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AT&T

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November 2, 1998

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

Re: Docket No. 980696-TP

Dear Mrs. Bayo:

Enclosed for filing in the above referenced proceeding are the original and fifteen (15) copies of the Joint Post-Hearing Brief of AT&T Communications of the Southern States, Inc., MCI Telecommunications Corporation, and WorldCom Technologies, Inc.

Copies of the foregoing are being served on all parties of record in accordance with the attached Certificate of Service.

Thank you for your assistance in this matter.

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Sincerely,

Tracy Hatch

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BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Determination of the cost of basic local telecommunications service pursuant to Section 364.025, Florida Statutes	Docket No. 980696-TL Filed: November 2, 1998

JOINT POST-HEARING BRIEF
OF
AT&T COMMUNICATIONS OF THE SOUTHERN STATES, INC.,
MCI TELECOMMUNICATIONS CORPORATION, AND
WORLDCOM TECHNOLOGIES, INC.

AT&T Communications of the Southern States, Inc. ("AT&T") MCI Telecommunications Corporation ("MCI"), and WorldCom Technologies, Inc. ("WorldCom") submit this post hearing brief to the Florida Public Service Commission ("Commission") in the above captioned proceeding pursuant to Order No. PSC-98-1303-PCO-TP and Rule 28-106.215, Florida Administrative Code. AT&T, MCI and WorldCom request that the Commission find and order that: the HAI 5.0a cost proxy model is the most appropriate cost proxy model to determine the cost of basic local telecommunications service in Florida; the inputs proposed by AT&T, MCI and WorldCom are the most appropriate inputs for the cost proxy model to be selected; the cost proxy model and inputs selected should be applied to BellSouth, GTEFL and Sprint-Florida; Universal Service Fund ("USF") costs should be calculated on a wire-center basis; and any determination of USF costs for small LECs should be deferred until the FCC addresses USF for small LECs or a small LEC can demonstrate a need for USF support.

INTRODUCTION

In accordance with Florida's 1998 USF legislation, MCI, AT&T and WorldCom believe that USF costs for BellSouth, GTEFL and Sprint-Florida should be determined by using both the HAI 5.0a cost proxy model as filed by AT&T and MCI and the inputs proposed by AT&T's and MCI's witnesses. Based on the comparison of costs to revenue generated by the services offered by these ILECs, the Commission should find that there is no need for a separate universal service fund for any of these companies at this time. Should the Commission adopt the BCPM and its proposed inputs, the Commission would be embarking on the creation of a USF in excess of $1.3 billion -- which could be the largest single consumer tax increase in Florida history. Such a ridiculous result is only further demonstrated by the fact that under current Commission policy, no ILEC has to date petitioned this Commission for any universal service support.

ISSUE BY ISSUE ANALYSIS

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

AT&T, MCI, WorldCom:
Basic local telecommunications service should be defined to include all forward-looking costs of the functionality (e.g. loop and switch) used to provide all services that can be provided to consumers by such functionality. This will ensure consistency when the revenue benchmark issue is addressed in structuring a USF fund.

MCI, AT&T and WorldCom adopt and incorporate by reference the arguments, analysis and discussion of the evidence set forth in the brief of the Florida Competitive Carriers Association ("FCCA")with regard to Issue 1.

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?

AT&T, MCI, WorldCom:
** The HAI Model 5.0A is the most appropriate cost model because it models a forward-looking, least cost, high quality network to actual customer locations using existing, efficient engineering practices and technologies. **

INTRODUCTION

The HAI 5.0a Model is the appropriate cost proxy model for use in calculating universal service costs for Florida. HAI 5.0a has two major strengths: first, it locates customers more accurately than the Benchmark Cost Proxy Model ("BCPM") (which physically locates no customers) and second, it designs a high quality network to serve those customers. Moreover, it builds the network at a more efficient cost than BCPM because it designs a network the way an engineer would, without the awkward and artificial inefficiencies BCPM's computer programming contains. In addition, the HAI Model is capable of providing consistency between UNE prices and USF costs, because it can generate prices for UNEs as well as costs for universal service.

The underlying logic of HAI 5.0a is straightforward and understandable: it applies generally accepted engineering principles to determine the amount of various network components required to meet a specified level and location of demand. The HAI Model assumes the location of existing wire centers, but otherwise calculates the least-cost, forward-looking cost of feeder, distribution and other facilities (the "scorched node" approach), consistent with the requirements of universal service. Applying user-adjustable cost data inputs, the model calculates a required level of investment, which is used to determine capital carrying costs and many operating expenses. The model thus develops costs that an efficient provider, facing competition from other providers, would incur in constructing facilities to provide universal service in the Florida market.

In order to address this issue, AT&T, MCI and WorldCom will first address the HAI Model's superior attributes, next will debunk the ILECs' criticisms of the HAI Model and finally, will describe defects in the BCPM which destroy its value as a cost proxy model.

I.

THE COMMISSION SHOULD ADOPT HAI 5.0A BECAUSE IT LOCATES CUSTOMERS MORE ACCURATELY THAN BCPM AND BUILDS AN EFFICIENT NETWORK TO THOSE CUSTOMERS

The HAI Model is far more accurate than BCPM in locating customers and estimating the costs of building a network to them. The ability to locate customers accurately is one of the most important attributes of an efficient cost model. (Wood/Pitkin, Tr. 1652) Accurate information is necessary both to determine the location of customers relative to the serving wire center and the location of customers relative to each other. (Wood, Tr. 535-536) This is important because customer locations and customer groupings largely determine the location and size of the carrier serving areas within the telecommunications network, which in turn determine the costs of cable and expensive Digital Loop Carrier ("DLC") electronic equipment necessary to reach and equip those carrier serving areas. HAI 5.0a locates 70% of the residential customers and 85% of the business customers in Florida. (Wood, Tr. 547; Wood/Pitkin, Tr. 1675) In contrast, BCPM locates no customers and uses several modeling assumptions that result in the use of more expensive material and equipment to get the job done. (Wood/Pitkin, Tr. 1649-1651)

To locate customers, HAI 5.0a uses a process known as "geocoding." Simply defined, "geocoding" means matching customers with their addresses and locating those addresses by latitude and longitude. The geocoding process, performed by a company called PNR and Associates, makes use of mailing lists from a company called Metromail and business addresses from Dun and Bradstreet. PNR then uses the U.S. Geological Survey TIGER database to determine the latitude and longitude of the street addresses, after which it uses a mathematical formula to read the data and determine which groups of people are located in "clusters," i.e. close to each other. For modeling purposes, a rectangle is overlaid over each cluster and these naturally occurring groups define the carrier serving areas within each wire center. 1/ (Wood, Ex. 43, DJW-2, at 27-33)

HAI 5.0a assumes that customer locations for which geocoding data currently does not exist are distributed evenly along the perimeter of the Census Block. (Wood/Pitkin, Tr. 1675-1676) This is an appropriate assumption because: (1) Census Blocks often are bounded by roads; and (2) placing customers at the outer limits of the Census Blocks is a conservative approach which tends to overstate required distribution plant. Indeed, data provided to

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1/ It is important to recognize that both HAI 5.0a and BCPM actually "model," that is, at some point they make assumptions so that they can perform calculations. The ILECs attempt to argue that Hatfield 5.0a "throws out" its geocoding data at some point in the process. This is not the case. HAI 5.0a builds distribution plant directly over the clusters containing each of the geocoded locations. BCPM, on the other hand, initially assumes even distribution of customers along roads, but ignores this assumption when it begins to calculate the required distribution plant. Customers are assumed to be evenly distributed in the BCPM distribution quadrants, even if these distribution quadrants have no roads in them! The focus of the inquiry of which model better locates customers, therefore, should be on which model does a better job of locating the customers for the

the FCC demonstrates that HAI 5.0a's approach of placing non-geocoded locations along the perimeter of the Census Block results in approximately 5% *more* distribution route mileage in Florida than if the non-geocoded locations are placed along all interior and exterior roads. (Wood/Pitkin, Tr. 1677-1678; see also Ex. 67) Therefore, even though the amount of plant required may be slightly overstated in the HAI model, there will be enough plant to ensure that the network will reach all customers. Accordingly, by using the geocoding process, HAI 5.0a provides a degree of precision in its results that simply cannot be duplicated by a model such as BCPM which does not "locate" any customers at all and instead uses an unrealistic modeling assumption that arbitrarily distributes households within "road reduced" quadrants overlaid upon an artificial grid structure. 2/

Moreover, the HAI Model designs facilities to neighborhoods the way an engineer would design those facilities. Unlike BCPM, the modeling algorithms in the HAI Model impose no artificial geographic constraints on carrier serving area design that

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purpose of determining the distribution areas. Clearly, Hatfield 5.0a is superior to BCPM in this process.

2/ The closest BCPM comes to "locating" customers is assigning an *amount* of customers to a geographic area as large as 60 acres (1/10th of a square mile). (Duffy-Deno, Tr. 1011-1013) By no stretch of the imagination is the identification of the underlying number of customers inside a 60 acre square an identification of each of those customer's geographic locations, particularly in rural areas in which there is likely no more than a single customer in any given square. As Commissioner Garcia aptly noted, BCPM would not be accurate enough to let you shoot customers, though you might be able to bomb them given a large enough bomb. (Tr. 1011, 1013) prevent utilization of real-world efficiencies and technologies. (Wood/Pitkin, Tr. 1684-1687) After all customers are located (as described above), the HAI 5.0a clustering algorithms identify customers that can be served together logically, such as customers located in the same neighborhood or town, subject to any technological constraints. (Wood/Pitkin, Tr. 1686; Wood, Ex. 43, DJW-2, at 3-4, 31-33) The model builds feeder facilities to these locations and defines carrier serving areas, where possible, to include the identified groupings. Within each neighborhood, HAI 5.0a designs distribution facilities using the efficient rectangular lots favored by real-world real estate developers. (Wood/Pitkin, Tr. 1707-1708) For outlying customers served by roads, HAI 5.0a actually builds distribution facilities along the roads to serve the customers. (Wood, Tr. 579)

The HAI Model also utilizes the same least cost, most efficient technologies that ILECs currently are deploying, including next generation digital loop carrier systems, digital switching, fiber rings for interoffice transport, and Signaling System 7. (Wood, Tr. 768) For parts of the network in which the choice of efficient technologies may differ under varying conditions, the HAI model contains alternative solutions and chooses efficient technologies the way real engineers make choices. For example, one choice an engineer must make in designing a telephone network is how much copper versus fiber feeder to use. Copper, being a semi-precious metal, is expensive while fiber is relatively cheap. However, fiber feeder requires installation of expensive digital loop carrier ("DLC") equipment. Therefore, while it is not cost effective to use fiber feeder for short distances, at some point it becomes less costly to use fiber with DLC electronics than expensive copper. To determine the most cost effective solution, HAI 5.0a compares costs of copper and fiber for every feeder loop segment and chooses the most efficient alternative. 3/ (Wood, Ex. 43, DJW-2, at 20-21, 45-46; Wells, Tr. 2473-2474)

In contrast, BCPM determines the mix of copper and fiber feeder using an arbitrary "crossover point" based on *total* loop length. (Wells, Tr. 2496, 2517) In fact, there is no fixed crossover point based on *total loop length* at which it is less costly to use fiber rather than copper. This is because the efficiencies of copper and fiber feeder depend on *feeder length*, not *total* loop length, which includes both feeder and distribution. (Id.) Therefore, BCPM never can optimize (and hence always overstates) feeder cost. As costs increase, so do the projected costs of universal service, and ultimately, the tax on Florida consumers.

Moreover, contrary to the ILECs' assertions, the universal service network which the HAI Model designs is fully capable of

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3/ The HAI Model also is capable of adjusting the mix of aerial and buried plant depending on the costs of placing each type of facility within specific geographic areas. (Wood, Tr. 768; Wood, Ex. 43, DJWaccommodating all manner of advanced services, including traditional analog modem and high speed ISDN data services. The HAI Model makes these capabilities available, in part, by the modeling of T-1 technologies in place of coarse-gauge cable and load coils utilized in embedded networks to permit extended copper loop lengths. (Wood, Tr. 769; Wells, Tr. 2472) Thus, even isolated customers can be served using facilities that accommodate advanced services including ISDN and other high speed data applications. In further contrast to BCPM, HAI Model 5.0a conducts tests of the outside plant facilities that it models to ensure that the transmission parameters necessary to permit accommodation of advanced services are not exceeded. (Wells, Tr. 2496) Thus, in *no sense* does the HAI Model assume or require a level of service less than that being provided to any customer in Florida today. In the vast majority of cases, it provides for greatly improved levels of service. 4/

II.
THE ILECS' CRITICISMS OF HAI 5.0A'S STRUCTURE AND ALGORITHMS ARE UNFOUNDED

The ILECs' attack on the structure of the HAI Model consists of four primary criticisms: (A) because HAI 5.0a permits a

2, at 6)

4/ The Louisiana Public Service Commission recently adopted the Final Recommendation of the Staff and independent expert consisting of detailed analysis of the HAI Model and BCPM indicating that the HAI Model is superior with regard to both customer location and engineering design. Order, La.Pub.Serv. Comm'n, Docket No. U-20883 (Subdocket-A) (April 15, 1998) (adopting Staff's Final maximum loop length of 18,000 feet it does not model a "quality" network; (B) HAI 5.0a does not accurately locate customers; (C) HAI 5.0a does not design plant to these customers; and (D) HAI 5.0a does not design enough distribution plant based on a minimum spanning tree (MST) analysis. These criticisms are without merit.

A. HAI 5.0a's Limitation of Copper Loops to 18,000 Feet Results in a Network That Efficiently Provides High Quality Service To All Florida Consumers; BCPM's Use of the Same Limitation Does Not

The BCPM proponents say that because HAI 5.0a permits a maximum loop length of 18,000 feet it does not model a "quality" network. Not only is this assertion wrong, plain and simple, but BCPM 3.1 itself serves customers out to 18,000 feet (and beyond) in precisely the same manner. Therefore, either both models fail to model a "quality" network or, as is the case, the 18,000 foot design limit is entirely consistent with a quality network.

BellSouth's witness, Dr. Bowman, told the Commission in his summary that "[t]he BCPM network delivers 60 percent more talking power to customers than the Hatfield network ensuring that customers can actually talk over the telephone." (Bowman, Tr. 1220) This assertion was a deliberate and highly dramatic attempt to mislead the Commission. On cross examination, Dr. Bowman told a different story:

Recommendation, La. Pub. Serv. Comm'n, Docket No. U-20883 (Sub. A) at 26-27 (Mar. 30, 1998).)

- Both BCPM and HAI deliver precisely the same power for loops of the same length. (Bowman, Tr. 1267)

- According to Dr. Bowman, loops 12,000 feet and under provide quality service. (Bowman, Tr. 1266-1267)

- Approximately 99-1/2% of loops that HAI 5.0a models are under 12,000 feet and thus meet Dr. Bowman's alleged "quality" standard. (Bowman, Tr. 1268) BCPM models over 99-1/2% (but not 100%) of loops under 12,000 feet.

- Both models design loops between 12,000 feet and 18,000 feet in some carrier serving areas to achieve cost efficiencies. (Bowman, Tr. 1274)

- Documentation Dr. Bowman filed with this Commission states that "Economy *often* requires a 33% increase [up to 16,000 feet] in length in nonloaded CSA loops, including bridge taps. Litespan's extended CSA is 12,000 ft using 26-gauge wire and *16,000 ft* using heavier gauge wire." (Bowman, Ex. 53, RMB-3) Moreover, "loops beyond the RT site can be rolled over with care up to an *18,000* foot extended CSA. This assumes RUVG2 [extended range card] is used throughout . . . ." (Id.) (emphasis added.) Consistent with these design principles, the HAI model incorporates extended range cards in those few loops which extend close to 18,000 feet.

- Use of extended range cards *permits* quality service and access to advanced services. (Bowman, Tr. 1194: "The extended range line card and the large cable size are necessary to ensure comparable access *to advanced services* in rural and urban areas"); see also Bowman, Ex. 52, RMB-3, at 7 ("line cards are available which support the access to various levels of advanced services.") 5/

5/ The BCPM model documentation is also clear on this point. The documentation states both that the network BCPM designs "allows customers to utilize currently available data modems for dial-up access" and that where BCPM does allow copper loops of up to 18,000 feet in the distribution network, 24 gauge cable (*with extended range line cards* for distribution distances over 13,600 feet) is used to serve all customers in the distribution area. (Ex. 73, at 000025, 000026)

Of course, the focus on performance at 18,000 feet of copper cable is extremely misleading since Hatfield 5.0a produces no loops

- While Dr. Bowman contradicted his written testimony and documentation on cross examination, asserting in the hearing that modem function will degrade in loops over 13,600 feet even with extended range cards, the "study" he presents as evidence of modem degradation in long loops does not use extended range cards and thus provides absolutely no evidence on this point. (Bowman, Tr. 1276-1277; see Ex. 52, RMB-3, at 22-23)

Thus, the only disagreement between the parties is what cost the models should include for the price of the extended range card electronics necessary to permit quality service in the very small percentage of loops over 12,000 feet. Based on the characteristics of the small DLC terminals available today, HAI 5.0a already includes the costs of extended range cards for *all* lines longer than 12,000 feet served by small DLC terminals (Wells, Tr. 2516-2517), as well as costs of extended range cards for copper loops over 17,600 feet served by large DLC units. (Wells, Tr. 2517) The BCPM does not.

In summary, both HAI 5.0a and BCPM 3.1 employ the same extended range line cards for every long loop served by small DLC units. For lines served by large DLC units, BellSouth and GTEFL assume a very expensive extended range card for every line in excess of 13,600 feet.

HAI 5.0a, on the other hand, uses a more efficient extended range line card designed specifically for the large DLC units

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greater than or equal to 18,000 feet and virtually none even near that length. (Wood/Pitkin, Tr. 1704-1705; Ex. 65, DJW/BFP-12) BCPM, on the other hand, has no specific procedure for checking distribution loop length and does design loops over 18,000 feet. (Wood/Pitkin, Tr. 1639-1640) both models employ, and includes the costs for these cards for every line in excess of 17,600 feet pursuant to technical direction from the manufacturer of large DLC units. (Wells, Tr. 2516-2517; Ex. 86, at JWW-5) BellSouth and GTEFL use very expensive extended range cards -- double the price of the standard card -- for all lines served by large DLC units greater than 13,600 feet, (Ex. 73, at 251; Ex. 78, at 98), while HAI 5.0a models less expensive but entirely appropriate extended range cards, just 25% more than the standard card, only for those lines exceeding 17,600 feet on the large DLC units. (Wells, Tr. 2516-2517) The evidence shows that, in both models, use of loops with proper electronics up to 18,000 feet is fully consistent with design of a quality network. HAI 5.0a, however, deploys existing technology in a manner that is much more efficient and thus less costly.

B. HAI 5.0a Locates Customers More Accurately Than BCPM

There can be no dispute that HAI model 5.0a identifies the actual geographic locations of more households than does BCPM. Geocoding data exists for 70% of the households in Florida. (Wood, Tr. 551) How many actual households does BCPM locate? Zero! (Duffy-Deno, Tr. 941, 1010-1011, 1028-1029; La. Recommendation at 8 ("BCPM does not locate customers")) Even more importantly, HAI Model 5.0a will continue to improve the accuracy of its customer locations with every addition of geocoding data; BCPM will not. 6/ (Wood/Pitkin, Tr. 1678)

BellSouth attempted to divert attention from the HAI model's geocoding method by comparing satellite images of identifiable housing units to the surrogate locations used by the BCPM model. This limited analysis was performed for a single wire center selected in part based BellSouth's desire to minimize the cost of analysis. (Duffy-Deno, Tr. 1068) Photographs of this single wire center were analyzed to determine how many housing units (not households) were located in one-mile wide bands at various distances from the central office. Witness Duffy-Deno then correlated the number of housing units identified in each band with the number of BCPM surrogate locations in that band, and found a high degree of correlation. (Duffy-Deno, Tr. 943) Although he provided no similar analysis for the HAI Model (despite having previously performed such analyses in Kentucky and Tennessee), Dr. Duffy-Deno asserts that this correlation analysis supports his claim that HAI, which precisely locates approximately 70% of Florida consumers, is less accurate in locating customers than the BCPM, which locates none. Yet there is nothing in this correlation analysis to overcome the obvious conclusion that a model which uses actual customer locations locates customers better than one which does not.

6/ Hatfield model 5.0a can incorporate virtually unlimited

It is no surprise that HAI's geocoding method is a better predictor of customer location than BCPM. BCPM's best and only guess is that all households are and will continue to be located identical distances apart along every qualifying road in a Census Block at a maximum distance of 500 feet from the road. (Wood/Pitkin, Tr. 1672) Because the vast majority of roads are located on census block boundaries, the vast majority of BCPM estimated customer locations also are on census block boundaries in every density zone. HAI 5.0a only uses such simplifying assumptions where it is unable to locate customers precisely using geocoding data.

For example, in Florida's lowest density zone, the HAI model is able to geocode only 34% of customers, and assumes the remaining 66% are located on census block boundaries. Even in this instance, HAI's accuracy in locating customers and its ability to design plant efficiently is better than BCPM's -- the geocoding of HAI's 34% provides precise locations for these customers and permits economies related to naturally occurring clusters of these customers, while BCPM evenly distributes 100% of these customers on internal and external census block roads without regard for actual locations. 7/ In the next lowest

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additional geocoding data such as data from E911 databases as this data becomes available.

7/ In 100% of cases, BCPM spreads each housing unit in each census block as far apart as possible from all other housing units along the road network. (See Duffy-Deno, Tr. 941) This is because BCPM uses no actual customer locations and can identify no naturally occurring density zone, HAI is much more accurate, geocoding 62% of customers and placing only 38% at surrogate locations, compared to 100% surrogates for BCPM. Importantly, in the medium density zones where geocoding is most important to obtaining accurate cost results, the percentage of customers HAI places at surrogate locations decreases even more dramatically to between 15% and 22% while BCPM continues to use 100% surrogates. (Wood, Tr. 821-824; Wood/Pitkin, 1683; Ex. 65, DJW/BFP-6) The facts are clear -- in every instance, HAI's location of customers is superior to BCPM's. The result is that BCPM produces the highest of all possible costs for provision of universal service for Florida customers.

C. **HAI Model 5.0a, Unlike BCPM, Builds Plant To Actual Customer Locations**

The ILECs' allegation that HAI 5.0a does not build plant to customer locations also is untrue. First, HAI 5.0a builds feeder plant directly to the center of neighborhoods and locates DLC equipment at that point. (Wood, Tr. 579) BCPM, on the other hand, does not know where neighborhoods are, much less individual households. Accordingly, BCPM breaks up neighborhoods by the imposition of latitude/longitude grids unrelated to real-world engineering design, and then designs and builds feeder plant to

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clusters of customers. The result, however, is that BCPM produces the highest of all possible costs for the provision of universal service to Florida consumers.

the road centroid of each grid without any idea where the houses or neighborhoods actually are located.

Moreover, HAI 5.0a builds distribution plant that blankets the HAI clusters from end-to-end. This ensures there is sufficient distribution plant to reach every customer. In fact, HAI 5.0a deploys more distribution plant in Florida than does BCPM. (Wood/Pitkin, Tr. 1712) BCPM, on the other hand, builds distribution plant in artificial square, road reduced quadrants. (Wood/Pitkin, Tr. 1702-1703) The area of the squares is equal to the area along the roads where BCPM supposes customers to be located, but this does not mean the amount of distribution cable modeled reaches customer locations. The problem with this method is that the distribution quadrant squares bear no resemblance to the shapes of the areas along the roads where BCPM assumes customers are located, so that the lengths of the cables within the two areas are not the same. While neither model designs distribution plant to the doorstep of each home in Florida, HAI 5.0a designs distribution areas that overlay actual geocoded customer locations; BCPM's distributions areas do not even overlay its road-mileage estimates. As a result, HAI 5.0a is far more precise in the design of distribution plant than BCPM. (Wood/Pitkin, Tr. 1699-1704) BCPM thus builds a tidy model, but one that unfortunately fails to approximate reality.

D. **A Proper Minimum Spanning Tree Analysis Shows That HAI Meets This Hypothetical Test More Consistently Than Does BCPM**

The minimum spanning tree ("MST") is a hypothetical test used to measure the dispersion of a group of customer locations. (Wood/Pitkin, Tr. 1673) Although Dr. Duffy-Deno attempts to use this test to discredit the HAI Model's ability to build enough distribution plant, a proper understanding of the MST and Dr. Duffy-Deno's misleading analysis shows that the MST does not provide a valid basis for comparing the models' ability to place cable and provide service to all locations. Even if it were, the HAI model outperforms the BCPM in meeting the MST hypothetical analysis.

Dr. Duffy-Deno readily admits that the MST does not, and is not intended to, compare the route mile distance in a model versus the route mile distance that one would actually find in the real world. (Duffy-Deno, Tr. 1072) It thus follows that the MST is not the minimum distance necessary to connect actual customer locations, and is not a validity check on the model's ability to provide service to every location.

For example, an analysis performed by Dr. Duffy-Deno in response to a Staff request shows that, for the Yankeetown wire center, an MST based on surrogate customer locations is 26.3% longer than an MST based on satellite observations of actual customer locations. (Ex. 48, Late-Filed Ex. 2) For the same wire center, the HAI Model estimates only 9% fewer route miles than the MST. (Ex. 65, DJW/BFP-18, at 4) Because the calculated MST for the Yankeetown wire center is substantially overstated when compared to real world conditions, the HAI Model does place enough cable to reach customers in that wire center -- despite the fact that the HAI Model builds less than the amount calculated by the MST analysis. As summarized by Mr. Pitkin "the MST is not a valid comparison -- either for the HAI Model or for the BCPM." (Pitkin, Tr. 1642)

In this proceeding, the only validation available to the Commission is to compare the amount of distribution cable placed by each model. The record shows that the HAI Model places more distribution cable in the lowest two density zones, and 3,900 more miles of distribution cable statewide, than does the BCPM. (Pitkin, Tr. 1641; Ex. 65, DJW/BFP-16) It is misleading for the BCPM supporters to claim that the HAI Model does not build enough distribution plant to reach customer locations when the HAI Model, in fact, places more distribution plant than does the BCPM.

Dr. Duffy-Deno performed MST tests on both the HAI Model and the BCPM which he claims demonstrate that the BCPM performs better than the HAI Model in meeting the hypothetical MST standard. Under close scrutiny, however, it is clear that Dr. Duffy-Deno's analysis of the two models is inconsistent, and does not provide a valid basis for comparison.

Dr. Duffy-Deno performed his MST test of the BCPM at the serving area level -- which *includes* the connecting cables between the distribution areas and the DLC. In contrast, he performed his MST analysis of the HAI Model at the distribution area level -- which *excludes* the connecting cables between the distribution areas and the DLC. (Pitkin, Tr. 1876-1877, 1879) The bias introduced by this inconsistency in the way the two MST analyses were performed is apparent from Dr. Duffy-Deno's own testimony that "because of the connecting cable between the main cluster and the outliers takes a right angle routing [and] the minimum spanning tree is a straight as the crow flies, when you add up the connecting cable to the outliers plus the outliers internal [cable], *you are always going to be above the minimum spanning tree* for those outliers and connecting cable." (Duffy-Deno, Tr. 1086-1087, emphasis added) Simply put, Dr. Duffy-Deno *includes* connecting cable that will exceed the MST in his analysis of BCPM, but *excludes* connecting cable that will exceed the MST in his analysis of HAI. This inconsistency precludes a direct comparison between Dr. Duffy-Deno's results for the two models.

In contrast, the MST analyses conducted by Messrs. Wood and Pitkin were carefully designed to ensure an apples-to-apples comparison. (Pitkin, Tr. 1640; Wood/Pitkin, Tr. 1718-1724) Their analyses show that the HAI Model outperforms the BCPM relative to the hypothetical MST standard. Specifically, this analysis shows that:

- for the lowest density zone, neither model places enough cable to satisfy the calculated MST, although the BCPM model falls farther short than does HAI 5.0a;
- for the lowest two density zones combined -- those areas that are most likely to require USF support -- the HAI Model places 25% more cable than the MST while the BCPM places only 8.5% more cable than the MST;
- for the two highest density zones, BCPM does not place enough cable to satisfy the calculated MST, while the HAI Model does; and
- for the middle density zones, the HAI Model consistently exceeds the MST minimum by a substantially greater percentage than BCPM.

(Pitkin, Tr. 1640-1641; Ex. 65, DJW/BFP-19)

While a great deal of time at the hearing was spent on this MST issue -- an area in which the HAI Model performs better than the BCPM (when the models are analyzed consistently) and where the HAI Model places more distribution cable than the BCPM -- these models should not be judged relative to a hypothetical MST test that is not indicative of the model's ability to reach actual customer locations. Mr. Pitkin and Mr. Wood do not suggest that the BCPM should be rejected because it fails the MST test by a greater margin than the HAI Model. Their expert opinion is that the BCPM should be rejected because of the various methodological problems in the BCPM that force it to design an arbitrary and inefficient network. (Pitkin, Tr. V.15, 1642)

In any event, AT&T and MCI have recently provided staff with a version of the HAI Model which ensures that the amount of distribution cable placed always meets the MST criteria. (Ex. 66) While AT&T and MCI do not believe that this is the most appropriate version for use in this proceeding -- since it is likely to overstate the amount of required universal service support. It is, however, available for the Commission to use in its evaluation of an appropriate USF model if the Commission believes that there is a legitimate concern about the application of the MST criteria.

The HAI Model, as any sophisticated analytical tool, has evolved as expected. Its designers have subjected the model to verification testing, and it has performed exceedingly well. Today, it is the most accurate and verifiable source of forward-looking, total-element, long-run cost information for a local exchange network in Florida. (Wood, Tr. 759) BCPM also has undergone numerous revisions. Notwithstanding these changes, BCPM still is not as accurate in locating customers and building distribution plant to serve them as the HAI Model.

III.
THE LOGIC AND STRUCTURE OF THE BCPM MODEL ARE DEFECTIVE AND GROSSLY OVERSTATE COSTS

As described below, the logic and structure of BCPM 3.1 contain several serious flaws which overstate costs and render the model unfit for use in calculating universal service costs. These flaws involve BCPM's dropping of some customers, its failure to group the remaining customers, and its inefficiency in deciding how to build plant to reach customers.

A. The BCPM Is Incapable of Providing Universal Service Because It Drops Customers At the Preprocessing Stage of Analysis

BCPM's method of allocating housing units to micrograms results in some microgrids, and some ultimate grids, being allocated only fractions of a housing unit. When these microgrids are aggregated at the preprocessing stage, the result can be an ultimate grid which is allocated *no* housing units, even though the data at the microgrid level shows that there are housing units allocated to that ultimate grid. The failure to include these housing units in the ultimate grid means that BCPM builds no feeder or distribution facilities within this grid. (Wood/Pitkin, Tr. 1663-1665; see Ex. 65, DJW/BFP-4)

B. The BCPM Breaks Up Neighborhoods Even Before It Decides How Best to Serve Them

BCPM 3.1 breaks up natural groupings of customers even before it decides how best to serve them. This occurs because, in the critical first step toward designing CSAs to serve customers, BCPM 3.1 establishes grids based on degrees of latitude and longitude, not real-life customer locations. These grids have the effect of splitting up natural groupings of customers who fall on different sides of an arbitrary grid line. In turn, this precludes BCPM from designing plant to serve these customers with due regard for engineering efficiencies. (Wood/Pitkin, Tr. 1651)

Exhibit 65 graphically demonstrates how BCPM 3.1 would serve an imaginary group of four adjacent households very differently depending upon where these households happen to be situated in relationship to the arbitrary latitude/longitude grid lines BCPM 3.1 imposes. (Wood/Pitkin, Ex. 65, DJW/BFP-1) If entirely included in one grid, all households in the group might be assigned to a single CSA with a single Digital Loop Carrier ("DLC") remote terminal to transmit calls and a single placement of subfeeder cable to carry signals to and from that remote terminal - an efficient arrangement. However, if imposition of the latitude/longitude lines isolated the four households in separate grids, these same four households would be put in *four* different CSAs, served by *four* different DLC remote terminals and at least *four* different serving area interfaces ("SAI"). (See id.; Wood/Pitkin, Tr. 1651, 1685) BCPM also would deploy *four* different subfeeder cable placements. Because DLC equipment is very expensive and because placement of each subfeeder cable requires expensive excavation, conduit boring, or pole placement (depending on the type of structure), arbitrarily breaking up natural groupings of customers is inefficient, increases the costs of universal service, and increases BCPM's tax on Florida consumers.

The magnitude of increased costs can be seen by comparing the number of costly DLCs placed by BCPM on a statewide basis, compared to those placed by HAI 5.0a to serve identified customer clusters. BCPM places 18,897 DLCs statewide for Florida, over 8,000 more than HAI 5.0a, which places 10,785. (Wood/Pitkin, Tr. 1712; Ex. 65, DJW/BFP-15, at 2-3) Of the excessive number of DLCs modeled by BCPM, 223 digital loop carriers serve only a single household, and -- because BCPM includes unoccupied housing units -- an additional 145 digital loop carriers serve *no* households. (Wood/Pitkin, Tr. 1688) On average, each DLC placed by BCPM is only 50% utilized. (Wood/Pitkin, Tr. 1691) These facts alone demonstrate that BCPM places excessive numbers of inefficiently sized DLCs, thus artificially increasing the total calculated cost of providing universal service.

C. BCPM Further Breaks Up Customer Groups Into Pieces That D Don't Make Efficient Use of Existing Technology

BCPM further interferes with the efficient serving of customers by artificially constraining the maximum size of a CSA to 999 households. (Wells, Tr. V.21, 2538-2539; see Ex. 73, p. 000126; Staihr, Tr. 1594) Absent this artificial constraint, the appropriate CSA might otherwise encompass natural groupings of up to 1800 households, which is the number that can be efficiently served by a single 2,016 line DLC fed by an OC-3 fiber optic system with a 90% fill rate. (Wood/Pitkin, Tr. 1691-1692; Wood, Ex. 43, DJW-2, at 31) While the constraint to 999 households per CSA, in and of itself, prevents deployment of the efficient, large capacity DLC remote terminals that ILECs actually have available, the effect of these inefficiencies is multiplied by the manner in which BCPM achieves this limitation. Every time a grid exceeds 999 evenly distributed households, even by a single household, BCPM divides it into *four* pieces ("microgrids"), *each with its own DLC remote terminal and expensive subfeeder placement*. 8/ (Wells, Tr. 2539) As a result, in an environment where even one unnecessary remote terminal and subfeeder placement significantly affects the BCPM universal service tax that Florida consumers must pay, the combination of arbitrary grid placement and CSA limitations promises that Florida consumers will pay for installation of significantly more DLC remote terminals and excessive subfeeder, compared to the amount an efficient real world telecommunications provider would install.

8/ The only circumstance under which BCPM will not divide into at least four CSAs is where 1/4, 1/16, or 1/64 grids exceed 400 housing units by so much that the entire remaining portion of the grid has less than 400 housing units. (See Ex. 73 at 00126) Obviously, the

D. **BCPM Designs More Carrier Serving Areas Than Necessary to Serve Customers, Especially in Rural Areas**

BCPM overstates the number of CSAs that a real world efficient provider would use to provide universal service to Florida consumers because it limits the size of its CSAs to approximately 12,000 feet by 14,000 feet. (Wood/Pitkin, Tr. 1689-1690) Smaller CSAs mean more CSAs, thus requiring additional expensive DLC equipment and subfeeder installation.

As discussed previously, copper cable can be utilized out to 18,000 feet from the DLC remote terminal without decibel loss that would make it hard to hear, so long as the proper electronics are installed. Similarly, there is no dispute that copper cable properly can be utilized out to 18,000 feet from a DLC remote terminal without load coils that would impede the provision of advanced services. Accordingly, even with very conservative modeling of cable routes, a serving area can be as large as 18,000 by 18,000 feet without violating *any* of the engineering requirements that ensure quality service and advanced services to Florida consumers, if, as is the case in HAI 5.0a, the DLC site is located in the geographic center of the CSA. Enlarging BCPM serving areas to these dimensions would result in a serving area that is approximately 11.6 square miles - almost *twice* the size of the serving area BCPM currently utilizes.

BCPM algorithms do not have the flexibility to design to natural clusters as an engineer would.

(Wood/Pitkin, Tr. 1690; Ex. 65, DJW/BFP-8) Thus, modification of the BCPM grid structure from 1/25th of a degree of latitude and longitude to a grid structure set at 18,000 feet by 18,000 feet would permit a single CSA, with a single set of DLC equipment and single placement of subfeeder, to serve an area almost twice as large (although this would not cure the effect of BCPM's arbitrary location of these grids without regard for actual customer groupings). Most importantly, the quality of service to the customers would continue to be high.

The use of larger CSAs is particularly critical to efficient network planning in rural areas, where households tend to be far apart. In a high density urban area, the number of households in a 12,000 foot by 14,000 foot grid easily may exceed the capacity of even the most efficient DLC remote terminal so that DLC capacity, rather than serving area size, determines efficiency. However, in rural areas, where costs already tend to be high, failure to group households as much as possible using the efficiencies of large serving areas means deployment of separate DLC remote terminals and subfeeder placement to serve multiple groups of very small numbers of households. An efficient engineer would group this demand rather than add more equipment and cable. By designing a network with many more CSAs than required, BCPM creates ridiculously high costs which will come from the pockets of Florida consumers. 9/

Each of the BCPM structural deficiencies discussed above results from BCPM's failure to simulate real-world engineering efficiencies successfully. This is not surprising since none of the ILEC witnesses who testified in this proceeding possess actual engineering experience sufficient to design a telephone network, and none testified to the qualifications of any other individual with input into the model development process. Because all three of the modeling deficiencies described above unnecessarily inflate costs at the expense of Florida consumers, this Commission should reject BCPM.

CONCLUSION

Based on the foregoing, AT&T, MCI and WorldCom respectfully request that the Commission adopt the HAI Model and its associated inputs for determination of the required universal service support in Florida. HAI 5.0a more accurately locates customers, engineers a quality network the way a real-world engineer would, and uses state-specific (rather than company-specific) inputs representative of the costs an efficient carrier in a competitive market can achieve.

9/ Ex. 65, at DJW/BJP-10 is a graphic depiction of the way in which BCPM 3.1 currently designs a carrier serving area, and a comparison of this approach with a more efficient design. (Wood/Pitkin, Tr. 1699-1700)

In addition, HAI 5.0a permits calculation of universal service costs and UNE costs on a consistent basis. This consistency is a critical if local markets in Florida are to be made competitive in a manner that provides no telecommunications carrier an unfair advantage.

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?

AT&T, MCI, WorldCom:
The total forward-looking cost of universal service should be determined on a wire center basis. However, the process to determine subsidy requirements in a permanent universal service mechanism should use costs aggregated at the same level that unbundled network element ("UNE") costs are offered.

The total forward-looking cost of universal cost should be determined on a wire center basis. The HAI model already provides cost estimates for universal service and UNEs at the wire center level. This is consistent with the FCC's requirement that any USF cost study or model used to calculate the forward-looking economic costs of providing universal service in rural, insular and high cost areas must deaverage support calculation at least to the wire center level. (Guepe, Tr. 688)

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; and (t) other inputs.

AT&T,MCI and WorldCom:

**The appropriate input values to calculate the cost of universal service are set forth those set forth in the HAI 5.0a model as revised on October 6, 1998. These inputs are efficient, forward looking and Florida specific. More specific information for each subissue is found below. **

The selection of a cost model with the appropriate logic is only the first half of the task before this Commission. Selection of the appropriate inputs has a profound effect on the estimation of the costs of universal service. Selection of unreasonable or inefficient inputs will cause the costs of universal service to be overstated or understated. The HAI 5.0a inputs are reasonable and efficient. The ILECs' criticisms of the inputs result primarily from BellSouth's attempt to input BellSouth numbers into the HAI Model and BellSouth's observation that the HAI Model does not generate costs that will allow the universal service fund to serve as a guarantee of current revenues for the ILECs. These criticisms should carry little weight, and the Commission should adopt the HAI 5.0a inputs.

I.

THE HAI 5.0a INPUTS REPRESENT FORWARD-LOOKING COSTS OF PROVIDING UNIVERSAL SERVICE IN FLORIDA

The output of any model is a function of both the logic of the model and of the data inputs. AT&T and MCI have supported each key input to the HAI Model with numerous documents and testimony. The rationale and sources for these inputs are documented in the 165 page HAI Inputs Portfolio. (Wood, Ex. 43, Attachment DJW-3) This is in stark contrast to the BCPM inputs that are supported solely by the ILECs' mutually contradictory assertions that each already is an efficient provider in a competitive environment. 10/

Each key input to the HAI Model is specific to BellSouth's, Sprint's or GTE's Florida operating territory, although not necessarily to the ILECs' existing embedded networks and operations in Florida. Each HAI input represents the costs and conditions an efficient competitor entering the local exchange market in Florida would experience. (Wood, Tr. 777) Some inputs, such as detailed geographic surveys, demographic and technological data, that are absolutely essential to the exercise of efficient, forward-looking engineering practices, are wholly objective and publicly available. (Wood, Tr. 765-766; Ex. 43, DSW-3) Other inputs including material and placement costs, forward-looking expense factors, facility sharing factors, and utilization rates, reflect the considered judgments and the

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10/ There is no BCPM inputs portfolio.

consensus of experts with over 180 years of collective experience. (Wells, Tr. 2669) These same experts carefully validated the HAI Model inputs using publicly available information from supplier sources that are fully available to an efficient competitor in Florida. (Wells, Tr. 2477 - 2489) Other inputs were validated by reference to documentation of product specifications provided by the suppliers of equipment actually available for use in Florida today. (Wood, Tr. 771; see also Wells, Tr. 2476-2489) All facility and equipment prices used as inputs to the model are based on discounted, rather than list, prices. (Wood, Tr. 771)

One expert who validated and supported the HAI Model inputs testified in this proceeding. Indeed, as a result of various state UNE and USF proceedings, BellSouth either has deposed or cross-examined all but one of the HAI Model 5.0a outside plant engineers. All of the HAI Model experts have been made known to the ILECs and the Commission. 11/ Finally, the HAI Model uses financial inputs calculated by acknowledged experts in their fields. As noted above, all these inputs have been subjected to intense scrutiny both before they were presented and throughout the universal service proceedings.

11/ This is in stark contrast to the evidence provided by the ILECs which rely heavily on the opinions of unnamed, and in many cases unknown, employees who work within their organizations, or upon the actions of an even less identifiable body of individuals responsible for the development of BCPM default values.

II.
BELLSOUTH'S CRITICISMS OF THE HAI 5.0A INPUTS ARE UNFOUNDED

BellSouth's attack on the HAI Model inputs primarily is limited to a single presentation of "expert" witnesses from the Georgetown Consulting Group ("GCG"). GCG claims "independently" to have developed least cost, most efficient inputs that should be used in the HAI Model in place of those offered by AT&T and MCI if the Commission should adopt the HAI Model for the BellSouth territory in Florida. In offering their opinion, GCG witnesses render unfounded, but condescending and derogatory assessments of the HAI inputs and the HAI engineering team that developed those inputs. GCG complains among other things that the "expert opinion" of the HAI engineering team, which supports some of the HAI Model inputs, is inadequate without "workpapers and sources associated therewith." (Ex. 95, GCG-3 at 4 § (10), GCG-5 at 3-5 § (2)(8), GCG-7 at 2 § (2)(4), GCG-8 at 2-3 § (2)(7), GCG-9 at 2 § (2)(4), GCG-10 at 2 § (2)(5), GCG-11 at 4 § (1)(3-10), GCG-12 at 2-3 § (1-2)(4-6))

Close scrutiny of GCG testimony demonstrates, however, that its witnesses are entirely unqualified to render such opinions and, in any event, its recommended alternatives to the HAI inputs are simply surrogates for BellSouth's embedded, actual, company-specific input values. Their employment by BellSouth patently is intended to offer the Commission a comforting sense of "independence" but GCG's true agenda is to urge this Commission to adopt BellSouth's company-specific, historic and embedded input values regardless of the model selected.

The majority of the inputs GCG "develops" for the HAI Model are for outside plant. (Ex. 95, GCG-3 (NID and Drop), GCG-4 (Terminal and Splice), GCG-5 (Distribution Investment), GCG-6 and 7 (Copper and Fiber Feeder Investment, respectively), GCG-8 and 9 (Structure Placement and Sharing Fractions, respectively), GCG-10 (Copper and Fiber Sizing Factors), and GCG-11 (Digital Loop Carrier)) Yet, none of the three GCG panelists ever worked as outside plant engineers, even Mr. Newton, the only panelist with actual telephone experience. (Ex. 95, Appendices B, C and D) Moreover, much of the analysis performed by GCG required knowledge of how a telephone company can and should purchase materials and equipment. Yet, again, none of the GCG panelists had any experience in purchasing. (Ex. 95, Appendices B, C and D; Tr. 2946)

So what did the three GCG panelists do independently that is worthy of this Commission's consideration? Not much, it turns out. Lacking any relevant telephone experience, Messrs. Madan and Dirmeier were dependent upon the representations made to them by BellSouth of the cost of building a network, and upon Mr. Newton to explain the equipment and technologies. It is no surprise therefore, that the GCG-recommended HAI input values are nothing more than replications of BellSouth's embedded cost data. GCG simply was in no position to question the information it received from its client or to develop independent data.

Indeed, the very process followed by GCG in its analysis was flawed and prejudiced in favor of BellSouth from the outset. As stated in their rebuttal testimony, the GCG witnesses identified sensitive user adjustable inputs, made a judgement on whether they met the standard of being "reflective of the territory and forward looking", and if they did not meet that standard, the witnesses "fashioned" their own values. (GCG, Tr. 2913) However, in determining whether an HAI input met their standard, GCG measured the HAI input values against the historic and embedded data of BellSouth rather than attempting to determine the "forward looking economic costs of an efficient provider". (GCG, Tr. 2954) Moreover, the group that supplied this data to GCG is the same group of BellSouth employees that developed the inputs for the BCPM. Significantly, GCG had been given BCPM input values prior to the time they did their Florida analysis. (GCG, Tr. 2960-61) The contention that GCG conducted an "independent and objective" analysis crumbles of its own weight in light of these facts.

As explained by Mr. Madan, GCG obtained what Mr. Madan termed "raw data" from BellSouth, which GCG then fitted to the categories of inputs used in the HAI Model. GCG never looked beyond BellSouth for evidence of least cost, most efficient input values for the HAI Model. GCG simply offered the facile explanation that its task was only to identify inputs specific to the BellSouth territory of Florida, and there was only one source of relevant data -- BellSouth -- the monopoly provider in that territory. Defining its task in that way conveniently ensured that GCG never would contaminate the BellSouth-generated input values with any bothersome information of other companies' lower costs or greater efficiencies.

As stark evidence that GCG merely plugged BellSouth numbers into its own report, one need only compare the "raw data" received by GCG from BellSouth and the GCG-recommended HAI input values. Such a comparison shows, for example, that the GCG-recommended input values were identical to the BellSouth supplied raw data for NID and Drop Labor Rate 12/, Installation Time, Travel Time, and Average Drop Distance. (Ex. 95, GCG 3)

There are many more indications in the GCG workpapers that virtually every GCG-recommended HAI input value is a simple plug-in of BellSouth's data. There is no indication of any "independent and objective" evaluation by GCG of what constitutes the least cost, most efficient input values for an efficient firm operating in Florida, despite GCG's protestations.

12/ Most interestingly, GCG vociferously criticizes the HAI Model for employing "national" default values rather than values specific to the BellSouth territory in Florida. (GCG, Tr. 5, 2949-2950) As Attachment C shows, labor of $40.80/hour for Florida is actually the same value used in all BellSouth states other than Kentucky. GCG's "BellSouth/Florida specific" labor rate in fact is a "regional" labor rate.

GCG wants the Commission to accept that its recommended HAI input values are "scrubbed" of any embedded cost characteristics (GCG, Tr. 2913), yet the GCG team fell far short of providing any plausible explanation of how that was accomplished. GCG is unrelenting in its criticism of the HAI Engineering Team, particularly the support for the input values that are based upon the collective judgment of the team. GCG's testimony, however, contains virtually no support for *any* of its recommended inputs, unless simple declaratory statements are deemed to constitute adequate support. The chart below provides a sampling of GCG's entire "support" for its recommended HAI input values:

Exhibit 95	**Entire GCG "Support" for Recommended Input Value**
Ex. 95, GCG-3, (3) 3.	"The Florida-specific time associated with the installation of the residential and business NID is 35 minutes."
Ex. 95, GCG-3, (3) 4.	"The Florida-specific time associated with travel is 22 minutes and is divided equally between the installation of the drop and the installation of the NID."
Ex. 95, GCG-3, (3) 5.	"The Florida-specific price for the residential and business protection block (B-1) is $8.10."
Ex. 95, GCG-5, (3) 6.	"The BST-Florida values for the investment required for outdoor SAIs (B-38) were determined from specific field reporting quotes associated with this investment."

Ex. 95, GCG-5, (3) 7.	"Information available on a BST-Florida-specific basis has been developed and indicates that, on a composite basis, underground excavation and restoration cost per foot (B-197 and 198) is $4.79. Similarly, the BST-Florida composite value of buried excavation and restoration per foot (B-1999 and B-200) is $3.09."
Ex. 95, GCG-8, (4) 2-5	"The fractions of aerial, buried and underground cable for [distribution cable structure (B-17)] based upon the BellSouth-Florida loop sample reconfigured to reflect forward-looking technology and a scorched node approach are as follows:
Ex. 95, GCG-10, (3) 2	"The BST-specific data for copper feeder utilization for the State of Florida indicates that 65.7% of the copper pairs available are assigned and continue to reflect reasonable engineering guidelines looking forward."
Ex. 95; GCG-11, (6) 4	"For high density DLC (Litespan), the following material costs have been obtained: ** The cost of the cabinet is $21,685. ** The cost of the hard wire and the common equipment at the remote terminal is $5,880. . . ."

GCG's "support" for its analysis turns out to be nothing more than its top level conclusions. Nowhere in GCG's testimony does it identify the source for the data underlying its conclusions so that a third party could verify the credibility of the source.

In contrast, the source for the HAI Model inputs is readily identified, namely the HAI Engineering Team, and a description of the development of the values also is provided in the Hatfield

Inputs Portfolio. (Wood, Ex. 43, DJW-3) Unlike GCG, which obtained its raw data from unidentified sources within BellSouth, AT&T identified the authors of its input values, made those authors available for pre-hearing depositions, and one of them appeared as a witness in this proceeding to be cross-examined. No BellSouth witness appeared at the hearing who could testify as an original author of the data, thus shielding BellSouth, and indirectly GCG, from any meaningful scrutiny. Also unlike GCG, none of whose members ever worked as an outside plant engineer, the HAI Engineering Team had over 180 collective years of outside plant engineering experience. Thus, even when the HAI team offered an input value based upon its "expert opinion," it carried the weight of over 180 years of experience in contrast to GCG, whose panelists who had no such experience.

In short, BellSouth's "HAI" witnesses, the GCG panel, offer no credible evidence supporting its assertion that its HAI Model input values represent the values of a least cost, most efficient provider of telephone service in Florida.

BellSouth's criticisms of the HAI Model's inputs are contrary to the fundamental intent of this proceeding -- to determine the forward-looking efficient costs of universal service. Moreover, the analysis performed by BellSouth's rebuttal witnesses was not an analysis at all, but merely a mechanical exercise that adds little, if anything, to this Commission's deliberations regarding the appropriate model for estimation of universal service costs. Accordingly, the Commission should reject BellSouth's criticisms of the HAI Model inputs.

III.
BCPM INPUTS ARE FATALLY FLAWED

The ILEC cost studies unabashedly use company-specific, embedded inputs that are not reflective of the costs an efficient forward-looking provider would incur.

BellSouth's BCPM 3.1 inputs, for example, reflect costs culled from the books of record and contracts entered into by BellSouth in years past, with no adjustments to reflect the way in which an efficient provider, constructing a network today, would proceed. (Caldwell, Tr. 2110, 2126-2127) As a consequence, these inputs protect inefficiency and overstate the costs of universal service. Sprint also uses company-specific values for inputs including cable and strand material cost, installation costs for conduit and buried and aerial cable, digital loop carrier cost (Dickerson, Tr. 2370-2371), plant mix, density fill factors, and operating expenses. (Dickerson, Tr. 2301, 2447) Like the others, GTEFL also utilized its embedded data as the source of its inputs. (Tucek, Tr. 2233-2234; Ex. 79, at 15)

BellSouth's and Sprint's claims that competition will bring no changes to their industry is ludicrous, unsubstantiated and flies in the face of the experience of every other industry in the United States. Importantly, none of the ILECs in this proceeding have provided a *specific justification* to support a finding that particular company-specific inputs are appropriate to replace the least-cost values an efficient competitor, operating in Florida, could achieve. Instead, the ILECs rely on a single unproven assertion: the ILECs are large, efficient providers of telecommunications services in Florida and their costs therefore reflect least-cost, most-efficient, forward-looking operating practices. (See, e.g., Caldwell, Tr. 2131-2136; Seamon, Tr. 1358)

In particular, ILEC input witnesses Caldwell and Dickerson, charged with justifying their respective inputs, in many cases did not have even second-hand knowledge of the basis upon which other, unnamed personnel formulated their companies' inputs. (Caldwell, Tr. 2139; Dickerson, Tr. 2301) Ms. Caldwell claimed personal knowledge only of material prices for digital loop carrier. (Caldwell, Tr. 2138) It is interesting to note that Ms. Caldwell cannot substantiate any of the default values used. (Tr. 2139-2140) None of these defaults were compared to any Florida specific data for validation and none of BellSouth's company-specific inputs were validated against any of the BCPM defaults. (Caldwell, Tr. 2140) For example, BellSouth's input value for a 4200 pair SAI is 3 ½ times higher than the default which GTEFL adopted in Florida and more that 1 ½ times higher than Sprint's. (Caldwell, Tr. 2146) BellSouth's conduit input was 3 times that of Sprint and 1 ½ times higher than GTE's. (Caldwell, Tr. 2148) Nothing in Ms. Caldwell's testimony provided specific justification for BellSouth's assertion that its proposed inputs were in fact representative of those an efficient company operating in a competitive market would achieve.

None of the ILECS availed themselves of information that could have assisted in the identification of efficient costs. BellSouth witness Ms. Caldwell was very clear that, in formulating her input values, she contacted neither outside vendors for current price quotes/bids nor considered any third-party data, including that of other ILECs, regarding efficient universal service costs. (See also Tucek, Tr. 2264-2265) Similarly, Sprint witness Dickerson testified that he did not compare any of his proposed inputs to BellSouth's (Dickerson, Tr. 2375), although clearly, if BellSouth or GTEFL were able to achieve more efficient costs in their own Florida territory, they certainly would be able to achieve these costs in Sprint's Florida territory. Such is the ILECs' great reliance on the fact that, whatever their proposed costs, these costs are least cost and most efficient if the ILECs actually have incurred them.

There are several specific problems with the cost model inputs proposed by the ILECs:

A. Material Costs Are Excessive

BellSouth's conduit costs are three to four times higher than costs available in the market, the BCPM default prices derived from ILEC data, the estimates of the HAI 5.0a engineering team and those of Sprint. (Wells, Ex. 87) BellSouth's material prices should not be vastly out of line with those other carriers can obtain. Either Ms. Caldwell is wrong and all parties' values actually reflect the inclusion of the same costs or she is wrong as to what the input value requires and has included inappropriate costs in the input value. Either way, this Commission should reject BellSouth's conduit material input as vastly out of line and unreasonable. 13/

Even more egregious, BellSouth and Sprint each provide material prices for materials that do not exist. For example, both provide prices for 4200 pair, 24 gauge underground copper cable (as well as 3000 and 3600 pair) even though this cable does not exist, and, if it did, could not be used for its intended purpose (conduit placement) because it is too big. (Dickerson, Tr. 2369 (3000, 3600, and 4200 pair 24-gauge underground cable not manufactured); Wells, Tr. 2509) Sprint's witness Dickerson could not explain how the BCPM - which allegedly creates an efficient and achievable, quality network with existing

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13/ It should be noted that labor costs for installation of conduit are captured in a wholly separate input, "placement costs."

technologies -- could achieve these objectives by modeling cables that simply don't exist. (Dickerson, Tr. 2369-2370)

Finally, as noted above, BellSouth never contacted outside vendors to solicit competitive prices for any materials, not even those for which they had no cost information available. No material cost input should be accepted without reference to prices obtainable in the current market.

B. Contractor Installation Costs Are Inaccurate

BellSouth's contractor installation costs do not take into account current market prices for such installations. Rather, BellSouth "straight averages" contracts of varying ages. (Caldwell, Tr. 2143-2144) Inexplicably, these contracts appear to be exclusivity or sole source contracts for discrete geographic locations within Florida. (Ex. 75, at 39-40) Moreover, BellSouth witness Caldwell admitted that her straight average did not take into account the obvious fact that higher volumes of work would be required to construct facilities in geographic regions with higher populations. (Caldwell, Tr. 2145)

Most importantly, Ms. Caldwell admitted that the so-called "master contracts" upon which her proposed costs rely were bid with the understanding that the winning contractor would be required to do all manner of jobs, large or small, day or night, that occur in the course of BellSouth's day-to-day operations. (Ex. 75, at 40) There is no reason to believe that a contractor, bidding to participate (with all attendant economies) in the building of an entire network for a competitive carrier would bid the BellSouth high contract prices. (Wells, Tr. 2526) Ms. Caldwell conceded that a large project contract price would be lower. (Ex. 75, at 56)

C. Loading Factors Are Not Least-Cost, Most Efficient or Forward-Looking

Loading factors are applied to material costs to determine the installed investment. (Wells, Tr. 2520) Material loading factors are modeled primarily to recover telecommunications engineering and labor, vendor engineering and installation, exempt (*i.e.* minor) material, and sales tax. (Wells, Tr. 2521) BellSouth's methodology is to calculate a ratio of these associated expenses to its non-exempt (major) material investments *for 1995*, and then multiply this ratio by the direct cable material cost. (Wells, Tr. 2521) These material loading expenses from 1995 are not least-cost, most efficient or forward-looking based on currently available technology. (Wells, Tr. 2521)

BellSouth's embedded loading factors tremendously inflate its material price inputs and are the most insidious contributor to the overstatement of costs reflected in BellSouth's installed material prices. (Wells, Tr. 2521-2524) As noted above with regard to the application of BellSouth's loading factors to indoor SAI material prices, a bottoms-up estimate of efficient installed material costs indicates that BellSouth's embedded loading factors bear no relation to costs that would attain in a efficient, competitive market. The Louisiana Commission found that the result of these factors was to generate engineered, furnished and installed material prices that are "excessive and incorrectly calculated." La. Recommendation at 29 (adopted by Order, La.Pub.Serv. Comm'n, Docket No. U-20883 (Subdocket-A) (April 15, 1998) These loading factors are based on BellSouth aggregate employee work times and exempt material usage recorded in a monopoly environment; as such, these loadings are unadjusted even for the forward-looking assumptions contained in BellSouth's own cost studies. (Wells, Tr. 2521) For example, BCPM 3.1 loop designs purport to eliminate the need for load coils to permit the provision of advanced services, yet BellSouth demonstrates no adjustments to its embedded exempt material loadings to reflect this fact.

D. Fill Factors are Excessive

The copper cable utilization rates BellSouth used to derive its BCPM fill factor inputs are BellSouth's historic, embedded utilization rates, unadjusted. (Ex. 75, at 79-80) Although BellSouth argues that these numbers are representative of future fill factors, BellSouth provides no support to suggest that these are the same factors an efficient competitor will compute, going forward. (Tr. 2151) Indeed, BellSouth's utilization rate for distribution is a mere 41%. (Ex. 75; Tr. 2155) Thus, for 6.4 million current working lines in Florida, BCPM would model a network with approximately 9 million lines idle. (Caldwell, Tr. 2156-2157) BellSouth's fill factors are inflated in part by its use of 25 pair distribution cable, regardless of the number of customers served using those pairs, although 6, 12 and 18 pair cable sizes are available. (Ex. 75, at 82) Placement of excess cable clearly inflates fill factor, producing "costs" no efficient competitor should incur.

Additionally, BellSouth uses fill factors that reflect excessive amounts of spare capacity for future customers unrelated to existing universal service demands and efficient forward-looking network design practices. BellSouth's BCPM cable fill factors indicate that it intends to recover, through universal service fund subsidies, the cost of facilities for huge numbers of future customers at the expense of current Florida consumers with absolutely no risk to itself. BellSouth's BCPM designs a distribution network that is intended to serve a current demand of 6.4 million lines with a spare capacity of 9 million pairs, with the *entire* costs of the cable allocated only to current customers. The allocated cost per person thus would be 250% of the cost of each person's pair and would recover return on investment for BellSouth's entire invested amount. Every time BellSouth places into service any of the spare facilities that were part of the initial investment, BellSouth will receive additional revenues based on "costs" that will include depreciation and return *on the same investment*.

E. Drop Costs Are Inflated

GTEFL modeled all drops as though buried. By running the BCPM with aerial drops, the cost of the drop dropped $0.17 per line per month. This amounts to an overstatement of USF costs in the amount of approximately $4.7 million. This is hardly an "immaterial" error. (Tucek, Tr. 2286-2289) To paraphrase Senator Goldwater, a million here a million there, pretty soon it adds up to real money. Real money that consumers will be forced to pay.

4(a) Depreciation rates

AT&T, MCI and WorldCom:

There are two values for each Uniform System of Accounts category: a projection life and a future net salvage value. The appropriate projection lives are shown on Exhibit No. 2, Attachment MJM-6, page 1 of 2, Columns c, d and e. The appropriate future net salvage values are shown on Exhibit No. 2, Attachment MJM-6, page 2 of 2, Columns c, d and e.

The Commission should reject the depreciation rates proposed by BellSouth, GTEFL and Sprint-Florida because they use unrealistically short lives that overstate the cost of universal service. (Majoros, Tr. 46) Only the proposals of Mr. Majoros, utilized in the HAI Model, reflect a forward looking analysis that is consistent with the FCC's Universal Service Order. (Majoros, Tr. 65-67)

The FCC's Universal Service Order requires the use of economic depreciation rates. (Majoros, Tr. 65-66) To comply with this requirement, plant lives must be based upon the expected economic lives of newly placed plant. (Majoros, Tr. 66) In practice, these "projection lives" have been derived from a forward-looking orientation that more appropriately matches technological developments and trends. (Majoros, Tr. 49-50, 54) The lives recommended by Mr. Majoros and utilized in the HAI Model in this case are derived from the projection lives and future net salvage percents prescribed by the FCC for BellSouth-Florida and GTE-Florida in 1995, with the Sprint-Florida lives and net salvage percents being from the low end of the FCC ranges. (Majoros, Tr. 72; Ex. 2, MJM-6) The record reflects that the FCC's rates are realistic, forward looking, and unbiased. (Majoros, Tr. 71)

The LEC proposals fail the forward looking standard. Contrary to FCC rulings, the LEC proposals are based upon a substitution analysis that assumes replacement of narrowband telecommunication's networks with broadband integrated networks capable of providing both telecommunications and video services instead of telecommunications-only replacement. (Majoros, Tr. 47-48) Moreover, substitution analysis is fraught with input selection problems and pattern completion assumptions that undermine output credibility. (Majoros, Tr. 50-51) Over time, substitution analysis has not proven accurate, and the poor quality of BellSouth's Florida-specific information only worsens the problem. (Majoros, Tr. 51-53; Ex. 2, MJM-9 to MJM-11)

The fact that the short lives proposed by BellSouth and GTEFL are consistent with the "book lives" utilized for financial reporting purposes further reinforces the problems with the LEC studies. (Majoros, Tr 53) Such lives are usually governed by the Generally Accepted Accounting Principle ("GAAP") of "conservatism" that requires erring on the side of shorter lives so as to eliminate any possibility of overstating the value of assets to stockholders. Even GTE, in the FCC's Prescription Simplification proceeding, noted this important GAAP principle, with which the FCC agreed. (Majoros, Tr. 55-57) The bottom line, however, is that the LEC depreciation lives are significantly shorter than the FCC lives, which increases depreciation charges beyond the FCC allowance and inappropriately raises the cost of universal service to the detriment of the consumers and competitors. (Majoros, Ex. 2, at MJM-7)

4(b) <u>Cost of money</u>

AT&T, MCI and WorldCom:
The forward-looking economic cost of capital appropriate for the provision of universal service by providers of local telephone service, based on modern finance theory and current empirical research in finance, is 8.50% for BellSouth, 8.74% for GTE, and 8.55% for Centel and United.

The 11.25% cost of capital utilized by BellSouth and Sprint-Florida and the 12.65% employed by GTEFL are far too high and should be rejected as inappropriate. (Billingsley; Tr. 293, Vander Weide, 390-391) Based upon the entire record, Mr. Hirshleifer's proposed cost of capital midpoint of 8.5% for BellSouth, 8.74% for GTE, and 8.55% for Sprint-Florida best reflects a forward looking cost of capital that should be adopted for these proceedings. (Hirshleifer, Tr. 194-195)

First, the 11.25% rate proposed by Mr. Billingsley is from a 1990 FCC decision, and so it does not reflect the dramatic decline in interest rates of the last eight years -- nor is it forward looking. (Hirshleifer, Tr. 230, 248-249) Since the 1990 decision, the 30-year Treasury bond rates have fallen from 9.04% to 5.62% in June 1998, which would imply a cost of capital of 7.84% before considering whether risk has increased. (Hirshleifer, Tr. 157) The LEC witnesses also exaggerate the extent of competition in the residential local market (which is virtually nonexistent), and thus exaggerate relevant business risk, which also contributes to an inflated cost of capital. (Hirshleifer Tr. 221-228) Finally, LEC witnesses have assumed growth for an infinite period at a rate exceeding the growth rate of the aggregate economy. (Hirshleifer Tr. 213-215, 217-221, 243) Together, these deficiencies, and those others identified by Mr. Hirshleifer, confirm that adoption of the LEC proposals would result in costs of capital that are excessive, would result in overrecovery, and would inappropriately increase the cost of universal service.

(c) __Tax rates__

AT&T, MCI and WorldCom:
The values for this input have been included in Exhibit 43, DJW-3, Sections 5.5.1 and 5.5.3.

The appropriate tax rate inputs are shown in Ex. 43, DJW-3. See also the testimony of Mr. Wood at Tr. 763.

(d) __Supporting structures__

AT&T, MCI and WorldCom:
The values for this input have been included in Exhibit 43, DJW-3, Section 2.4.1 through 2.4.4.

The appropriate values are shown in Ex. 43, DJW-3. See also Ex. 86 and the testimony of Mr. Wells at Tr. 2484, 2498-2506, and 2525-2526.

(e) __Structure sharing factors__

AT&T, MCI and WorldCom:
The values for this input have been included in Exhibit 43, DJW-3, Sections 2.2.3, 4.4.24, and Appendix B.

The appropriate values are shown in Ex. 43, DJW-3. See also the testimony of Mr. Wells at Tr. 2506 and Ex. 86.

(f) __Fill factors__

AT&T, MCI and WorldCom:
The values for this input have been included in Exhibit 43, DJW-3, Sections 2.6.1, 2.8.6, 3.3.1, 3.3.2, 3.5.3, 4.1.4, and 4.1.5.

The appropriate fill factors are shown in Ex. 43, DJW-3. See also Ex. 86.

(g) Manholes

AT&T, MCI and WorldCom:
The values for this input have been included in Exhibit 43, DJW-3, Sections 3.1.2, 3.6, 3.6.1, 3.6.2.

The appropriate values are shown in Ex. 43, DJW-3. See also Ex. 86.

(h) Fiber cable costs

AT&T, MCI and WorldCom:
**The values for this input have been included in Exhibit 43, DJW-3, Section 3.4.2.

The appropriate values for fiber cable costs are shown in Ex. 43, DJW-3. See also the testimony of Mr. Wells at Tr. 2511-2512 and Ex. 86.

(i) Copper cable costs

AT&T, MCI and WorldCom:
The values for this input have been included in Exhibit 43, DJW-3, Sections 2.2.7, 2.3.2, and 3.4.1.

The appropriate values are shown in Ex. 43, DJW-3. See also the testimony of Mr. Wells at Tr. 2509-2510, 2522-2524, and Ex. 86.

(j) Drops

AT&T, MCI and WorldCom:
The values for this input have been included in Exhibit 43, DJW-3, Sections 2.2.1 through 2.2.7.

The appropriate values are shown in Ex. 43, DJW-3. See also the testimony of Mr. Wells at Tr. 2513-2514, 2524, and Ex. 86.

(k) Network interface devices

AT&T, MCI and WorldCom:
The values for this input have been included in Exhibit 43, DJW-3, Section 2.1.

The appropriate values are shown in Ex. 43, DJW-3. See also the testimony of Mr. Wells at Tr. 2514-2515 and Ex. 86.

(l) Outside plant mix

AT&T, MCI and WorldCom:
The values for this input have been included in Exhibit 43, DJW-3, Sections 2.5.1, 2.5.2, 3.1.1, 3.2.1, 4.4.15.

The appropriate values are shown in Ex. 43, DJW-3. See also the testimony of Mr. Wells at Tr. 2518-2520 and Ex. 86.

(m) Digital loop carrier costs

AT&T, MCI and WorldCom:
The values for this input have been included in Exhibit 43, DJW-3, Sections 3.5.1 through 3.5.12.

The appropriate values are shown in Ex. 43, DJW-3. See also the testimony of Mr. Wells at Tr. 2515-2517 and Ex. 86.

(n) Terminal costs

AT&T, MCI and WorldCom:
The values for this input have been included in Exhibit 43, DJW-3, Sections 3.5.1 through 3.5.12.

The appropriate values are shown in Ex. 43, DJW-3. See also Ex. 86.

(o) Switching costs and associated variables

AT&T, MCI and WorldCom:
The values for this input have been included in Exhibit 43, DJW-3, Sections 4.1.1 through 4.1.12 and 4.2.1 through 4.2.6.

There are serious flaws in the ILECs' fundamental construct of the switch module, a number of apparent modeling errors, and switch inputs that are simply not reasonable. These flaws require that the Commission reject the BCPM outright as well as the inputs proposed by the ILECs.

I.
BCPM IS NOT FORWARD LOOKING

The BCPM switching module does not model a forward looking network. The BCPM model relies on the Local Exchange Routing Guide (LERG) for the construct of the network to determine the placement of host and remote switches. (Petzinger, Tr. 2763) A forward looking model holds fixed the customer locations and the wire centers. (Petzinger, Tr. 2763-64) It does not hold fixed which switches are hosts and which switches are remotes. (Petzinger, Tr. 2764) Embedded host/remote configurations were often made decades ago using old technology demands in effect at the time. In an appropriate forward looking cost study that is premised on replacing and building a new cost efficient network, the host/remote decision made decades ago cannot be considered forward looking. (Petzinger, Tr. 2815)

Remote switches have tremendously increased capacities. Where once a host or a standalone switch would have been placed, today a remote can be placed at much lower cost. (Petzinger, Tr. 2816) Moreover, in a forward looking network design the host/remote configuration would be optimized based on at least current conditions. (Petzinger, Tr. 2764) BCPM performs no such function.

Another problem with BCPM is that it requires all switches to be either a DMS-100 or a 5ESS. (Petzinger, Tr. 2765) Many switches actually in use today are small; forcing the BCPM to model them as large DMS-100s or 5ESSs seriously overstates costs. (Petzinger, Tr. 2765) Finally, BCPM's disaggregation calculations are specific to DMS-100 or 5ESS switches. These cost calculations are irrelevant to other switch types that may be forward looking, and thus effectively precludes accurate modeling of more appropriate forward looking small switch technology. (Petzinger, Tr. 2765-66)

II. BCPM INAPROPRIATLY RELIES ON INPUTS FROM PROPRIETARY CLOSED MODELS

BCPM's reliance upon a proprietary and closed Switching Cost Information System ("SCIS") model that was run with undocumented input data is a fundamental flaw in its construct. The BCPM uses both SCIS and the SCM Models. (Petzinger, Tr. 2762) In addition, GTEFL apparently used SCIS and its own proprietary model, COSTMOD. (Petzinger, Tr. 2762) Using closed models for determining USF violates the FCC's USF Report and Order. 14/ Closed models make it excessively difficult and usually impossible to evaluate whether the models are valid and whether they were used appropriately in the context of USF. (Petzinger, Tr. 2768) For example, no assessment can be made of whether any forward looking assumptions were made for such items as SS7 signaling or digital loop carrier. (Petzinger, Tr. 2767)

Because the ILEC models are proprietary and closed, and, in view of the short time available, it was simply impossible to comprehensively and accurately assess the thousands and thousands of items that would have to be reviewed to validate the appropriateness of the various ILEC proprietary cost models. (Petzinger, Tr. 2767 and 2869)

BCPM has multiple ways of entering switch price data. (Petzinger, Tr. 2761-62) However, ultimately, at one point or another in the processing they all rely upon data that has been extracted from proprietary models. Despite assertions that BCPM is not completely dependent on these models and that there are alternate ways of entering data, at some point in the processing, BCPM still relies on data from those models. (Petzinger, Tr. 2812)

There are concrete modeling problems within BCPM related to inconsistencies between the data that was run in SCIS (which forms the foundation for some of the data in BCPM) compared to the same data that is entered into BCPM. For example, it appears that Sprint entered fill factors as part of its SCIS inputs, which adjusts costs upward to account for fill. The fill factor information apparently also went into the development of BCPM

14/ See USF Report and Order ¶ 242. See also, Staff Cost Model Analysis ¶ 15; State Cost Study Criteria.

regression prices in the model. Sprint further entered the fill factors into BCPM itself, thus overstating the investments.

Another problem is the assumptions made when SCIS was run to generate the switching default prices in BCPM. Next Generation Digital Loop Carrier ("NGDLC") currently is available and is being deployed. (Petzinger, Tr. 2813) It is forward looking technology and has a lower port cost than the older types of digital loop carrier such as IDLC or analog lines. From this record, however, it appears that NGDLC was not entered into SCIS. (Petzinger, Tr. 2768) This failure causes higher port costs to be generated by BCPM. (Petzinger, Tr. 2814) Further, although no NGDLC is in the BCPM switch module, it apparently is assumed in the BCPM loop module, which raises serious questions of inconsistencies within BCPM itself. (Petzinger, Tr. 2769)

Finally, based on this record, there is no way to discern whether the inputs used in the proprietary cost models and the inputs to BCPM are consistent. Without carefully reviewing the voluminous and confidential data inputs to the proprietary models, BCPM cannot be considered consistent or accurate. (Petzinger, Tr. 2770)

III.
BCPM MODELING ERRORS

There are a number of modeling errors that cause BCPM to produce incorrect switch results. The BCPM regression analysis used to develop switch prices used undiscounted switch data.

(Petzinger, Tr. 2773) To correct the switch prices, an undocumented BellSouth "special study" produced factors to generate effective discounts. (Petzinger, Tr. 2773) The glaring error is that BCPM's regression analysis was not done on actual switch prices. (Petzinger, Tr. 2773) This error affects all of BellSouth's and Sprint's switches and seventy percent of GTE's switches. (Petzinger, Tr. 2773)

BCPM's results overrecover USF switch-related investments as identified by BCPM itself. (Petzinger, Tr. 2774) In the calculation of the investment relevant to USF for each switch, BCPM reaggregates the subcatagories of investments into an investment per port and usage per port. An unknown defect in the model causes the aggregate port investment plus usage to always exceed BCPM's identified total USF related switching investment. (Petzinger, Tr. 2774) The overrecovery for Sprint is $6,012,629, while the amount of overrecovery for GTEFL and BellSouth has not been accurately determined. 15/ It remains clear, however, that the investment per port including USF-related usage far exceeds

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15/ Since the conclusion of the hearing, it has been determined that the amount shown in the table on page 2774 of the transcript for GTEFL and BellSouth is incorrect. The error stems from fact that GTEFL and BellSouth, unlike Sprint-Florida, included in their respective BCPM filings all the wirecenters in Florida rather than just those in their respective territories. This caused the amount reflected in the table to be overstated for BellSouth and GTE. The amounts shown for GTEFL and BellSouth in the table represent the over recovery of investment for all the wire centers in Florida based on the BCPM inputs for BellSouth and GTE, respectively.

the amount BCPM has calculated to be the total USF switch investment. (Petzinger, Tr. 2774)

Additionally, BCPM makes numerous errors in the assignment of investments to cost categories. (Petzinger, Tr. 2776) For example, BCPM adds call termination costs (incurred only when a call is terminated either inter- or intraoffice) to trunk usage costs. Trunk usage costs are then applied to both originating and terminating interoffice calls but not intraoffice calls. As a result, Terminating Call Cost is assessed incorrectly on originating interoffice calls and not at all on terminating intraoffice calls. (Petzinger, Tr. 2776)

A more egregious inflation of investment occurs when BCPM adds the investment related to usage from a remote to a host and the usage within a multiple remote complex and then multiplies these usage costs by the total number of local calls. Since the total of local calls is significantly higher than just the calls involving remotes, the total usage investment is significantly inflated. (Petzinger, Tr. 2776)

BCPM inflates trunk investments by calculating the number of trunks needed based on the total number of lines rather than on the number of working lines. (Petzinger, Tr. 2575) This is contrary even to BCPM's documentation, which states that the trunk investment should be based on working lines. (Petzinger, Tr. 2575) It defies common sense to engineer trunks for lines on which there is no traffic.

BCPM also overstates switch engineering and installation costs by applying the Telco E&I Factor after the Common Equipment and Power Investment factor has already increased switch investment dollars. (Petzinger, Tr. 2777) This is inconsistent with the factor's description in the BCPM documentation. (Petzinger, Tr. 2777)

IV.
BCPM INPUT DATA ERRORS

The principal input error common to each ILEC is the failure to begin with the correct switch price. The information in Exhibit 93 (CEP-1, Table 1) shows the price per line as proposed by each of the three ILECs. These are the ILEC switching inputs into BCPM. These numbers simply do not correspond to the data that is publicly available regarding current price of switching, nor does it comply with the actual contract data that is available in this record. (Petzinger, Tr. 2818) The Turner Plant Index shows that switching prices are falling and there is no reason to expect that a discount effective even a few years ago would accurately reflect forward looking costs. (Tr. 2819)

An appropriate forward looking cost study with a goal of building a network from scratch should reflect the least cost generally available technology. (Petzinger, Tr. 2781, 2819) None of the ILECs have done this. Exhibit 93 (CEP-1, Table 3) clearly shows that the ILECs are using inconsistent and excessive switch inputs. Current publicly available information belies the excessive prices proposed by BellSouth, GTEFL and Sprint. (Petzinger, Tr. 2784, Table)

A. BellSouth Input Errors

BellSouth inappropriately incorporates growth into its BCPM inputs. Including discounts, which are lower than new switch discounts, is inconsistent with a forward looking model which assumes building a new network from scratch. (Petzinger, Tr. 2785) In addition, BCPM includes growth only for switching; it does not include growth in its loop plant calculations, which would lead to cheaper loop investment. (Petzinger, Tr. 2786) The incorporation of growth only in switching opportunely increases costs. (Petzinger, Tr. 2786)

BellSouth's proposed prices for Lucent and Nortel switches are substantially higher than its own most recent contracts indicate. (Petzinger, Tr. 2803-2808; see also Ex. 94) BellSouth's proposed growth discount is not reasonable. The circumstances set forth in BellSouth's proprietary Lucent contract that would give rise to this discount amount represent a worst-case scenario, which is highly unlikely to occur. (Tr. 2804; see Ex. 94) BellSouth's prices as proposed in Exhibit 93 are radically higher than the contract prices, and the difference cannot be explained away because of taxes or transport. (Petzinger, Tr. 2819) Exhibit E of Hearing Exhibit 93 shows the switching investment by wire center based on BellSouth's current effective switch price. This information belies any claim that BellSouth has as to the accuracy of its switch prices in its BCPM filing.

In addition, BellSouth's inputs for discounted cost of Reserve CCS per line are wrong. As AT&T's witness Petzinger stated, "BellSouth's numbers indicate an "absolutely huge amount of Reserve CCS for the DMS host, that is twice as much as the already inflated 5ESS Reserve CCS. The 5ESS Reserve CCS input values far exceed any costs I have ever seen." 16/ (Petzinger, Tr. 2887) In part, it appears that BellSouth's overstatement of switching investment is due to the constraint in BCPM that assumes all switches, even small ones, to be either a DMS-100 or a 5ESS. Thirty five BellSouth switches fall into this category. However, even if BellSouth were to use the BCPM small switch option, the small switch price matrix must be revised to reflect prices paid by a large LEC.

B. Sprint Input Errors

Sprint, unlike BellSouth and GTE, did use the BCPM small switch option. However, the BCPM small switch option is populated with data from an FCC presentation by Dr. Gabel which showed the switch prices for very small independent telephone companies that obtain Rural Utility Service ("RUS") assistance.

16/ It is significant to note that Ms. Petzinger has spent the last 15 years working in the area of switching cost modeling. In particular she has 13 years direct switching cost modeling experience at Bellcore working on the SCIS model.

(Tr. 2788) The BCPM small switch data clearly would not be applicable to a GTE, BellSouth or Sprint-Florida, each of which has sufficiently greater buying power to enable them to obtain better prices than small rural telcos. (Petzinger, Tr. 2788) Moreover, the widely divergent prices per line between host and remotes are unreasonable, and cast doubt on Dr. Gabel's data, even for the small telcos. (Petzinger, Tr. 2788) Finally, there are problems with the data used for Sprint SCIS run compared to its BCPM filing. Sprint's BCPM filing uses more than twice the number of standalone switches and hosts than its SCIS run, suggesting that Sprint's costs have been overstated. (Petzinger, Tr. 2789-90)

C. **GTEFL Input Errors**

Unlike BellSouth and Sprint-Florida, GTEFL did not use the BCPM default switch prices for all its switches. A review of BCPM indicates that data for certain switches was entered through the SCM price inputs. (Petzinger, Tr. 2790) It appears that GTEFL entered data into the SCM for 52 standalone, 6 host and 11 remote switches. These appear to be GTE's GTD-5 switches. GTEFL also selected 21 5ESS and DMS-100 standalone switches to be entered via SCM. No 5ESS or DMS hosts or remotes were included. (Petzinger, Tr. 2790) The presence of GTD-5s in GTE's mixture of switches renders GTE's switch costs inappropriate for USF. The GTD-5 clearly is not forward looking least cost technology and should be excluded from calculation of USF costs. (Petzinger, Tr. 2791-95, 2883)

CONCLUSION

The BCPM is fatally flawed as a model for the switch module. It relies on massive amounts of proprietary data and proprietary models that make BCPM virtually impossible to validate. BCPM's overly complex modeling to granularize switching investment into very small, discrete functions does not add accuracy to the analysis. It does not add accuracy to the model, and it does not add accuracy to the results for USF funding. It only adds complexity. It precludes others from viewing the model, for all practical purposes, and tremendously increases the probability of errors. The more complex a model is, the greater the probability for errors. However, should this Commission decide adopt the BCPM model despite its flaws, at a minimum, the input errors described above must be corrected.

(p) Traffic data

AT&T, MCI and WorldCom:
The values for this input have been included in Exhibit 43, DJW-3, Section 4.3.1 through 4.3.15 and DJW-6 in the input screen entitled Traffic Parameters.

The appropriate values are shown in Ex. 43, DJW-3.

(q) Signaling system costs

AT&T, MCI and WorldCom:
The values for this input have been included in Exhibit 43, DJW-3, Section 4.7.1 through 4.7.14.

The appropriate values are shown in Ex. 43, DJW-3.

(r) Transport system costs and associated variables

AT&T, MCI and WorldCom:
**The values for this input have been included in Exhibit 43, DJW-3, Section 4.4.1 through 4.4.24 and 4.5.1 through 4.5.14. **

The appropriate values are shown in Ex. 43, at DJW-3.

(s) Expenses

AT&T, MCI and WorldCom:
The values for this input have been included in Exhibit 43, DJW-3, Section 5 and Appendices C and D, and DJW-6 in the input screens entitled Expenses.

The Commission should not accept or rely on the operating expenses proposed by BellSouth, GTEFL or Sprint-Florida. None of these ILECs have provided any documentation with their respective BCPM filings that would enable a party to verify the appropriateness of the their proposed expense inputs. (Lerma Tr. 2695) Further, the operating expense inputs for these ILECs are based principally on historical costs and include other inappropriate costs that are not reflective of forward-looking competitive costs. (Lerma Tr. 2695-96)

In a competitive environment, G&A expenses are considerably less than those reflected by BellSouth, GTEFL and Sprint in their respective BCPM filings. (Lerma Tr. 2697) In addition, least cost technology produces lower network operating expenses in a competitive environment. Because current trends show network operations expenses per line declining, they can be expected to be less than the historical levels reflected in BellSouth's, GTE's and Sprint's operating expense inputs. (Lerma Tr. 2697) Further, BellSouth GTEFL and Sprint-Florida inappropriately have included advertising in their per line expenses. (Lerma Tr. 2699, 2705) Including advertising is inappropriate because the ILECs do virtually no advertising for basic local service. (Lerma Tr. 2699, 2705) BellSouth and Sprint also included nonrecurring charges in their expense inputs, which inappropriately causes double recovery of NRCs. (Lerma Tr. 2709) If the Commission adopts the BCPM, the expense input errors noted above must be corrected. The appropriate corrections for each ILEC are shown in Exhibits Nos. 91 (ALR-3) and 92.

(t) Other inputs

AT&T, MCI and WorldCom:
**The input values for all other inputs have been included in Exhibit 43, DJW-3. **

The appropriate values are shown in Ex. 43, at DJW-3.

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 5 in the cost proxy model identified in Issue 2?

AT&T, MCI and WorldCom:

(a) Costs should be developed using the same cost proxy model for BellSouth, GTEFL and Sprint.

**(b) Cost results by wirecenter for BellSouth, GTEFL and Sprint are shown in Exhibit 43, Attachment DJW-5(Revised 10/6/98). The total cost and average cost per residence line per month is as follows:

	Total	Avg./Month
BellSouth	$649.9M	$15.43
GTE	$260.1M	$15.37
Sprint-United	$223.5M	$19.08
Sprint-Centel	$$70.4M	$26.87**

BellSouth, GTE, and Sprint-Florida should be required to use the same cost methodology. The cost studies should be representative of an efficient firm providing service in the specific geographic area. The cost study for each LEC should be generic in order to be appropriately independent of the incumbent LEC's embedded network and operations. (Guepe, Tr. 689-690) Input factors should be specific to the geographic areas being modeled. The total forward-looking costs to provide universal service served by BellSouth, GTEFL and Sprint-Florida are set forth above. (Guepe, Tr. 690; Ex. 43, Attachment DJW-5 (revised))

BellSouth's productivity factor is understated. While BellSouth included a 3.1% productivity factor in its filing, this paltry amount is less than half the 6.5% productivity factor approved by the FCC. The FCC's productivity factor, in turn, is lower than the 7% trend in declining expenses. (Lerma, Tr. 2710-2712) The claim by Sprint's witness Dickerson of a 37% expense reduction is misleading. His reduction consisted simply of removing local expenses in ARMIS from total ARMIS expenses. There was no attempt to reduce local expense to reflect increased productivity, re-engineering or the downward trend in expenses.

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?

AT&T, MCI and WorldCom:

(a) No. This is consistent with the FCC determination, for interstate high cost fund purposes, that rural LECs will not be required to use a forward-looking cost methodology at least until January 1, 2001.

(b) Not applicable.

(c) Since there is no local competition in these areas and universal service is not jeopardized, it is appropriate to defer determination of universal service costs and subsidy needs until the FCC addresses this issue or a rural ILEC can demonstrate a specific need for support.

The FCC has determined that, for interstate high cost fund purposes, rural LECs will not be required to use a forward-looking cost methodology at least until January 1, 2001. It may not be appropriate at this time to require small LECs to use the same cost proxy model as the large LECs. (Lerma, Tr. 689) In addition, due to the compressed time in which this proceeding has taken place, there was an inadequate time in which to perform a reasonable examination of the small LECs' cost studies. In view of the lack of competition in rural LEC territories and the inability to adequately examine the small LECs' cost studies, the Commission should defer determination of universal service costs and subsidy needs until the FCC addresses this issue or a rural ILEC can demonstrate a specific need for support.

WHEREFORE, AT&T, MCI, and WorldCom respectfully request that the Commission recommend to the Florida legislature the HAI 5.0a cost proxy model and input values as the most appropriate cost proxy model and values to determine the cost of basic local telecommunications service in Florida.

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