometric models, linear optimization routines, and assumptions. Further, the creation of clusters, the assigning of customer locations to clusters, the placement of clusters, the land area of clusters and the assigning of line counts to clusters is all pre-processed information. (Tr. 800-02)[3]. None of this occurs within the Hatfield Model itself. Instead, this information is developed by PNR outside the HAI model. Only the final result of this process, the rectangular serving area developed from the underlying cluster, is actually input into the model. The entire cluster process, thus, remains hidden within the preprocessing, where it is unavailable for objective scrutiny.

For example, upon cross examination, Mr. Wood admitted that PNR will not allow anyone to leave their premises with the file that contains the underlying customer location data points. (Tr. 808-09). Instead, the only alternative means to obtain this type of data is to pay PNR for access to the underlying databases and training to replicate the results of their customer location process. Mr. Wood testified that the cost for this information and training is in excess of two million dollars, and that this charge would be levied against anyone—even a public service commission—that wished to obtain a surrogate for the underlying data (Tr. 815). Such charges make it difficult, if not impossible, for this commission to conduct an independent evaluation of the customer location geocoding and cluster development that is at the heart of HAI 5.0a.

[3] Mr. Wood did claim that one can go on site and analyze the PNR data, although he has never done so himself (Id.). In the Supplemental Rebuttal Testimony of Dr. Staihr, he explains the difficulties that ensued when the BellSouth/Sprint team did go to PNR premises in an attempt to analyze the data.

In contrast, BCPM 3.1 uses publicly available data, with the limited exception of one page of the documentation of specific proprietary switch manufacturer discounts.[8] The algorithms used to develop the BCPM 3.1 ultimate grids are publicly available at the BCPM web site ("www.BCPM2.com"). Customer location data is based on Census Block data and Census road network data. In addition, the code for all of the modules contained in BCPM 3.1 is publicly available as well. Thus, an evaluator of BCPM 3.1 can confirm the precision asserted by the BCPM 3.1 developers in locating customers and building a network that efficiently serves those customers.

The stark contrast in the degree of openness in the models is particularly important given recent events. Specifically, BellSouth, Sprint and GTE all requested from AT&T the underlying data points. AT&T refused, Motions to Compel were filed, and the prehearing officer entered an Order on October 6, 1998 that provided that BellSouth, Sprint and GTE could have access to the underlying information on premises of PNR. (Order No. PSC-98-1298-PCO-TP). The Order further provided the specifics of the access to the information that was to be given to BellSouth in order to make the review meaningful. (Order, at 6-7). The product of the expedited review that followed was the Supplemental Rebuttal Testimony filed by Dr. Brian K. Staihr on behalf of BellSouth and Sprint. In this testimony, Dr. Staihr noted that there were extreme limitations on the ability of those who went to PNR premises on behalf of BellSouth and Sprint (BellSouth/Sprint experts) to analyze the data. The problems included inadequate computers, inadequate memory on the computers that were provided, and inadequate time.

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[8] Even these switch vendor discounts were provided to AT&T's witness, Ms. Petzinger, after execution of an appropriate proprietary agreement.

(Staihr sup. Rep. 9-10). Given the expedited nature of the review and analysis, the BellSouth/Sprint experts were able to do little more than spot check the underlying PNR data. Even based on this cursory review, a myriad of substantial problems came to light. These findings included the following:

(1) the PNR polygon clusters do not match (in shape or in orientation) the "equivalent" HAI rectangles. In other words, the clusters of customers do not match the rectangular serving areas built to serve those customers. (Tr. 1508).

(2) The PNR clustering algorithm is such that it clusters customers across geographic barriers "such as large bodies of water", and further constructs network facilities across these barriers to serve customers. (Id.).

(3) Some of the PNR clusters overlap, which would logically appear to result in the overbuilding of overlapping network facilities to serve the customers in the clusters. (Id.).

(4) Some of the clusters extend beyond the borders of the wire centers that ostensibly serve them. (Id.).

(5) A "comparison to the distribution cable and drop distance required to serve the customers in locations identified by PNR" . . . indicates that the HAI model grossly underbuilds distribution plant. Specifically, this test indicates that the HAI network is underbuilt by a substantially greater margin than the underbuilding that is suggested by a minimum spanning tree analysis (described below). (Tr. 1508-09).

(6) There is an observable disparity between the addressed geocoded locations identified by PNR and actual customer locations obtained via satellite imagery for the Yankeetown wire center (also explained further hereafter). (Tr. 1509-10). Thus, on the basis of only a cursory review, it was found (and graphically illustrated in a series of exhibits to Dr. Staihr's testimony),

that the PNR preprocessing is deficient in many respects. Thus, even if the HAI/PNR approach to locating customers were theoretically sound (which it is not), it still is badly lacking in the actual execution of the theory.

This information is extremely important because it appears that, with the exception of the review by the BellSouth/Sprint team, no one has scrutinized the underlying data of PNR. AT&T responded to BellSouth's efforts to obtain this data through discovery by stating that AT&T does not, and never has had, the data in its possession. (Order No. PSC-98-1298-PCO-TP, at 5). Although portions of Mr. Pitkin's Rebuttal Testimony contained analyses of the underlying data, he testified that these analyses were performed (prior to his interpretation of them) by PNR. (Deposition of Wood/Pitkin, Ex. 45, pp.104-05). He further stated specifically that he has never seen the underlying data. (Id., p. 104). Finally, AT&T/MCI's witness, Mr. Wood--while offering a ringing endorsement of the Hatfield process, including the preprocessing by PNR--also admitted upon cross examination that he has never seen the underlying data. (Tr. 809)[7]. At the same time, PNR appeared to make every effort to limit the availability of not only the underlying data, but also the graphic depictions of the problems described in Dr. Staihr's testimony. Specifically, PNR only allowed the BellSouth/Sprint team to leave its premises with reports, analyses, or graphic depictions that had been stripped of the underlying data. Still, PNR insisted that even these depictions must be treated confidentially. At the same time, AT&T was unable to offer at the hearing any explanation of why PNR

[7] Mr. Wood was not the only AT&T witness with a noteworthy perspective on issues of model openness. For example, Ms. Petzinger contended that the proprietary nature of a small amount of switching information in BCPM militates against acceptance of the model. When comparing the two models during cross examination, however, Ms. Petzinger contended that switching is "not a really big ticket item," so switching inputs must be open; however, she also contended that since the design of the network is a much more significant cost driver, it is acceptable for it to be proprietary. (Tr. 2870-71).

considered this information to be confidential. (CITE).

Perhaps, the most graphic example of how this claim of confidentiality hindered any sort of scrutiny of the HAI Model preprocessing occurred during the cross examination of Mr. Wood. At that time, Commissioner Clark attempted to ask Mr. Wood for an explanation of some of the apparent anomalies detailed in the testimony of Dr. Staihr and represented by his examples. Counsel for AT&T interjected that Mr. Wood could not look at the information because he had not signed a proprietary agreement with PNR. (Tr. 1870). Thus, while AT&T's principal witness who testified in support of the model claims that the PNR process is accurate, he not only has never seen the specifics of the process, but was specifically prevented from seeing it during the hearing because of the secret nature of the data.[8]

Thus, the choice for this Commission is between BCPM, an almost totally open model, and HAI 5.0a, a model that is so cloaked in secrecy that not even the AT&T witnesses who advocate its adoption have witnessed its inner workings. Further, the myriad of crippling deficiencies in the HAI preprocessing that were obvious upon even a two-day review by the BellSouth/Sprint team on the premises of PNR raise serious concerns about the effect on the functioning of the HAI model. One can only wonder as to the magnitude of the deficiencies in the PNR customer location process that could have been brought to light if the time and facilities had been available to conduct a more thorough and systematic review.

[8] On October 28, 1998, almost three weeks after PNR was initially provided a copy of these exhibits, counsel for AT&T contacted BellSouth and stated that PNR had determined that the exhibits did not contain confidential material after all.

D. **The Evidence Demonstrated That BCPM 3.1 Locates Customers In Rural Areas Better Than HAI 5.0a And That, Unlike HAI 5.0a, It Provides Sufficient Facilities To Serve These Customers**

Given the fact that, as stated above, both BCPM and Hatfield estimate customer locations the question raises as to which model estimates better. This question was answered by a direct comparison of the models that was performed by INDETEC, and which was explained in testimony by Dr. Kevin Duffy-Deno.

INDETEC, the developers of the BCPM model, performed an empirical analysis that confirmed that large numbers of customers cannot be located by geocoding in rural areas in Florida. (Tr. 934-38). The geocoding success rate for three randomly selected rural counties in Florida was examined: Dixie, Levy and Washington. All three counties are characterized by low housing unit densities (i.e., less than 15 housing units per square mile). (Tr. 934). The percentages of Census housing units that could be geocoded were as follows: Dixie—0; Levy—27%; Washington—27%. (Id.).

Exhibits KDD-2, 3, and 4 to Dr. Duffy-Deno's Rebuttal Testimony (Ex. 47) show that geocoded locations in these counties tend to be in towns and along major roads, not in the sparsely populated areas of the counties. (*Id.*, 935-36). This is the case, despite the existence of a substantial number of observed customer locations in less densely populated areas. To demonstrate this phenomenon, INDETEC obtained geocoded locations for the Yankeetown wire center in Levy County, Florida, and actual customer locations through analysis of satellite photographs of this wire center. A map of the Yankeetown wire center (Exhibit KDD-5)(Ex. 47) shows the locations of the housing units that could be identified from satellite images as well as the geocoded locations. This exhibit confirms that the geocoded locations tend to fall in and around towns. More importantly, only 633 of the 2,119 housing units in the Yankeetown wire center could be successfully geocoded. (Tr. 937).

Moreover, even if the HAI Model did locate customers appropriately in rural areas, further analysis by INDETEC and Dr. Duffy-Deno demonstrated that the Hatfield Model fails to model adequate cable to provide services to customers. Specifically, Dr. Duffy-Deno conducted a Minimum Spanning Tree (MST) test on both BCPM and Hatfield. As Dr. Duffy-Deno described, the MST test is a "test of the model's internal consistency, in other words, whether the respective model does what it purports to do, assuming that one accepts its particular modeling assumptions." (Tr. 964). In concept, the test is very simple. It simply assumes the customer locations utilized by a particular model to be correct and then attempts to determine whether the model provides enough cable to connect customers to each other and to the network (Tr. 962).

As Dr. Duffy-Deno emphasized, an "as the crow flies" cable span, such as the MST, will render a distance shorter than that which, in all probability, is needed to span the distances between points. Thus, the amount of cable that is really needed to build a network will almost certainly be greater than that suggested by a minimum spanning tree analysis. (Tr. 954). Dr. Duffy-Deno found that both models come up short under an MST analysis to some extent. However, BCPM comes much closer to meeting the requirements suggested by the MST test. For example, in the lowest density zone for BellSouth Florida territory, BCPM comes up short in 31.76% of the grids. By contrast, Hatfield comes up short in 76.43% of its serving areas. The results are similar in the next density range, i.e., 5-20 customers per square mile. In this range, BCPM underestimates in 15.08% of the grids, while Hatfield underestimates in 64.65%

service areas. Moving up one more range, BCPM underestimates in the 20-100 customer per square range 2.93% of the time as compared to 33.25% for Hatfield (Tr. 962-965).

AT&T's witness, Mr. Pitkin, did his own version of a minimum spanning tree analysis, and concluded that Hatfield does a better job of complying with the minimum spanning tree test than does BCPM. The fact that his results are diametrically opposed to Dr. Duffy-Deno's is not surprising, however, since he used a markedly different methodology. Dr. Duffy-Deno testified that he proceeded from the premise that the minimum spanning tree distance would be the minimum possible distance in which two points could be covered by cable in the real world. Thus, he worked from the additional premise that the minimum spanning tree test should be met on every route. (Tr. 1073). Mr. Pitkin, however, did his analysis by taking the routes that were short in a given wire center and the routes that are long in a given wire center and simply averaging them together. (Id.). Thus, he yielded an analysis that would appear to demonstrate that HAI Model performs better by MST standards.

There are, however, two critical flaws in Mr. Pitkin's underlying assumption that it is appropriate to offset cable shortages against routes for which the cable is too long. First of all, as Dr. Duffy-Deno testified, a minimum spanning tree distance will almost certainly be shorter than the distance required to be cabled in reality. (Tr. 954). Further, the real distance needed to span any given two points is not known. Thus, it is not valid to assume that any amount of cable is, in reality, longer than needed to bridge the subject points. All that is really known is that a given cable distance may be longer than the MST distance. (Tr. 1074-75). Whether it is longer than the real distance, or even adequate to span the real distance, is unknown.

Further, even if the MST distance were the correct distance, this process of offsetting underages and overages is still improper. As Dr. Brian Staihr testified, the geological factors that affect the price of placing plant throughout the state vary. (Tr. 1609). Soil type, depth to bedrock and other factors effect the cost to place cable. Therefore, by averaging longer and shorter cables, Mr. Pitkin is also averaging cables that almost certainly have different placement costs. His analysis does not factor in these differing placement costs, but instead treats all cables as if they are fungible. Thus, his analysis provides no basis to support the conclusion that "on average" HAI models sufficient costs to place cable of an adequate length.

Thus, the head-to-head comparisons in the analyses of Dr. Duffy-Deno demonstrate: (1) that Hatfield does not locate rural customers as well as BCPM; (2) that even if the HAI customer locations were correct, the HAI model performs substantially worse than BCPM in its estimations of the cable needed to connect these customers.

E. The Network Design of BCPM 3.1 is Superior to the HAI 5.0a Network Design

In addition to customer location, a second, equally important matter that must be considered to select an appropriate model is the reasonableness of the network design incorporated in each model. The costs of constructing and maintaining the loop network are the principal costs of providing universal service. (Tr. 1197). The loop network consists of the facilities from the central office switching center to the customer's premises, or, in particular, the feeder cable, distribution cable, feeder distribution interfaces ("FDIs"), distribution terminals, drop wire, and network interface devices ("NIDs") at the customer's premises. (Id.). A sound cost proxy model, like BCPM 3.1, will design a network that includes all the loop cost elements necessarily incurred in providing customers with the capability of placing and receiving telephone calls. (Tr. 1191).

Hatfield does not do this. Hatfield takes a lowest-cost approach and, as a result, provides only marginal voice grade services. Logically, such a network will fail to provide even minimal access to data and other advanced services which are required by Section 254 of the Act. (Tr. 1204). Conversely, BCPM 3.1 models a network that will work, and that will provide quality service to all customers in Florida. In the words of BellSouth witness, Dr. Robert M. Bowman, these goals are met because BCPM 3.1 "designs a network that has the capability to provide customers in rural and other high cost areas, access to advanced services comparable to those provided in urban areas." (Tr. 1192).

BCPM 3.1 follows standard engineering guidelines to ensure both proper transmission and the safety of subscribers and their property (Tr. 1196). On the other hand, as Dr. Bowman testified, the Hatfield Engineering Team, of which AT&T witness James Wells is a member, appears to have "adopted guidelines that are inconsistent with industry standards." (Tr. 1208). In fact, HAI 5.0a does not even comport with the engineering guidelines and practices published by AT&T for constructing its own network. (*Id.*) For example, the Hatfield Model engineers loops to 18,000 feet and beyond whereas AT&T's "Outside Plant Engineering Handbook, August 1994" (reprinted under the Lucent label in 1996) generally limits copper loops beyond the Digital Loop Carrier Remote Terminal ("DLC") to 12,000 feet for quality service. (*Id.*).

Moreover, HAI 5.0a engineers copper loops beyond the DLC up to 18,000 feet without additional provisions, such as extended range channel unit cards. (Tr. 1208). Instead, HM 5.0a underestimates network costs by placing standard channel unit cards (plug-ins) in its DLC, which are less expensive than the extended range cards. Therefore, HM 5.0a models longer copper loops without the technology needed to provide quality telephone service on these loops.

More precisely, the use of standard channel unit cards, combined with the distance of the loop past the DLC, results in an unacceptable decibel loss on the loop. (Tr. 1209).

The absence of extended range line cards in HM 5.0a for loops up to 18,000 feet, therefore, produces a network over which, in Dr. Bowman's words, "[c]ustomers would have to yell into the telephone in order to be heard." (Tr. 1210). This erroneous engineering design assumption degrades not only the quality or functionality of the HM 5.0a network, but also results in a significant understatement of costs. (*Id.*, p. 269).

When confronted on cross-examination with the AT&T design criteria that HAI violates, Mr. Wells first claimed that it had been "superseded." (Tr. 2601, 2604). He did, however, acknowledge that it was published in 1994, when he was still employed by AT&T (Tr. 2606). When asked whether this standard had been incorporated into the Lucent republication of the AT&T handbook in 1996, Mr. Wells denied knowledge of this. (Id.). Mr. Wells subsequently accepted that this standard appeared in the Lucent guidelines after he was shown a copy of these guidelines. (Tr. 2607-08). When asked whether any currently accepted, national, published standard superseded the AT&T guidelines, Mr. Wells answered in the affirmative and claimed that, among others, the BOC Notes On The Network does do so. However, when read the precise language of the Bellcore Notes On The Network (dated December 1997) regarding customer serving areas, Mr. Wells conceded that it set forth the same 12,000 foot serving area standard as is continued on the AT&T/Lucent guidelines. (Tr. 2012-13). Finally, when questioned as to whether any local exchange company in North American currently designs or builds copper loops longer than 12,000 feet from the DLC to the customer, he stated that his knowledge of current practice was inadequate to answer the question. (Tr. 2609). Upon further cross examination, Mr. Wells finally also conceded that the judgment that the AT&T standard had been "superseded" had been made by himself and the other members of the Hatfield team. (Tr. 2646-48).

It is also noteworthy that, during the hearing of this matter, rather than defending the design criteria, the Hatfield proponents attempted to mischaracterize the models as both routinely having loops that exceed 12,000 feet. Specifically, during cross-examination, Mr. Wells repeatedly stated that both BCPM and Hatfield have loops that exceed 12,000 feet. Mr. Wells also contended that because BCPM has some loops that exceed 12,000 feet, it must necessarily design its loops to do so. (Tr. 2614). At the same time, Mr. Wells acknowledged that he did not know how many loops in either model exceed this standard in Florida. (Tr. 2613-14). According to Mr. Pitkin, in the state of Florida, the HAI model has 84,838 loops that exceed 12,000 feet, while BCPM has 4,291 (Wood/Pitkin Deposition, Ex. 45, pp. 99-100). When confronted with this information, Mr. Wells contended that if the relevant design standard is that loops should not exceed 12,000 feet, then this design criteria should never be exceeded, not even once. (Tr. 2615). In other words, Mr. Wells refused to acknowledge the difference in the design criteria of the two models even though the frequency with which Hatfield designs loops longer than 12,000 feet is approximately 20 times the instances in which BCPM exceeds the limit of 12,000 feet. Specifically, this exchange occurred:

> Q. You are changing my question a little bit. I know you think 18,000 feet is the correct standard. The BCPM proponents say 12,000 is the correct standard. So for purposes of my question I want you to accept as a hypothetical that 12,000 feet is the correct standard. I just want to be clear on your position.
>
> Your position is that if BCPM exceeds it one time for every twenty times Hatfield exceeds it, then there is really no significant difference between their performance as to that standard?
>
> A. The answer to your question is, yes, because if hypothetically the limit is 12 [sic] and either model exceeds it, then either model is unacceptable.

Thus, Mr. Wells', speaking as an engineer, saw no significant distinction between the loops exceeding 12,000 feet in the models, even though HAI has approximately 80,000 of these loops while BCPM has approximately 4,000.

As to other problems in HAI from a network design perspective, some of HM 5.0a's engineering assumptions are not obvious and are not user adjustable. For example, HM 5.0a does not place telephone poles as a part of the model's aerial structure in the two highest density zones. (Tr. 1205). Not only is this assumption not obvious to the user, there is no user-adjustable input that allows the user to provide for placement of poles as part of the aerial structure in these two density zones. The user must not only search through the Excel formulas to discern exactly how structure is treated, but also must modify the Excel formulas to incorporate a more realistic assumption. (Tr. 1205). Moreover, exclusion of poles in the two highest density zones is a critical omission from a cost perspective. HM 5.0a assumes that as much as 60 % to 85 % of loop plant is aerial in its two highest density zones. However, by assuming <u>no</u> poles, HM 5.0a only includes the material cost of the cables. This likely results in an <u>understatement</u> of structure costs in the highest density zones, especially given HM 5.0a's assumption of such a high percentage of aerial plant. (Tr. 1205-06).

Ultimately, the BCPM 3.1's network design is superior to HM 5.0a's because it follows industry-accepted network design standards: a) it builds a network that reaches all customers—existing and potential; b) it makes advanced services as available to rural customers as they are to urban customers; and c) it builds a high quality network over which Floridians in both urban and rural areas could actually talk. Hatfield, in contrast, fails each of these tests.

Issue 3: For purposes of determining the cost of basic local telecommunications service appropriate for establishing a permanent universal service mechanism, should the total forward-looking cost of basic local telecommunications service pursuant to Section 364.025(4)(b), Florida Statutes, be determined by a cost proxy model on a basis smaller than a wire center? If so, on what basis should it be determined?

**Position: Initially, the cost should be calculated at the wire center level. The goal should be to eventually move the basis of support calculations to a smaller geographic area.

Witnesses for five parties presented testimony regarding Issue 3: BellSouth, Sprint, GTE, FCTA and AT&T. In general, the calculation of cost at the wire center level appears to be the approach that most parties currently support. GTE, however, took the position that cost should be calculated on a basis smaller than the wire center because there is the potential, within a single wire center, to have both low cost urban areas and higher cost areas that are less densely populated. Thus, providing support on a wire center basis would, in this circumstance, fail to target to the customers in the high cost areas that need are in greatest need of support. (Tr. 1328). BellSouth likewise acknowledges that, generally speaking, the more precise the targeting of support, the better. (Tr. 1166). BellSouth, however, also notes that presently there are administrative difficulties with utilizing areas for calculation smaller than a wire center. For this reason, BellSouth specifically advocated that the wire center level is the smallest level of data aggregation that can reasonably be used at this time. (Tr. 1114-15).

At first blush, it would appear that AT&T also believes that the cost of universal service should be determined on a wire center basis. In fact, Mr. Guepe testified specifically that "[t]he total forward-looking cost of universal service should be determined on a wire center basis (Tr. 688). He also acknowledged that the FCC has required the federal fund calculation to be deaggregated to this level. (Id.). AT&T, however, essentially argues that the universal service cost per wire center, once calculated, should simply be discarded.

For the reasons stated above and in response to Issue 1, BellSouth disagrees with the proposals of AT&T and FCCA to calculate universal service costs on a state-wide basis. Still, BellSouth believes that the parties are not in fundamental disagreement as to the answer to the precise question raised in Issue 3. Put differently, AT&T and FCCA's position regarding aggregation of high cost and low cost areas is essentially a policy argument. It is also an argument that goes to the creation of the fund, an issue substantially beyond the charge of the Legislature to the Commission to select a vehicle for determining high cost areas.

However, if we limit ourselves to the strict question raised by Issue 3--the geographic level at which cost should be calculated--calculations at the wire center level would appear to be, by near consensus, the best current alternative. Calculation at this level will allow the targeting of high cost areas that are in need of support to an extent that is practical today. As the administrative challenges of using smaller areas are resolved in the future, support should be calculated on the basis of these smaller areas to the extent possible.

Issue 4: **For purposes of determining the cost of basic local telecommunications service appropriate for establishing a permanent universal service mechanism, for each of the following categories what input values to the cost proxy model identified in Issue 2 are appropriate for each Florida LEC?**

(a) Depreciation rates
(b) Cost of money
(c) Tax rates
(d) Supporting structures
(e) Structure sharing factors
(f) Fill factors
(g) Manholes
(h) Fiber cable costs
(i) Copper cable costs
(j) Drops
(k) Network interface devices
(l) Outside plant mix
(m) Digital loop carrier costs
(n) Terminal costs
(o) Switching costs and associated variables
(p) Traffic data
(q) Signaling system costs
(r) Transport system costs and associated variables
(s) Expenses
(t) Other inputs

**Position: The appropriate input values are the Florida specific values proposed by BellSouth. These values are contained in the BCPM 3.1 model attached to the testimony of D. Daonne Caldwell. Page numbers are the Bate Stamped page numbers.

(a) Depreciation rates - page 256
(b) Cost of money - page 251
(c) Tax rates - pages 251, 255
(d) Supporting structures - pages 191-235, 241
(e) Structure sharing factors - pages 191-235, 244-245
(f) Fill factors - pages 166 and 251
(g) Manholes - pages 236-240
(h) Fiber cable costs - pages 176-180
(I) Copper cable costs - 180.1-180.15
(j) Drops - pages 171-175

(k) Network interface devices - pages 171-175
(l) Outside plant mix - pages 242-243
(m) Digital loop carrier costs - page 246
(n) Terminal costs - pages 181-185
(o) Switching costs and associated variables - pages 161-169, 257
(p) Traffic data - pages 161, 163-165
(q) Signaling system costs - page 170
(r) Transport system costs and associated variables - pages 247-249
(s) Expenses - pages 252-254
(t) Other inputs - pages 250-251

A. BellSouth's Input Development Process For Use With BCPM 3.1 Produces Inputs Superior (That Is, Forward Looking, Florida-Specific, and Realistic) to Those of HAI 5.0a

Although the selection of the proper cost model is important, the selection of the appropriate model inputs that result in an accurate determination of the "real world" costs of providing universal service in high cost areas is just as critical. These real-world costs must reflect the costs that an efficient carrier will incur in providing universal service in Florida.

Again, the FCC's model selection criteria is instructive. It provides that "[t]he technology assumed in the cost study or model must be the least-cost, most-efficient, and reasonable technology for providing the supported services that is currently being deployed." (FCC Universal Service Order, ¶ 250.) BellSouth's proposed inputs to BCPM 3.1 meet this standard. They are forward-looking and reflect the costs of currently available technologies. (Tr. 2105-07). BellSouth witness Ms. Daonne Caldwell testified that the inputs used by BellSouth "reflect the most accurate view of conditions and experiences that an efficient carrier would experience in providing universal service in BellSouth territory in [Florida]." (Tr. 2106). Further, BellSouth has used current material prices, labor costs, and contractor costs that are adjusted by Telephone Plant Indices ("TPIs") to reflect 1998-2000 costs. "In certain plant accounts, the TPIs add inflation estimates to the costs. In other accounts, the TPIs actually result in lower costs when costs are forecasted to decline in a particular type of telephone plant." (Testimony of D. Caldwell; Tr. 2110). Thus, BellSouth's inputs do not reflect embedded costs. While they take into consideration the actual costs incurred today by BellSouth, they are adjusted to reflect cost changes projected over the next three-year period. These adjustments include inflation, deflation, and productivity gains.

BCPM 3.1 contains approximately 12,000 user adjustable inputs. (Tr. 2131). For the overwhelming majority of user adjustable inputs, BellSouth has supplied input values that are specific to its service territory in Florida. Ms. Caldwell testified that, out of the 12,000 BCPM user adjustable inputs, BellSouth developed Florida-specific, BellSouth-specific values for 90% of the total inputs, and all of the "major cost drivers." (Tr. 2132). In those relatively few instances in which BellSouth data was not available in the format or at the level of detail required by the model, BellSouth drew upon its own experience and available company data to verify the reasonableness of the BCPM default values. (Id.).

BellSouth supported the appropriateness of all of its inputs through the testimony of Daonne Caldwell.[9] The state-specific inputs advocated in Ms. Caldwell's testimony include: contractor costs of placing cable, conduit and poles; sharing percentage associated with structures; cable material and labor and labor unit costs; cable sizing/utilization; drop terminal cost; feeder/distribution interface costs; switch costs; drop network interface device costs; land and building costs; depreciation lives, survivor curves and net salvage percents; cost of capital; actual wire center line count; and expenses and support assets. (Tr. 2108).

[9] In addition, BellSouth submitted the stipulated testimony of Dr. Randall Billingsley on its cost of capital and Mr. David Cunningham on depreciation costs.

BellSouth is the largest provider of telecommunications services in Florida as well as in the southeastern United States. Logically, BellSouth's specific inputs reflect the most accurate (and lowest) cost for providing universal service in BellSouth territory in Florida. BellSouth has many years of experience building and operating a network that provides quality telecommunications service in Florida. BellSouth's network engineers understand the specific requirements of developing a network in Florida. Because of its size, BellSouth is a large purchaser of telecommunications equipment and, therefore, often receives substantial volume discounts from vendors. Thus, the BellSouth inputs reflect a reasonable view of conditions and experiences that an efficient carrier would experience providing service in BellSouth's territory in Florida.

In contrast to the Florida-specific inputs that BellSouth has used in BCPM 3.1, the default inputs in the HM 5.0a do not contain information specific to Florida and, accordingly, cannot accurately reflect the forward-looking cost of providing high quality telephone service in Florida.

There are essentially two databases used in the HAI 5.0a model: 1) a voluminous set of cluster data concerning customer counts, locations and geophysical characteristics of the service territory (discussed previously); and 2) a set of data that make up a user adjustable input database. The values for the cluster data are fixed and are not intended to be user adjustable. The values for the user adjustable inputs are designed to reflect the conditions of the carrier for which prices are being developed. Thus, they can be changed. The HAI proponents, however, have elected, with a very few exceptions, not to charge the user adjustable inputs, but rather to rely on the default inputs.

The HAI 5.0a's default values are generic in nature, national in scope, and largely form the basis for AT&T and MCI model filings in numerous states across the nation. Therefore, the HM 5.0a default inputs, unless changed, are the same for Florida as they would be for every other state. The HAI model has 1578 user adjustable default inputs, which fall into approximately 202 types or categories of input. (Tr. 783-84). Of these, AT&T and MCI's witness, Don Wood, changed only three categories—cost of capital (rate of return) depreciation, and the regional labor adjustment. (Tr. 784-85). Upon cross examination, Mr. Wood stated that changing these three categories of inputs resuits in "down stream" changes to less than 400 of the 1,578 inputs. Mr. Wood also admitted that of the approximately 1175 remaining inputs, none were changed for Florida. (*Id.*).

Mr. Wood conceded that the inputs that were utilized in an overwhelming majority of the cases are identified as default inputs in the model. (Tr. 789). Mr. Wood contended, however, that this was appropriate, because these are values that "don't need to change." (Tr. 786). Despite expressing this view, Mr. Wood also acknowledged that, of the approximately 202 categories of inputs, 118 were developed by persons other than the members of the Hatfield engineering team, (Tr. 795) and that he was not able to provide any of the specifics as to who developed these inputs or how they arrived at the particular input values he supports on behalf of AT&T. (Tr. 796-98). He further stated that he was "not sure the individuals themselves could sit down at this point and recall with any degree of accuracy exactly who talked about what for every input." (Tr. 798). Mr. Wood was then asked whether there are any records in existence that "reflect that process of exactly what they did to set the input values." (Tr. 798). Without elaboration, Mr. Woods simply answered, "no." Thus, Mr. Wood felt confident that roughly 199 categories of inputs (representing at least 1175 individual inputs) need not be charged to run the model in Florida. He held this belief despite having virtually no knowledge of the specifics of how approximately 120 of these categories were developed or by whom.

In fact, no witness, other than AT&T's Mr. Wells, offered any testimony on the specifics of how the default inputs recommended for use in Florida were developed. Even Mr. Wells could not offer supporting testimony for all of the user adjustable inputs, because he, as a member of the engineering team, only had responsibility for those inputs related to outside plant. (Tr. 2469). Moreover, Mr. Wells' testimony revealed that the development input process of the HAI engineering team is, at best, suspect.

The Hatfield outside plant engineering team consists of only six members. (Ex. 85, JWW-1). According to Mr. Wells, the outside plant inputs for HAI 5.0a were developed by first using the team's "collective expert judgment on what they perceived to be cost effective, forward-looking costs that could reasonably achieved, and these judgments were then used to determine the default values in the model." (Tr. 2477). Then the various team members attempted to perform after the fact validations of those results in their own way. (Tr. 2477; Ex. 88, Deposition of James Wells, p. 75)[10].

As to input development, Mr. Wells admitted that this exercise of "collective judgement" happened largely before he became a team member. Specifically, he stated that most of the input values that are the responsibility of the engineering team were set before he joined the team. (Tr. 2584). He was unable to provide any specific explanation of how the input values that were developed before he arrived were set. (Tr. 2587). Mr. Wells also did not know

[10] In his deposition, Mr. Wells explained the process as one in which "we as experts come up with these numbers, but then we then subsequently went and did a variety of types of validation to show that they were reasonable." (Id.)

how many of the inputs were developed by the engineering team specifically for 5.0a, as opposed to existing in prior versions. (Tr. 2592; Ex. 88, pp. 79-80).

Mr. Wells' description of the validation process also prompted questions more frequently than it provided answers. First, Mr. Wells admitted that there is no formal process to ensure that all of the inputs are validated. (Tr. 2593). Instead, the validation process basically boils down to allowing individual team members to arrive at their own validation technique. In Mr. Wells' words, "[e]ach member of the team used different approaches to validate the HAI Model OSP methodology, assumptions and input values." (Tr. 2487-88).

As to these individual efforts, Mr. Wells cited in his testimony to validation study of Dean Fascett, a member of the HAI engineering team. Mr. Wells admitted, however, that efforts of Mr. Fascett detailed in his testimony related to only 30 of the 1400 inputs for which the engineering team was responsible. (Tr. 2596). He also admitted that other inputs were reviewed by Mr. Fascett, but that the results of this review were not described in his testimony. (Id.). He could not explain why Mr. Fascett's analysis of some inputs were not included, however, because this part of his testimony was prepared by someone else. (Tr. 2596-97). He also conceded that he had no knowledge of who Mr. Fascett spoke to in order to obtain this validation. (Tr. 2597).

Mr. Wells also stated that the validation that he performed on an earlier version of the model based on Georgia data was not a validation of the current Hatfield 5.0a. (Tr. 2594). He further stated that, to his knowledge, no efforts had been made to check the other earlier validations referred to in his testimony to see if they offered any validation as to current version of 5.0a. (Ex. 88, pp. 78-79). There also has been no effort to see if inputs from earlier versions of HAI remain current and valid today (Tr. 2593). Further, Mr. Wells stated that the type of validations described in his testimony had not been performed at all for 5.0. (Tr. 2593). Instead, he testified that the current method of validation is to present the model in hearings such as the instant proceeding to "validate in essence our assumptions and input values relative to various models . . . ." (Tr. 2593).

The belief of Mr. Wells that presenting the HAI 5.0a inputs in hearings constitutes a form of validation seems exceedingly odd in light of related testimony given by Mr. Wood. Specifically, in the rebuttal testimony of Misters Wood and Pitkin, they made much of the fact that the Kentucky and Louisiana Commissions have picked Hatfield as a platform for universal service. On cross-examination, however, Mr. Wood admitted that both the Kentucky and Louisiana Commissions rejected a number of the most significant Hatfield inputs. For example, he acknowledged that the Louisiana Commission rejected the Hatfield default inputs for drop lengths, drop placements, buried drop sharing fraction, sharing factor for buried cable, switching expense and a variety of other switching factors.[11] (Tr. 1819-1831). Likewise, he acknowledged that the Kentucky Commission rejected the Hatfield default inputs for buried drop sharing fraction, distribution fill, network interface device, digital loop carrier, distribution cable investment, serving area interface, copper feeder fill, fiber feeder fill and the sharing factor for buried distribution. (Tr. 1834-1838). He further acknowledged that the Kentucky Commission entered an Order that was specifically critical of the Hatfield default inputs in many respects.

[11] The Staff also found that added expense was necessary to add electronics to support copper loops in the HAI model in excess of 13,200 feet. (Tr. 1826).

and that the Commission largely adopted inputs into HAI provided by the Georgetown Consulting Group. (Id.)[12].

Taking Mr. Wood's testimony together with Mr. Wells, it would appear that the Hatfield engineering team is largely "validating" the specific inputs of 5.0a by presenting them in hearings in which the inputs are rejected. At the same time, the Hatfield proponents continue to offer their national default inputs in this proceeding, despite their having been rejected by other Commissions. It is perhaps understandable that the Hatfield proponents would continue to advocate their position regarding inputs even though it has been rejected by other Commissions. It is less understandable, however, how Mr. Wells can view the submission of the default inputs in regulatory proceedings in which they are rejected as a validation of the inputs.

Beyond the deficiencies of the HAI input development process, the inputs themselves are, in many cases, facially implausible. The HAI model input for structure sharing provides one example. The HAI Model assumes that an ILEC can share buried support structures for distribution cable with other companies two-thirds of the time (i.e. so that only 33% of the cost is assigned to the incumbent telephone company). However, Mr. Wells admitted that structure sharing simply cannot be achieved to this extent at present. (Tr. 2617, 2622). Nevertheless, even though the sharing factor percentage cannot be achieved currently, the Hatfield model reduces network investment costs currently on the basis of this sharing factor.

During the cross-examination of Mr. Wells, specific numbers in evidence were used to demonstrate the magnitude of this cost reduction. Specifically, the total network investment for

[12] Mr. Wood acknowledged that the Commission found that HAI overstated fill factors (Tr. 1836), that it's SAI values were not Kentucky-specific and were of questionable origin (Tr. 1837), and that the HAI values for fiber and copper feeder lacked adequate support. (Tr. 1838).

support structures for buried cable in the state of Florida[13] is 978.1 million dollars. Applying the 33% sharing factor to this number (that is, assuming that only 33% of the cost will be paid by the builder of the network) reduces this network investment by 655.3 million, leaving a cost in the HAI model of 322.8 million dollars. (Tr. 2619)[14] Given these numbers, Mr. Wells' agreed that the Hatfield Model functions, on the basis of a modeling assumption that he acknowledges cannot be currently achieved, to simply do away with more than half a billion dollars of network costs. (Tr. 2619). To the extent the sharing factor cannot be achieved in the present, obviously these costs cannot be reduced in the present; Hatfield subtracts them anyway. This brings us one last time to Mr. Wells' contention that the Hatfield model has been "validated" through the regulatory process. In his deposition, Mr. Wells' acknowledged that he is unaware of any commission in the entire country that has accepted the 33% sharing factor of the HAI for buried distribution plant (CITE). Nevertheless, this percentage remains in the default inputs of HAI, and it continues to be advocated by the HAI proponents.

B. If The HAI Model Is Selected, Its Default Inputs Should Be Rejected In Favor Of The Inputs Proposed By The Georgetown Consulting Group

The HM 5.0a approach to input development, designed to produce the lowest cost-per-loop possible, should be rejected in favor of inputs that reflect the cost of producing a real world network (i.e. the more reasonable approach of BCPM 3.1 with the Florida-specific inputs proposed by BellSouth). However if this Commission selects HAI 5.0a, it must disregard the

[13] Actually these numbers did not reflect the entire state of Florida, but rather the cost attributable to BellSouth, Sprint and GTE.

[14] These numbers are taken from the CD ROM attached as Exhibit 6 to the testimony of Mr. Wood (Ex.43)

HAI 5.0a default inputs, because they do not reflect the forward-looking cost of constructing a telephone network in Florida.

BellSouth asked the Georgetown Consulting Group ("Georgetown") to analyze the appropriateness of the Hatfield 5.0a inputs and to suggest changes where appropriate. For the purpose of its analysis, Georgetown accepted the underlying logic of HAI 5.0a and focused its attention only on the model's user adjustable inputs. (Tr. 2913). Georgetown identified groups of inputs that were related by the model's logic and then tested the model's sensitivity to changes in the values for the groups. (Id.). The results of HAI 5.0a were considered sensitive to a group of inputs if a change in one or more of the default values for the related inputs changed the average loop price or switching price by one percent or more. (Id.). Georgetown found that the default values selected for 14 groups of user adjustable inputs had a significant effect on the results derived by applying HM 5.0a.

Focusing on the input groups that were found to be sensitive, Georgetown examined whether the default values chosen by MCI and AT&T reflected BellSouth's operations in Florida and reflected costs or other considerations reasonably expected to occur in the future. (Tr. 2913). When the default values for those groups of inputs failed that standard, Georgetown fashioned alternative values to meet it by examining current costs and other data specific to BellSouth in Florida, stripping that information of any embedded characteristics and creating the type of forward-looking cost or other data for use in the model. (Id.). The Georgetown Consulting Group's analysis demonstrates that when the correct inputs are used, the results of the two models trend toward each other. In fact, by changing the default values for these 14 groups of inputs to reflect Florida-specific data and then running HM 5.0a with those new values, Georgetown produced a state-wide average line cost of $27.14. (Tr. 2918).

Further, the Georgetown analysis unmasked the "result oriented" approach of the Hatfield modelers. Georgetown found that as the Hatfield Model has been refined through different successive versions, the outputs have remained fairly consistent. (Tr. 2923). This consistency appears to have been achieved by making downward changes in the default values for the user-adjustable inputs. (Tr. 2924). Moreover, if the values for UAIs (user adjustable inputs) between [Hatfield version] 2.2.2 and HAI R5.0a "had remained the same, the universal service support would have risen by $17.5 million (from 7.3 million to $24.8 million)" (Tr. 2926).

Based upon the Georgetown analysis, it is obvious that Hatfield does not include the appropriate, forward-looking state-specific inputs, and that the inputs that are used to change from one model to the next in a way that appears to correspond to nothing except the goal of keeping the model outputs low. For these reasons, it is imperative that—even if this Commission determines that the Hatfield Model 5.0a is the appropriate model—it should still utilize with the Hatfield model the inputs developed by the Georgetown Consulting Group.

Issue 5: (a) For purposes of determining the cost of basic local telecommunications service appropriate for establishing a permanent universal service mechanism, for which Florida local exchange companies must the cost of basic local telecommunications service be determined using the cost proxy model identified in Issue 2?

(b) For each of the LECs identified in (a), what cost results from using the input values identified in Issue 4 in the cost proxy model identified in Issue 2?

**Position: (a) The BCPM 3.1 model should be used to determine the cost of basic local telecommunications service for the non-rural local exchange companies in Florida, i.e., BellSouth, Sprint and GTE.

(b) The forward-looking costs for BellSouth by wire center from the BCPM 3.1 model are located in the revised version of Exhibit PFM-1 attached to Mr. Peter Martin's direct testimony.

Issue 6: (a) For purposes of determining the cost of basic local telecommunications service appropriate for establishing a permanent universal service mechanism, should the cost of basic local telecommunications service for each of the LECs that serve fewer than 100,000 access lines be computed using the cost proxy model identified in Issue 2 with the input values identified in Issue 4?

(b) If yes, for each of the LECs that serve fewer than 100,000 access lines, what cost results from using the input values identified in Issue 4 in the cost proxy model identified in Issue 2?

(c) If not, for each of the Florida LECs that serve fewer than 100,000 access lines, what approach should be employed to determine the cost of basic local telecommunications service and what is the resulting cost?

**Position:

(a) No.

(b) Not applicable.

(c) Embedded costs should be used to determine the cost of basic local telecommunications service for rural local exchange companies.

In essence, Issue Nos. 5 and 6 address the same question: to which companies should the proxy models identified in Issue 2 be applied. The primary difference between the two is that Issue 6 asks the question in specific reference to local exchange companies with fewer than 100,000 lines. The parties to this proceeding would appear to be in agreement as to which companies the selected cost proxy model should apply. Specifically, all parties would appear to agree that the cost proxy model selected in Issue 2 should be utilized to determine the cost of service for the non-rural local exchange companies in Florida, in other words, BellSouth, Sprint, and GTE. At the same time, the parties would also appear to be unanimous in the position that embedded cost studies should be used for the small, rural local exchange companies in the state, i.e., those having fewer than 100,000 lines.[15]

As to the specific costs that are produced for the large local exchange carriers by the use of the model, BellSouth can provide only the costs that pertain on a wire center by wire center basis in its territory. These costs (based on use of the BCPM 3.1) are set forth specifically in Exhibit PFM-1 to the Direct Testimony of BellSouth witness, Peter F. Martin. (Ex. 50). As stated in response to Issue 2, BellSouth believes that the BCPM 3.1 is the appropriate cost model. Thus costs in the areas of Florida served by GTE and Sprint should be derived from this model also.

[15] This conclusion is based upon the positions of the various parties as set forth in the Pre-Hearing Order (Order No. PSC-98-1303-PHO-TP, pp. 31-36).

CONCLUSION

This Commission should select BCPM 3.1 with the user adjustable inputs proposed by BellSouth. The BCPM model is superior to HAI 5.0a because BCPM more accurately locates customers in the rural high cost areas that are in greatest need of universal service support, and "builds" to these customers a quality network that reflects accepted engineering practices. Further, BellSouth's proposed inputs are realistic, state-specific, and forward looking.

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