

STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. P-100, SUB 133b

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of)
Establishment of Universal Support Mechanisms Pursuant to) ORDER ADOPTING FORWARD-LOOKING
Section 254 of the Telecommunications Act of 1996) ECONOMIC COST MODEL AND INPUTS

HEARD IN: Commission Hearing Room 2115, Dobbs Building, 430 North Salisbury Street, Raleigh, North Carolina, on Tuesday, February 3, 1998, Wednesday, February 4, 1998, Thursday, February 5, 1998, Friday, February 6, 1998, Monday, February 9, 1998, and Tuesday, February 10, 1998

BEFORE: Commissioner Allyson K. Duncan, Presiding, Chairman Jo Anne Sanford, and Commissioners Ralph A. Hunt, Judy Hunt, William R. Pittman, and J. Richard Conder

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BY THE COMMISSION: On May 8, 1997, the Federal Communications Commission (FCC) released a Report and Order in CC Docket No. 96-45 (Universal Service Order or USO) in response to Section 254 of the Telecommunications Act of 1996 (the Act). In this Order, the FCC asked the states to elect, by August 15, 1997, whether they would conduct their own forward-looking economic cost (FLEC) studies for the purpose of determining federal universal service support for nonrural eligible carriers' rural, insular, and high cost areas. In Paragraph 250 of the USO, the FCC prescribed the following ten criteria which a state-conducted study must meet in order to be approved for use in calculating federal universal service support:

1. The technology assumed in the study or model must be the least-cost, most-efficient, and reasonable technology for providing the supported services that is currently being deployed. The model must include the incumbent local exchange companies' (ILECs') wire centers as the center of the loop network; the outside plant should terminate at the ILECs' current wire centers. The loop design should not impede the provision of advanced services. Wire center line counts should equal actual ILEC wire center line counts. Average loop length should reflect the ILECs' actual average loop length.
2. Any network function or element, such as loop, switching, transport, or signaling, necessary to produce supported services must have an associated cost.
3. Only long-run, forward-looking economic costs may be included. The long-run period must be long enough that all costs may be treated as variable and avoidable. The costs must not be the embedded cost of the facilities, functions, or elements. The study or model must be based on an examination of the current cost of purchasing facilities and equipment rather than list prices.
4. The rate of return must be either the authorized federal rate of return on interstate services, currently

11.25%, or the state's prescribed rate of return for intrastate services.

5. Economic lives and future net salvage percentages used in calculating depreciation expense must be within the FCC-authorized range.
6. The cost study or model must estimate the cost of providing service for all businesses and households within a geographic area, including the provision of multi-line business services, special access, private lines, and multiple residential lines.
7. A reasonable allocation of joint and common costs must be assigned to the cost of supported services.
8. The cost study or model and all underlying data, formulae, computations, and software associated with the model must be available to all interested parties for review and comment. All underlying data should be verifiable, engineering assumptions reasonable, and outputs plausible.
9. The cost study or model must include the capability to examine and modify the critical assumptions and engineering principles.
10. The cost study or model must deaverage support calculations to the wire center serving area level at least and, if feasible, to even smaller areas such as Census Block Group, Census Block, or grid cell.

The FCC also stated that the study must be the same study that is used by the state to determine intrastate universal service support levels pursuant to Section 254(f) of the Act.

On August 12, 1997, the Commission issued an Order electing to conduct its own FLEC study for submission to the FCC and notifying the FCC of its election. The Commission also adopted a timetable, which was modified by subsequent Orders, for developing North Carolina FLEC studies. The timetable included dates for filing proposed studies, supporting testimony and documentation, and for holding evidentiary hearings.

Proposed cost studies were filed by Carolina Telephone and Telegraph Company and Central Telephone Company (collectively, Carolina/Central), BellSouth Telecommunications, Inc. (BellSouth), and GTE South Incorporated (GTE), using Version 2.5/2.6 of the Benchmark Cost Proxy Model (BCPM); and by AT&T Communications of the Southern States, Inc. (AT&T) and MCI Telecommunications Corporation (MCI) jointly, using Release 4.0 of the Hatfield Model (HM). Carolina/Central and BellSouth updated their studies using BCPM 3.1, GTE updated its study using BCPM 3.0, and AT&T/MCI updated their study using HM 5.0.

The matter came on for hearing on February 3, 1998. AT&T and MCI jointly sponsored HM 5.0 and presented the direct and supplemental direct testimony of Don J. Wood and the rebuttal testimony of John C. Klick. AT&T also presented the direct and rebuttal testimony of Joseph Gillan; the direct, supplemental direct, and rebuttal testimony of James W. Wells, Jr.; and the rebuttal testimony of Art Lema. BellSouth and Carolina/Central jointly sponsored BCPM 3.1 and presented the direct, supplemental direct, and rebuttal testimony of Dr. Robert M. Bowman; the direct and supplemental direct testimony of Dr. Brian K. Staihr; and the direct and rebuttal testimony of Dr. Kevin Duffy-Deno. BellSouth also presented the direct testimony of Alphonso J. Varner and the direct and rebuttal testimony of D. Daonne Caldwell. Carolina/Central presented the direct and supplemental direct testimony of C. Steve Parrott and Marcus H. Potter. BellSouth presented the rebuttal testimony of Jamshed K. Madan, Michael D. Dirmeier, and David C. Newton (Georgetown Consulting Group). GTE presented the direct, supplemental direct, and rebuttal testimony of Dr. Mark S. Calnon and the direct, supplemental direct, and rebuttal testimony of Terence D. Robinson. GTE also presented the rebuttal testimony of Dr. Timothy J. Tardiff and Robert P. Cellupica. The Public Staff presented the revised testimony of John T. Garrison, Jr. The North Carolina Cable Telecommunications Association (NCCTA) presented the direct and rebuttal testimony of William J. Barta. Neither the Public Staff nor NCCTA sponsored a cost study.

The testimony of the following witnesses was entered into the record by stipulation: John I. Hirshleifer, direct and rebuttal (AT&T); Richard B. Lee, direct and rebuttal (AT&T); Dr. David L. Kaserman, direct (AT&T); G. David Cunningham, rebuttal (BellSouth); Dr. Randall S. Billingsley, rebuttal (BellSouth); Anthony J. Flesch, rebuttal (GTE); Gregory D. Jacobson, rebuttal (GTE); Jerome C. Weinert, rebuttal (Carolina/Central); John R. Hinton, direct (Public Staff); and Royster M. Tucker, III, direct (North State Telephone Company).

On February 27, 1998, the FCC released a Public Notice setting forth the information it needs to determine whether a state's cost study complies with the ten criteria prescribed in its Universal Service Order and the format in which this information should be presented.

Based on a careful consideration of the entire record in this matter, the Commission now makes the following

FINDINGS OF FACT

1. It is appropriate to conduct separate cost studies to determine the forward-looking economic cost of providing universal service in the respective service territories of Carolina/Central, BellSouth, and GTE in North Carolina.
2. The BCPM 3.1 is the appropriate model to use in determining the forward-looking economic cost of providing universal service for Carolina/Central, BellSouth, and GTE in North Carolina.
3. Except as modified below, the user adjustable inputs and parameters proposed by Carolina/Central are appropriate for use in the FLEC study for their service territories.
4. Except as modified below, the user adjustable inputs and parameters proposed by BellSouth are appropriate for use in the FLEC study for its service territory.
5. The following user adjustable inputs and parameters for GTE's plant investment should be modified:
 - a. Outside plant material and installation costs
 - b. Support ratios
 - c. Switching inputs
 - d. Cable sizing factors
6. The following user adjustable inputs for GTE's expenses should be modified:
 - a. Per line expenses: Network Support, General Support, Other Property Plant, Network Operations, Marketing, Services, Executive and Planning, and General and Administrative
 - b. Percentage of investment expenses: Poles, Aerial Fiber Cable, Buried Fiber Cable
7. Expense inputs for Information Origination/Termination should be excluded from the FLEC studies of all three ILECs.
8. Structure sharing percentage inputs of each ILEC should be revised to reflect structure sharing percentages that fall midway between each ILEC's proposed percentages and the percentages proposed by AT&T/MCI as inputs into the HM 5.0.
9. The FLEC study inputs of each ILEC should include actual access line data for each wire center.
10. The prescribed cost of capital for intrastate services in North Carolina which is reasonable and appropriate for use in determining the forward-looking economic costs associated with providing universal service is 9.94%, based on the following capital structure and cost rates:

Component	Ratio	Cost Rate	Weighted Cost Rate
Long-term debt	42%	7.38%	3.10%
Common equity	58%	11.80%	6.84%

Total

100%

9.94%

11. The appropriate economic lives and future net salvage percentages for calculating depreciation rates for use in the FLEC studies are those that are within the FCC-authorized range.
12. The appropriate input value for distribution pairs per residential housing unit for use in the FLEC studies is 1.4.
13. The appropriate tax rates and regulatory fee rate for use in the FLEC studies are as follows: federal income tax rate, 35%; state income tax rate, 6.9%; gross receipts tax rate, 3.22%; regulatory fee, 0.09%.
14. Revised FLEC studies conducted in accordance with the provisions and requirements of this Order will be in compliance with the FCC's ten criteria.

DISCUSSION OF EVIDENCE AND CONCLUSIONS

PART NO. 1: OVERVIEW

This proceeding was instituted to enable the Commission to adopt a FLEC study or studies acceptable to the FCC for the purpose of determining federal universal service support. The ILECs expressed concern that if the FCC bases its determination of federal support on costs that are not representative of costs in North Carolina (i.e., on costs that are understated), there will be an additional burden on the intrastate universal service fund.

It is anticipated that the ILECs, who are currently the universal service providers in their franchised areas, will be the principal recipients from the universal service fund. They have asserted that setting the cost too low will jeopardize service quality at affordable rates. The ILECs have sponsored company-specific studies using the BCPM which, they say, represent the reasonable forward-looking costs that an efficient provider of universal service would incur in their respective areas. The competitors, who will be contributors to the universal service fund, have asserted that setting the cost too high will thwart competition. AT&T and MCI have sponsored a study using the Hatfield Model which, they say, represents the costs that a least-cost, most-efficient provider would incur in providing universal service in a competitive environment.

The Commission has given substantial weight to testimony from ILEC witnesses regarding their companies' forward-looking costs. The Commission is persuaded, both by the evidence presented and by its own investigation, that the ILECs' networks employ efficient technology and good engineering practices. They also provide reliable service throughout the State. The Commission is therefore inclined to accept the ILECs' proposed user adjustable inputs where they are forward looking and reasonable. The question then becomes whether the Commission should also accept the ILECs' proposed model or whether another model would better accomplish our purpose.

PART NO. 2: MODEL SELECTION

2(a): MODEL SELECTION (CUSTOMER LOCATION / NETWORK DESIGN)

POSITIONS OF PARTIES

BELLSOUTH: The BCPM 3.1's road-based, customer-location methodology is superior to Hatfield 5.0's and, therefore, more accurately estimates the cost of providing universal service in North Carolina. In addition, the BCPM 3.1's network design is superior to HM 5.0's because it follows industry-accepted design standards; builds a network that reaches all customers _ existing and potential; makes advanced services as available to rural customers as they are to urban customers; and builds a high quality network over which urban and rural North Carolinians can actually talk.

CAROLINA/CENTRAL: The BCPM 3.1 relies on the reasonable assumption that the great majority of customers, both business and residential, will be located along roads. In addition, the BCPM 3.1 more accurately estimates loop length, and accordingly provides an accurate and realistic estimate of loop cost (the most costly component of the serving network).

GTE: The BCPM platform provides a better basis for a universal service calculation than does the Hatfield Model. The BCPM's network architecture is developed by locating telephone plant along roads, streets, and avenues _ where most customers can be expected to live and where telecommunications facilities are currently placed. BCPM conforms to all applicable engineering and design standards, and its switching module reflects "actual ILEC switching purchases."

GTE has proposed that BCPM be chosen on an interim basis, and that it be populated with GTE company-specific inputs. GTE's cost model (Integrated Cost Model or ICM) has been filed with the Commission in Docket No. P-100, Sub 133d, relating to the pricing of unbundled network elements (UNEs), but ICM could not be modified for universal service purposes in time for consideration here. GTE indicates that work on ICM for universal service continues, and that it intends to submit ICM to the Commission at a later date.

AT&T: The Hatfield Model is more accurate than the BCPM in locating customers and estimating the costs of building a network to them. Hatfield 5.0 locates the customers (many within 50 feet of their actual location) and uses modeling assumptions that result in the use of the least-cost material and equipment required to engineer a high quality network. Where data is available _ for approximately 70-75% of customers _ the Hatfield Model uses the actual location of the customer. The remaining customers are included at the census block level. In addition, the Hatfield Model develops costs based on the total demand for network elements, including loops, switching, and interoffice transport. By designing a forward-looking network based on total demand, the Hatfield Model properly includes economies of scale.

MCI: The Hatfield 5.0 is superior to BCPM 3.1 for purposes of customer location. While geocoding is currently not available for all customers, it does provide locations for 64% of the customers in North Carolina, and the ability to geocode addresses will only improve in the future.

NCCTA: The NCCTA believes that either of the basic platforms of the Hatfield and BCPM models will serve the purposes for which they are intended and that either model could be recommended to the FCC consistent with the FCC's requirements.

ATTORNEY GENERAL: The differences between BCPM 3.1 and Hatfield 5.0 appear de minimis, and either the BCPM or the Hatfield Model would be acceptable to use in this docket if the input values provided to the models are cost appropriate. By the evidence presented in this docket, Hatfield 5.0 does not appear to calculate significantly different route miles from the route miles calculated by the BCPM which does not use geocoding.

PUBLIC STAFF: The BCPM 3.1 is more reasonable, more accessible, and more appropriate than the Hatfield Model for determining the forward-looking economic cost of providing universal service in North Carolina. The BCPM method of locating customers is more appropriate than the Hatfield method for FLEC study purposes. Once the Hatfield Model establishes clusters based on geocoded data, it disregards the data when it places customers throughout the clusters and actually models the facilities.

MAJOR DIFFERENCES BETWEEN BCPM AND HATFIELD

The major differences in the model platforms appear to be in the areas of customer location and network design. A more detailed description of each of these areas, based on the positions of the proponents of each model, follows.

A. CUSTOMER LOCATION:

BCPM

According to the proponents of the BCPM model, the BCPM 3.1 relies on publicly available wire center boundary data obtained from Business Location Research (BLR). A BCPM 3.1 customer location algorithm then partitions the area of a wire center into "microgrids," roughly 1,500 feet by 1,700 feet in size (0.09 square miles). Thus, each Census Block within the serving wire center is overlaid with microgrids, unless the entire Census Block falls within a single microgrid.

In the rural areas of the wire center, the allocation of customer locations is based upon the road network, the

location of which is known in every Census Block. Proponents of the BCPM model state that the BCPM 3.1 uses data on the road network obtained from TIGER/Line files (Topologically Integrated Geographic Encoding and Referencing) from the U.S. Census Bureau. In dense urban areas, Census Blocks may be smaller than the microgrid, and the assignment of customer data along the road network is not required. Because the Census Block road network is known with certainty and because people tend to live along roads, proponents of the BCPM model state that the BCPM 3.1 apportions Census Block housing units to microgrids based on the share of the Census Block's road mileage that occurs in a given microgrid.

These microgrids are then aggregated into telephone engineering Carrier Service Areas (CSAs) and Distribution Areas (DAs) as appropriate. These are referred to as "ultimate grids." The maximum size of an ultimate grid is constrained to approximately 12,000 feet by 14,000 feet (roughly six square miles) to comport with engineering guidelines. BCPM proponents state the BCPM 3.1 does not assume that customers are uniformly distributed within each ultimate grid. Rather, each ultimate grid is divided into four distribution quadrants, each of which may contain a distribution area. The latitude and longitude coordinates of the distribution quadrants are determined by first establishing the road centroid of the ultimate grid. The distribution quadrants are centered on this road centroid. For those distribution quadrants that do not have any customers assigned to them, no distribution area is designed within the distribution quadrants, thus ensuring that plant is not "built" in nonpopulated areas.

HATFIELD

Proponents of the Hatfield Model contended that the Hatfield 5.0 is at least as accurate as the BCPM for locating one-third of North Carolina consumers and more accurate than the BCPM in locating two-thirds of consumers. The proponents of the Hatfield Model further stated that the Hatfield 5.0 accurately locates customers (precisely locating a large percentage of all households to within fifty feet of actual locations), identifies clusters of households as real-world neighborhoods or groupings, and builds a network to these neighborhoods using the same engineering practices, efficiencies, and technologies available to network designers in the real world. In order to accomplish this task, Hatfield 5.0 uses a process known as "geocoding." Simply defined, "geocoding" means matching customers with their addresses and locating those addresses by latitude and longitude.

The Hatfield proponents further explained that the geocoding process is performed by a company called PNR Associates (PNR) which makes use of mailing lists from Metromail, a mass mailing firm, employed by many businesses for advertising purposes. PNR also obtains business addresses from Dun and Bradstreet. PNR then goes to the U.S. Geological Survey TIGER database to determine the latitude and longitude of the street addresses. At that point, PNR uses a mathematical formula to determine where people are "clustered" or, in other words, where the towns and neighborhoods are located. For modeling purposes, a rectangle is overlaid over the cluster, and this defines the serving area. Customers are then assigned to a wire center.

Proponents of the Hatfield Model state that the Hatfield 5.0 assumes that customer locations for which geocoding data currently does not exist are distributed evenly along the perimeter of the Census Block. The Proponents of the Hatfield 5.0 believe that 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. Therefore, even though the amount of plant required may be slightly overstated, there will be enough plant to ensure that the network will reach all of the customers.

B. NETWORK DESIGN:

BCPM

The proponents of the BCPM explained that the great majority of the costs of providing universal service are the costs of constructing and maintaining the loop network. The loop network consists of the facilities from the central office switching center to the customer's premise. The loop includes feeder cable, distribution cable, Feeder Distribution Interfaces (FDIs), distribution terminals, drop wire, and a Network Interface Device (NID) at the customer's premise. The facilities between the switching center and the terminal at the customer's premise are typically divided into feeder and distribution cable plant. Feeder facilities are the facilities between the switching center and the FDI. A FDI is generally the demarcation point between feeder and distribution facilities. Distribution facilities begin at the FDI and end at the NID or at a building terminal. A distribution terminal (drop terminal) is used to terminate drop

wire and connect the drop wire to the distribution cable. Drop wire connects the distribution cable to the network device located at the customer's premises. A sound cost proxy model must design a network that includes all the loop cost elements necessarily incurred in providing customers with the capability of placing and receiving telephone calls. BellSouth and Carolina/Central witness Bowman referenced AT&T's Outside Plant Engineering Handbook (August 1994) which generally limits copper loops beyond the Digital Loop Carrier Remote Terminal (DLC) to 12,000 feet for quality service. Witness Bowman stated that the BCPM 3.1 followed this engineering practice in its network design by using larger 24-gauge cable beyond 11,100 feet and replacing standard channel unit cards with extended range line cards beyond 13,600 feet.

Witness Bowman stated that the use of these standard channel unit cards, combined with the distance of the loop past the DLC, results in an unacceptable decibel loss on the loop. To provide an adequate grade of service using standard channel unit cards, the maximum copper loop length from the DLC to the customer for buried cable should not exceed 12,000 feet of 26-gauge cable and 14,800 feet of 24-gauge cable. If aerial plant is used, the decibel loss increases and, therefore, the maximum copper loop lengths would be less than 12,000 feet on 26-gauge cable and less than 14,800 feet on 24-gauge cable.

Proponents of the BCPM 3.1 explained that it builds to all housing units, regardless of whether they are occupied or currently have phone service. BCPM proponents contended that as the carrier of last resort, the incumbent local exchange company must stand ready to serve all housing units.

HATFIELD

The proponents of the Hatfield Model explained that it designs facilities to neighborhoods the way an engineer would design these facilities. After customers are located, the Hatfield 5.0 identifies customers that can be served together logically, such as customers located in the same neighborhood or town, subject to any technological constraints. The model builds feeder facilities to these locations and defines carrier serving areas, where possible, to include the identified groupings. Within each neighborhood, Hatfield 5.0 designs distribution facilities using the efficient rectangular lots favored by real-world real estate developers. For outlying customers served by roads, Hatfield 5.0 actually builds the distribution along the roads to serve the customers.

The proponents of the Hatfield Model stated that it 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. For parts of the network in which the choice of efficient technologies may be different under different conditions, the 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 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 the DLC electronics rather than the expensive copper. Proponents of the Hatfield Model stated that in order to determine the most cost effective solution, Hatfield 5.0 compares costs of copper and fiber for every feeder loop segment and chooses the most efficient alternative.

Proponents of the Hatfield Model contended that the universal service network which the Hatfield Model designs is fully capable of accommodating the next generation of advanced services, including low cost, high speed digital subscriber line services expected to be available later this year. The Hatfield 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. Thus, even the longest loops (those over 18,000 feet) can accommodate advanced services including Integrated Services Digital Network (ISDN) and other high speed data applications. The Hatfield Model proponents stated that, further, Hatfield 5.0 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.

Hatfield Model proponents stated that the Hatfield 5.0 develops costs based on the total demand for network elements, including loops, switching, and interoffice transport. Total demand includes the demand created by residence (first and additional lines), business (single and multi-line), public (coin), and special access services. Hatfield 5.0 builds only to customers that currently have telephone service. The proponents of the HM argued that universal service

support should not include the potential cost of serving customers that currently do not have service.

DISCUSSION

As noted above, two cost proxy models have been presented to the Commission for consideration, as well as various sets of cost inputs to those models. The BCPM sponsored by Carolina/Central and BellSouth (and adopted by GTE on an interim basis) is a model that has been developed by BellSouth, INDETEC International, Sprint, and US West. The Hatfield Model has been developed by HAI Consulting, Inc., for AT&T and MCI.

The BCPM bases its customer location on the assumption that households and businesses typically are located near roads and centering the distribution quadrant of the DA at the center of the roads establishes network facilities closer to where customers are located. The Hatfield Model uses geocoding which means matching customers with their addresses and locating those addresses by latitude and longitude. The location of customers will then determine the cost of cable, switches, and other facilities necessary to implement a least cost, forward-looking network.

The BCPM 3.1 network was designed by using large 24-gauge cable beyond 11,100 feet and replacing standard channel unit cards with extended range line cards beyond 13,600 feet. The Hatfield 5.0 models with T-1 technologies in place of coarse-gauge cable and load coils utilized in embedded networks to permit extended copper loop lengths. Thus, even the longest loops (those over 18,000 feet) can accommodate advanced services including ISDN and other high speed data applications.

In reviewing the cost model selection issue, the Commission notes that neither the Attorney General nor the NCCTA recommended one model over the other in their Briefs, but seemed to agree that either of the models may be acceptable. The Attorney General indicated that evidence before the Commission supports the opinions of the witnesses that the models are converging. The Attorney General also mentioned that when BellSouth's panel of Georgetown Consulting witnesses Madan, Dirmeier, and Newton fed BellSouth-derived inputs into the Hatfield Model, they got results very similar to those obtained by BellSouth's BCPM. Similarly, when AT&T/MCI witness Klick compared the cabling that each model calculated, the total route miles were very close (41,398 total route miles for Hatfield 5.0; 42,822 total route miles for BCPM 3.1, a difference of about 3%). The NCCTA commented that, driven by FCC-mandated criteria and FCC-sponsored technical discussions, it appears that the model platforms are becoming more similar and one would expect that, over time, the platform distinctions will become even less significant.

In its Proposed Order, the Public Staff endorsed adoption of the BCPM 3.1 rather than the Hatfield Model, asserting that BCPM 3.1 is more reasonable, more accessible, and more appropriate for use in determining the forward-looking economic cost of providing universal service in North Carolina. In arriving at its recommendation, the Public Staff discussed the strengths and weaknesses of both models.

Customer location is unquestionably an important part of the modeling process, and the Commission agrees with the Public Staff's analysis on the following points regarding the value of geocoding as it currently exists in the Hatfield Model. For instance, the Public Staff stated that, first of all, geocoding is only as accurate as the underlying addresses. Not only is it possible that some street addresses are inaccurate, it is a fact that other addresses are not street addresses at all. The Public Staff pointed out that, according to witness Wood's testimony, only about two-thirds of customers in North Carolina are geocodable, and the most geocodable locations are in suburban areas. Other areas tend to be difficult to geocode because of the presence of post office boxes in urban areas and rural route numbers in rural areas. The Public Staff further noted that BellSouth and Carolina/Central witness Duffy-Deno pointed out that little is likely to be gained in terms of cost estimation from geocoding in urban areas, while accurate location in rural areas is critical. Thus, whatever the virtues of geocoding, they fail to manifest themselves where they are needed most. The Public Staff stated that it believes the BCPM method of locating customers is more appropriate than the Hatfield method for FLEC study purposes. The Public Staff stated that this conclusion is bolstered by the fact that, once the Hatfield Model establishes clusters based on geocoded data, it disregards the data when it places customers throughout the clusters and actually models the facilities. The Public Staff agreed with witness Duffy-Deno's testimony that "a sound cost proxy model should reasonably reflect the locations of customers, especially in rural high cost areas . . . [and] should reasonably reflect the telecommunications structures and facilities needed to serve customers in their locations."

The Public Staff further noted that there was considerable debate over the use of extended range line cards and how much power loss occurs over copper facilities. The BCPM developers believe that good engineering design limits

the length of copper beyond the DLC to 12,000 feet, and that after 13,000 feet an extended range line card should be used. The Hatfield developers take a different approach, assuming that a copper loop will work out to 17,600 feet before an extended range line card is needed. The Public Staff noted that it is not clear whether costs for those line cards have been included in the model and, if not, whether they would drive the overall loop cost above that produced by the BCPM.

In its Proposed Order, the Public Staff also noted that the models build to different numbers of housing units; Hatfield to current customers and BCPM to all housing units. The Hatfield proponents, the competing local providers (CLPs), maintain that universal service funding should be based only on the cost of serving customers who have telephones. BCPM proponents, the ILECs, point out that as carriers of last resort they have the obligation to serve all who apply for service. Here again, the Commission agrees with the Public Staff that the BCPM assumption is correct and that a forward-looking cost study should include all housing units.

The Commission believes that both models have considerable merit, with each having strengths and weaknesses. However, the Commission believes that the arguments advanced by the Public Staff tip the balance in favor of the BCPM. In particular, the Commission has concerns regarding the geocoding method used by the Hatfield Model 5.0 and believes that the customer location methodology used by the BCPM is more appropriate and better suited to the rural areas of North Carolina where it would be expected that many of the high cost areas are located.

CONCLUSIONS

The Commission concludes that the BCPM 3.1 is more reasonable, more accessible, and more appropriate than the Hatfield Model for determining the forward-looking economic cost of providing universal service in North Carolina. The Commission further concludes that the Carolina/Central version of the BCPM 3.1, which is the only version that is capable of producing results below the wire center level, should be used by BellSouth, GTE, and Carolina/Central in determining the forward-looking economic cost of providing universal service in North Carolina.

2(b): DATA VERIFICATION / PREPROCESSING INFORMATION

POSITIONS OF PARTIES

BELLSOUTH: Citing FCC Criterion No. 8 that models should be open and verifiable, BellSouth argued that the Commission lacks meaningful access to the preprocessing information embedded in HM 5.0, especially that information related to clusters and clustering algorithms. PNR apparently considers geocoded locations to be proprietary; and even if geocoded information and clustering algorithms could be obtained, the annual licensing cost is approximately \$2.6 million. Thus, HM 5.0 cannot be adequately verified.

CAROLINA/CENTRAL: Carolina/Central did not address this specific issue in their Brief or Proposed Order.

GTE: GTE echoed the position of BellSouth, stressing that the geocoding data was deemed proprietary to PNR's data vendors, was derived from 12 different databases and five independent models or algorithms, and costs \$2.6 million annually.

AT&T: AT&T did not address this specific issue in its Brief or Proposed Order.

MCI: MCI contended that, while both models contain preprocessing information that has not been made completely available, HM 5.0 provides more readily available information than BCPM 3.1. Furthermore, the Commission can verify the information involved in the HM 5.0 preprocessing aspect of customer location through a request to Hatfield proponents or to PNR. There should be no cost for that type of demonstration. The licensing and user fees are to obtain the underlying database and all the software that goes along with the Metromail database. The \$2.6 million figure is for nationwide geocoding information as well as training. MCI also pointed out that BCPM proponents had not provided all the missing utility header and functions necessary to run the BCPM preprocessor and that BCPM 3.1 has feeder and subfeeder calculations in the processor that cannot be evaluated.

NCCTA: The NCCTA did not address this specific issue in its Brief.

ATTORNEY GENERAL: The Attorney General did not address this specific issue in his Brief.

PUBLIC STAFF: The Public Staff did not address this specific issue. However, the Public Staff stated that BCPM 3.1 complies with the FCC's ten criteria, with the possible exception of the first one.

DISCUSSION

FCC Criterion No. 8 reads:

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

The size and complexity of HM 5.0 and BCPM 3.1 are such that an exhaustive assessment of their openness and verifiability is likely to be problematical. Although BellSouth and GTE have raised some legitimate concerns, MCI has pointed out that preprocessing assumptions are common to both models and that the Commission would have access to verification of the preprocessing aspect of customer location through a request to Hatfield proponents or PNR at no cost. In any event, MCI also pointed out that the \$2.6 million figure was a comprehensive nationwide figure. Thus, both models appear to be reasonably open and verifiable.

CONCLUSIONS

The Commission concludes that both HM 5.0 and BCPM 3.1 satisfy FCC Criterion No. 8.

PART NO. 3: INPUTS

3(a): DEFAULT INPUTS / CURRENT AND HISTORICAL COSTS / IMPACT OF COMPETITION

POSITIONS OF PARTIES

BELLSOUTH: BellSouth's inputs to BCPM 3.1 reflect the costs of currently available technologies. BellSouth's inputs do not reflect embedded costs.

CAROLINA/CENTRAL: Although historical costs should not be considered determinative of the issue, an ILEC's current costs provide the best information available as a starting point in estimating costs on a go-forward basis.

GTE: GTE contended that the methodology used in the Best of Breed survey to develop BCPM's default input values is far superior to the "pick and choose" approach of Hatfield 5.0. GTE contended that its specific categories of inputs for cost of capital, depreciation lives, structure sharing, structure mix and fill factors and GTE's ARMIS data are far superior to the default inputs in HM 5.0, and are also better than BCPM's default inputs because they are GTE specific.

AT&T: Hatfield 5.0 inputs adjusted for North Carolina should be used rather than company-specific inputs. The inputs sponsored by BellSouth, GTE, and Carolina/Central in this proceeding fail to address the impact of competition on the local exchange market and represent embedded costs rather than the cost an efficient provider would expect to incur.

MCI: Hatfield 5.0 inputs are the appropriate inputs for use in the cost proxy models submitted to the FCC. Hatfield 5.0 is designed to accurately estimate the cost an efficient carrier would incur to provide service in the geographic area being studied.

NCCTA: The sponsors of both models have failed to substantiate the basis of their inputs to the models and have failed to validate their model results through real-world comparisons. In many instances, the use of company-specific inputs is the best way to approximate the forward-looking costs of constructing a network. However, the use of existing cost information is inherently a backward-looking approach and, therefore, carries with it the danger that inappropriate (i.e., embedded or nonforward looking) costs will be utilized.

ATTORNEY GENERAL: The Attorney General recommended that the Commission require the BCPM proponents to submit model results using the BCPM defaults as inputs and compare those results with the Hatfield results and the company-specific results already submitted in this docket. The Attorney General recommended that the Commission then choose specific inputs that are cost appropriate in each case, confident that such cost appropriate inputs will fall somewhere between the input values advocated by the proponents of the two models.

PUBLIC STAFF: The ILECs' networks employ efficient technology and good engineering practices. The Commission should accept the ILECs' proposed user adjustable inputs where they are forward looking and reasonable. The Public Staff recommended modifications in some proposed ILEC inputs where it found that they were not forward looking and reasonable.

DISCUSSION

The Commission's goal is to determine inputs that would accurately reflect long-run, forward-looking economic costs, as required by the FCC. Either method of determining these costs, using current costs as the base, as proposed by BellSouth and Carolina/Central, or default values based on fresh estimates of the costs of network construction and operation, can be superior, depending on the care with which each is developed. The proposals of BellSouth and Carolina/Central deserve careful consideration because they represent verifiable and current costs of well-engineered networks that have provided a high quality of service. Examining current costs is certainly a reasonable first step in determining forward-looking costs. AT&T and MCI, however, pointed out plausible reasons why these proposed costs might be too high, given changes in the industry. First, ILECs have plans to become more efficient. These efficiency improvements are not reflected in the cost inputs, according to AT&T and MCI. Second, competition can be expected to spur additional innovation, efficiency improvements, and cost cutting not currently reflected in the proposals filed by the ILECs. While these are plausible scenarios, their true impact is speculative and thus demands that a very secure foundation of cause, mechanism, and potential effect be put in place. AT&T and MCI have not put in place a sufficient foundation for the Commission to accept their proposals. The Public Staff recommended the acceptance of the ILECs' proposed user adjustable inputs where they are forward-looking and reasonable. The Public Staff has also recommended adjustments to some costs proposed by the ILECs, and these recommendations are discussed under other issues.

CONCLUSIONS

The Commission concludes that company-specific inputs, where they are forward looking and reasonable, should be used in lieu of default values.

3(b): EXPENSE INPUTS

POSITIONS OF PARTIES

BELLSOUTH: The expense inputs used in BellSouth's exhibit are correct.

CAROLINA/CENTRAL: The expense inputs used in Carolina/Central's exhibit are correct.

GTE: The expense inputs used in GTE's exhibit are correct.

AT&T: Inputs should represent the Commission's best judgment as to the forward-looking costs of the most efficient technology that could be used to interconnect customers with existing wire center locations.

MCI: Hatfield 5.0 inputs are the appropriate inputs for use in the cost proxy models submitted to the FCC.

NCCTA: The NCCTA did not address the adjustments proposed by the Public Staff with specificity in its Brief. NCCTA did state that it is not clear whether the BCPM's estimate of operating expenses allegedly required to support universal service includes categories of expenses that are incurred mainly to provide competitive and/or discretionary services.

ATTORNEY GENERAL: The Attorney General addressed expense inputs in general in his Brief, but did not

discuss the Public Staff's proposed adjustments with specificity.

PUBLIC STAFF: In its Proposed Order, the Public Staff recommended certain adjustments to expense inputs. More specifically, the Public Staff recommended that expense inputs for Information Origination/Termination should be excluded from the FLEC studies of all three ILECs and that the following user adjustable inputs for GTE's expenses should be modified:

- a. Per line expenses: Network Support, General Support, Other Property Plant, Network Operations, Marketing, Services, Executive and Planning, and General and Administrative.
- b. Percentage of investment expenses: Poles, Aerial Fiber Cable, and Buried Fiber Cable.

DISCUSSION

The BCPM uses inputs for determining operating expenses on either a per line basis or as a percentage of the investment for the related expense. In some cases, the BCPM permits the use of either type of input for a particular expense. The per line expense inputs for all three ILECs include amounts for expenses recorded in Account 6310 (Information Origination/Termination) of the Uniform System of Accounts (USOA). The BCPM, however, does not include any investment associated with these expenses. Part 32 of the FCC's rules defines the amounts to be recorded in Account 6310 as expenses associated with investments in station apparatus, large private branch exchanges, public telephone terminal equipment, and other terminal equipment. The Commission agrees with the Public Staff that these are not investments or expenses that should be included as universal service costs.

The remaining adjustments, as proposed by the Public Staff, concern only GTE.

The record shows that GTE's proposed per line expenses are typically higher than the expenses proposed by either BellSouth or Carolina/Central. GTE's per line amounts are based on a calculation of the universal service expense associated with its 1996 expenses. These amounts are then divided by the number of access lines to obtain the desired per line expense amount. GTE's workpapers indicate that it used 321,139 access lines to calculate expenses on a per line basis. However, according to its 1996 Annual Report, GTE had 366,794 access lines in service in North Carolina. The Commission agrees with the Public Staff that GTE's proposed per line expenses are overstated and should be adjusted to reflect the higher number of access lines.

In addition, the Commission concurs with the position taken by the Public Staff that the per line amount for GTE's General Support expense should be adjusted to reflect the change in investment support associated with the account discussed above. This adjustment is accomplished by a pro rata reduction in the expense associated with Furniture and Office Equipment investments.

Another adjustment recommended by the Public Staff, which the Commission finds to be necessary, reasonable and appropriate, concerns Services expenses attributable to universal service. GTE has proposed a per line amount of \$2.44 compared to BellSouth's \$0.46 and Carolina/Central's \$0.73. GTE's workpapers indicate that a 73.4% factor was used but failed to state a basis for this factor. The workpapers filed by BellSouth indicate that an allocation factor of 11.78% was used based on the allocation of common line costs to this expense. Since the Services expenses per access line according to the Annual Reports filed by BellSouth, GTE, and Carolina/Central for the years 1994 through 1996 are relatively equal, it appears that the difference in the per line expense amounts is attributable to the discrepancy in the allocation factors. The Commission agrees with the Public Staff that the 73.4% factor used by GTE represents an unreasonably high allocation of Services expenses to universal service. Therefore, given the similarities between the operating conditions of GTE and Carolina/Central, the Commission concludes that the per line expense amount used by Carolina/Central is a reasonable amount for use in GTE's service area.

With respect to the expense percentage of investment inputs, the Commission concurs with the position taken by the Public Staff that three of the inputs proposed by GTE reflect unreasonable assumptions. First, the Poles expense reflecting 9.07% of the Poles investment is unusually large compared to GTE's historical Poles expense, which, according to its Annual Reports ranged from 1.10% to 2.20% of the associated poles investment. Thus, the Commission believes that the Poles expense amount used by Carolina/Central represents a more reasonable amount of Poles expense for GTE.

The other two inputs for GTE that the Public Staff argued should be adjusted concern the Aerial Fiber Cable and Buried Fiber Cable expense inputs. Unlike BellSouth and Carolina/Central, GTE did not differentiate between copper and fiber cable expenses.

BellSouth and Carolina/Central, however, proposed much lower expense factors for fiber cable than for copper cable. GTE's existing Aerial Cable and Buried Cable consists mostly of copper, according to its 1996 Annual Report. The overall Aerial Cable and Buried Cable expense factors therefore appear to be appropriate for copper cable, while overstating the expense cost associated with fiber cable. Because of the operating similarities between GTE and Carolina/Central, the Commission agrees with the Public Staff that the relationship between Carolina/Central's copper and fiber cable expenses provides a reasonable method for adjusting GTE's fiber cable expenses. Thus, GTE's Aerial Fiber Cable expense input should be adjusted to reflect the same relationship with GTE's Aerial Copper Cable that exists between Carolina/Central's Aerial Fiber Cable and its Aerial Copper Cable. Likewise, GTE's Buried Fiber Cable expense input should be adjusted to reflect the same relationship with GTE's Buried Copper Cable that exists between Carolina/Central's Buried Fiber Cable and its Buried Copper Cable.

CONCLUSIONS

The Commission concludes that, for the reasons set forth above, the expense input adjustments proposed by the Public Staff are reasonable and appropriate and that BellSouth, GTE, and Carolina/Central should make the appropriate revisions to their cost studies.

3(c): WIRE CENTER LINE COUNTS

POSITIONS OF PARTIES

BELLSOUTH: BellSouth filed its Proposed Order, Brief, and three Attachments on March 10, 1998. In Attachment 3, BellSouth presented its updated BCPM output to reflect that the number of lines by wire center have been adjusted to match the 4044 report (station development report), which is filed monthly with the Commission, based upon recommendations from the Public Staff.

CAROLINA/CENTRAL: Carolina/Central's FLEC study reflected the actual line count for each wire center. During cross-examination, Public Staff witness Garrison testified that he had found some errors in the line counts, but he agreed that Carolina/Central's revised data files on the actual access line inputs appear to be correct.

GTE: GTE did not address this issue with specificity in its Proposed Order or Brief.

AT&T: AT&T did not address this issue with specificity in its Proposed Order or Brief.

MCI: MCI stated that line counts at the wire center are estimated by HM 5.0 based on demographic data. The current release of the model has the capability to normalize residents and business line counts at the wire center level if this data is provided by the ILEC.

NCCTA: The NCCTA concurred with the Public Staff that the Commission should adopt a FLEC study which includes actual access line data for each wire center.

ATTORNEY GENERAL: The Attorney General did not address this issue with specificity in his Brief.

PUBLIC STAFF: The Public Staff recommended that the FLEC study inputs of all of the ILECs should include actual access line data for each wire center. In its Proposed Order, the Public Staff stated that none of the studies initially submitted by the parties were based on the ILEC's actual wire center line counts on file with the Commission. However, the Public Staff stated that Carolina/Central had now provided corrected information in this regard.

DISCUSSION

Public Staff witness Garrison testified that one of the crucial inputs to all of the FLEC studies is the number of access lines for each geographic area. This input goes toward determining the efficiencies that can be gained by serving

a specific area as well as the total costs that would be incurred in serving the area. Witness Garrison stated that, ideally, the Commission should require access line inputs to be the actual line counts for the geographic area for which costs are being calculated _ whether grid, Census Block, or Census Block Group _ but that none of the ILECs to his knowledge maintain access line counts below the wire center level. Thus, the Public Staff recommended that the FLEC study inputs of all of the ILECs should include actual access line data for each wire center. The Public Staff stated, in its Proposed Order, that none of the studies initially submitted by the parties are based on the ILECs' actual wire center line counts on file with the Commission. However, the Public Staff stated that Carolina/Central had now provided corrected information in this regard.

The positions set forth in the Proposed Orders and/or Briefs of BellSouth, Carolina/Central, and NCCTA, as noted above, support the Public Staff's position that actual wire center line counts should be used. BellSouth and Carolina/Central have now made revisions to reflect actual access line data for each wire center based upon recommendations from the Public Staff. However, GTE's inputs need to be revised to reflect actual access line data for each wire center in North Carolina.

CONCLUSIONS

The Public Staff's recommendation would be consistent with FCC Criterion No. 1 which states in part that ". . . [w]ire center line counts should equal actual ILEC wire center line counts. . . ." The Commission concludes that the Public Staff's recommendation requiring that the FLEC study inputs of all of the ILECs include actual access line data for each wire center is appropriate.

3(d): MATERIAL, INSTALLATION, AND LABOR COSTS / LOADING FACTORS

POSITIONS OF PARTIES

BELLSOUTH: BellSouth used current material prices, labor costs, and contractor costs that are adjusted by Telephone Plant Indices (TPIs) (inflation in certain accounts) to reflect 1997-1999 costs and do not reflect embedded costs.

CAROLINA/CENTRAL: Carolina/Central reflected the cost of cable and material actually used in provisioning cable facilities in the areas served by the Companies in North Carolina. The cost inputs were either derived from accounting records or were based on actual construction activity during 1996.

GTE: GTE reflected the default values of the BCPM 3.0 for material and installation to determine outside plant investment which are based on national average prices net of any discounts. GTE did not address this issue with specificity in its Proposed Order or Brief.

AT&T: AT&T adjusted the labor portion of the installation costs to reflect North Carolina wages, the terrain factors specific to each Census Block Group in North Carolina, and the customer and wire center locations to make them specific to North Carolina. The input values used are not the lowest prices attainable and are not an average of any prices.

MCI: MCI did not address this issue with specificity in its Proposed Order. MCI co-sponsored the HM 5.0 with AT&T.

NCCTA: The NCCTA recommended that the Commission determine whether the BCPM inputs for installation times and labor rates reflect historical experience (i.e., embedded costs) or are indicative of the forward-looking operations of an efficient carrier in a competitive market. The installation times and labor rates assumed in the HM are lower than those used in the BCPM.

ATTORNEY GENERAL: The Attorney General did not address this issue with specificity in his Brief.

PUBLIC STAFF: The Public Staff recommended that the Commission conclude that it is appropriate to require GTE in its FLEC study to use the inputs developed by Carolina/Central for its North Carolina service area instead of the BCPM 3.0 default values for loop fixed costs, structures (base cost, cost adjustment, and installation cost), and

material and installation costs for handholes, manholes, adder, and conduit.

DISCUSSION

According to the Public Staff, in its Proposed Order, default values for material and installation (which GTE applied in its study) are not state specific and do not have a direct relationship to North Carolina service area costs. The Public Staff argued that state specific costs for material and installation costs as developed by both BellSouth and Carolina/Central which are based on the Companies' experience of operating in North Carolina are superior to default values. The Public Staff advocated that one of the main purposes of a state adopting its own FLEC model for submission to the FCC is to ensure that state specific inputs are reflected when possible. In this instant case, evidence was presented by both BellSouth and Carolina/Central of state specific costs for material and installation. The Public Staff maintained that GTE and Carolina/Central have similar aspects such as substantial purchasing power, similar demographic characteristics, and comparable access lines per exchange. Therefore, the Public Staff stated that it is reasonable for the Commission to require GTE to reflect those state specific costs as represented by Carolina/Central for materials and labor in GTE's FLEC study.

GTE asserted in its summary of input differences filed March 10, 1998, that the Company views the default values as a reasonable representation of its costs until such time as it can develop the necessary company-specific inputs for North Carolina.

Carolina/Central stated in their Proposed Order that the cable material prices and construction costs included in the BCPM 3.1 reflect the ILECs' cost of cable and material actually used in provisioning cable facilities in the areas served by those Companies in North Carolina. Carolina/Central stated that the HM national default inputs were developed for nationwide application by a small group of engineers paid by AT&T and MCI. Carolina/Central argued that the national default inputs used in the HM are inferior to the actual costs reflected by the ILECs.

AT&T stated, in its Proposed Order, that BellSouth contacted no outside vendors to solicit price quotes to be used in its model and, therefore, does not know what prices are obtainable in the current market. Additionally, AT&T stated that BellSouth's contractor installation costs do not take into account current market prices for such installation but rather uses "averages" of contracts of varying ages. Concerning material costs, AT&T asserted, in its Proposed Order, that BellSouth's conduit and manhole costs are significantly higher than costs available in the market, with conduit costs also being significantly higher than the BCPM default prices derived from ILEC data.

Material loading factors are applied to material costs in order to determine the installed investment. According to AT&T's Proposed Order, BellSouth's methodology is to calculate a ratio of these associated expenses to its nonexempt (major) material investments for 1995, and then multiply this ratio by the direct cable material cost. AT&T asserted that the loading factors tremendously inflate BellSouth's material price inputs and are the most insidious contributor to the overstatement of costs reflected in BellSouth's installed material prices. AT&T further stated that the loading factors are based on BellSouth employee work times and exempt material usage recorded in a monopoly environment; therefore, the loading factors are unadjusted for the forward-looking assumptions contained in BellSouth's own cost studies.

Additionally, AT&T witness Wells, in rebuttal testimony, argued that BellSouth's outside plant loadings are not forward looking and instead attempt to recover the costs of BellSouth's past methods of operations. Witness Wells asserted that many of BellSouth's loadings have been developed based on BellSouth's embedded investment and its 1995 costs and investments. Further, witness Wells expressed concern with BellSouth's cost modeling methodology of its loadings. Witness Wells stated that BellSouth applies a material loading factor to the inflated direct material cost for copper and fiber cables in its outside plant Field Reporting Codes (FRC). BellSouth calculates a ratio of these associated expenses to its nonexempt (i.e., major) material investments for the year 1995, and then multiplies this ratio by the direct cable material cost. Witness Wells argued that BellSouth's material loading factors for cable are a large contributor to the total loop investment. Witness Wells recommended that the material factors ratios be reduced to a ratio of 1.5, which is consistent with the HM's assumptions.

The Commission concurs with the recommendation and justification advocated by the Public Staff in its Proposed Order to require GTE to reflect those state specific costs as represented by Carolina/Central for materials and labor in GTE's FLEC study.

CONCLUSIONS

The Commission concludes that North Carolina specific data is the most forward-looking and reasonable and is thus superior to default inputs. Therefore, the Commission orders GTE to reflect Carolina/Central's state specific costs for material and installation costs for loop fixed costs, structures (base cost, cost adjustment, and installation cost), and material and installation costs for handholes, manholes, adder, and conduit in GTE's FLEC study.

3(e): SUPPORT RATIOS

POSITIONS OF PARTIES

BELLSOUTH: BellSouth did not address this issue with specificity in its Proposed Order or Brief. BellSouth supported the BCPM and used BellSouth-specific support investment ratios for input into BCPM using forward-looking projected assets.

CAROLINA/CENTRAL: Carolina/Central did not address this issue with specificity in their Proposed Order or Brief. Carolina/Central support the BCPM and the North Carolina-specific inputs developed for use therein.

GTE: GTE did not address this issue with specificity in its Proposed Order or Brief. GTE supports the BCPM and the North Carolina-specific inputs developed for use therein.

AT&T: AT&T did not address this issue with specificity in its Proposed Order or Brief.

MCI: MCI did not address this issue with specificity in its Proposed Order.

NCCTA: The NCCTA did not address this issue with specificity in its Brief.

ATTORNEY GENERAL: The Attorney General did not address this issue with specificity in his Brief.

PUBLIC STAFF: The record indicates that the support ratios proposed by GTE for the Furniture and Office Support accounts are substantially higher than those proposed by BellSouth and Carolina/Central. The Public Staff recommended that the support ratio inputs into the BCPM 3.1 for the calculation of GTE's Furniture and Office Support investments should be those proposed by Carolina/Central.

DISCUSSION

The BCPM 3.1 does not directly determine the investments associated with the support accounts. Instead, support ratios are calculated separately and then applied to the total plant investment, excluding land and buildings, developed by the BCPM in order to produce an investment level for each of the support plant categories. The record indicates that the support ratios proposed by GTE for the Furniture and Office Support accounts are substantially higher than those proposed by BellSouth and Carolina/Central: more than six times higher for Furniture investment and more than four times higher for Office Support investment. The Public Staff stated, in its Proposed Order, that it could not rationalize such a disparity and therefore recommended that the support ratio inputs into the BCPM 3.1 for the calculation of GTE's Furniture and Office Support investments should be those proposed by Carolina/Central. The following table shows the ILEC's support ratios proposed for Furniture investment and Office Support investment:

ILEC	Furniture	Office Support
BellSouth	0.125%	0.281%
Carolina/Central	0.209%	0.576%
GTE	1.255%	2.519%

In consideration of the similarities between GTE and Carolina/Central, such as both having substantial purchasing power, similar demographic characteristics, having 65.6%-GTE and 67.2%-Carolina/Central of their respective exchanges serving less than 5,000 access lines, and having 93.8%-GTE and 93.5%-Carolina/Central of their respective

exchanges serving less than 20,000 access lines, the Commission believes that the Public Staff's proposal is reasonable.

CONCLUSIONS

The Commission adopts the Public Staff's recommendation in this regard. The Commission concludes that the support ratio inputs into the BCPM 3.1 for the calculation of GTE's Furniture and Office Support investment should be those proposed by Carolina/Central which are 0.209% and 0.576%, respectively.

3(f): STRUCTURE SHARING

POSITIONS OF PARTIES

BELLSOUTH: BellSouth reflected structure sharing percentages of 1% for conduit (1% paid for by carrier other than BellSouth); 0% for buried feeder; 1% for buried distribution; 63.87% for poles; 0% for anchors and guys; and 1% for manholes. Buried and underground sharing percentages are based upon BellSouth's engineers' experience and expertise.

CAROLINA/CENTRAL: Carolina/Central reflected default structure sharing percentages based on the actual experience of ILECs under such sharing arrangements of 0% -20% for conduit; 0% -15% for buried feeder; 0%-20% for buried distribution; 50% for poles; 0% for anchors and guys; and 0%-25% for manholes. Carolina/Central used default inputs based on the actual experience of the ILECs to give a realistic estimate of the cost savings that can be realized through such sharing arrangements.

GTE: GTE reflected a structure sharing percentage of 44% for aerial support structures; 7% for buried feeder and distribution cable; and 0% for conduit based on the Company's actual operating experience as well as the expertise of its engineers.

AT&T: AT&T reflected a structure sharing percentage of 67% for buried distribution cable; 60% for buried feeder cable; 67% for conduit; 50% -75% for poles; and 50% -75% for guys and anchors. AT&T argued that increased competitive pressures will increase ILEC structure sharing and that the structure sharing assumptions made by the ILECs do not reflect a forward-looking network.

MCI: MCI did not address this issue with specificity in its Proposed Order. MCI co-sponsored the HM 5.0 with AT&T.

NCCTA: The NCCTA recommended that the Commission assign a user input value for structure sharing in each model that is more representative of forward-looking conditions. The BCPM sponsors' absolute reliance on current practice is not reflective of a forward-looking and efficient cost analysis. However, it is doubtful whether the degree of structure sharing envisioned by the HM sponsors will materialize immediately or even in the near future.

ATTORNEY GENERAL: The Attorney General recommended in his Brief that the Commission adopt structure sharing amounts that fall midway within the range bounded by the testimony of the two sides (ILECs and AT&T/MCI).

PUBLIC STAFF: The Public Staff did not address this issue with specificity in its Proposed Order.

DISCUSSION

Structure sharing refers to the allocation of costs from the ILEC to other providers that may share space on the ILEC's structures including poles, conduits, cable, and manholes. The parties presented various percentages for structure sharing: the ILECs with lower structure sharing percentages and AT&T/MCI with higher structure sharing percentages.

BellSouth witness Caldwell stated in rebuttal testimony that BellSouth's structure sharing projections included in the BCPM 3.1 reflect actual arrangements between BellSouth and other parties in North Carolina. Witness Caldwell asserted that BellSouth shares structures when possible and that BellSouth's inputs for structure sharing are appropriate.

According to BellSouth's Proposed Order, AT&T (HM 5.0) assumes that an ILEC will share buried support structures for distribution cable with other companies one-third of the time. BellSouth asserted that the sharing factor was developed by the Hatfield input team, and that the input team's validation process did not reveal a single telephone company in North America that had achieved a 33% sharing factor.

During the hearing, on redirect, BellSouth witnesses Madan, Dirmeier, and Newton testified that the structure sharing percentages used in the HM were not national inputs but "simply an assertion". The BellSouth witnesses also stated that the HM assertion has no backup.

Carolina/Central stated, in their Proposed Order, that the actual experience of the ILECs under such sharing arrangements has been factored into the BCPM 3.1 to provide a realistic estimate of the cost savings that can be realized through such sharing arrangements. Carolina/Central criticized the HM which uses projected structure sharing based on predicted competitive pressures for the ILECs to engage in more structure sharing arrangements. Carolina/Central stated that AT&T witness Wells on cross-examination admitted that some of the structure sharing assumptions incorporated into the HM have not been achieved by any other telecommunications carrier providing local service anywhere in North America. Carolina/Central argued that the HM uses inputs for structure sharing that were developed by a small group of engineers that were paid by AT&T. Carolina/Central argued that the structure sharing inputs that were developed by engineers responsible for the actual placement of telecommunications facilities in North Carolina are superior to those inputs used in the HM.

AT&T witness Wells stated in his rebuttal testimony that for aerial structure sharing, the HM shows considerably more structure sharing in the urban area than in the rural area because the HM postulates that in the future, there will be more utilities to share with in the urban area than in the rural area. Witness Wells stated that the ILECs have input less structure sharing in the urban area than the rural area and that the ILECs have provided no supporting documentation to explain the ILECs reverse modeling logic. For underground feeder conduit structure sharing, witness Wells stated that "the ILECs' viewpoint in regards to minimal or zero structure sharing is totally unreasonable for a least-cost, most-efficient, forward-looking model". Witness Wells argued that in a competitive environment, telephone companies will seek ways to lower their costs by structure sharing with other utilities. Witness Wells argued that there will also be additional utilities in the market during competition with which the ILECs could structure share.

NCCTA witness Barta testified during cross-examination by the Attorney General that he finds merits in blending the inputs from both the BCPM and the HM to come up with a form of hybrid inputs.

The Attorney General noted in his Brief that the ILECs did a fair amount of sharing of aerial plant (poles), however, the input values they put into sharing buried and underground structures was minimal. The Attorney General also noted that BellSouth witness Caldwell testified that BellSouth intended to look into structure sharing in the future, and BellSouth will try to share as much as possible. Additionally, Carolina/Central witness Potter testified that as competitors enter the market, more underground facilities would be shared. The Attorney General also commented that the ILECs were firm in their opinion that because the FCC requires that FLEC models duplicate current wire centers ("scorched node"), it is too late to reasonably expect that any appreciable amount of structure sharing will occur. The Attorney General concluded in his Brief that both sides appear to have unrealistic structure sharing percentages, and recommended that the Commission adopt percentages that fall midway within the range recommended by both the ILECs and AT&T/MCI.

The Commission believes that the structure sharing percentages recommended by both the ILECs and AT&T/MCI are unreasonable. The Commission finds that the ILECs' position concerning the scorched node approach does not fully support the structure sharing percentages advocated by the ILECs. Additionally, the percentages reflected by AT&T/MCI are certainly too aggressive and have not been achieved by any telecommunications carrier in North America. Therefore, the Commission believes that it would be reasonable and appropriate to reflect structure sharing percentages that fall between the percentages advocated by the ILECs and AT&T/MCI to capture a realistic, future-looking amount of structure sharing.

CONCLUSIONS

The Commission concludes that the ILECs should be required to input structure sharing percentages into their cost models that fall midway between their proposed percentages and the percentages proposed by AT&T/MCI in the HM

3(g): STRUCTURE MIX

POSITIONS OF PARTIES

BELLSOUTH: BellSouth argued in its Proposed Order and Brief that the HM 5.0 does not place telephone poles as a part of the model's aerial structure in the two highest density zones.

CAROLINA/CENTRAL: Carolina/Central used structure mix percentages based on an analysis of existing Carolina/Central facilities in North Carolina. However, this issue was not addressed with specificity in their Proposed Order or Brief.

GTE: GTE reflected its actual plant mix in North Carolina.

AT&T: AT&T reflected structure mix percentages based on the density zone (lines per square mile), soil conditions, and size and number of cables required.

MCI: MCI did not address this issue with specificity in its Proposed Order. MCI co-sponsored the HM 5.0 with AT&T.

NCCTA: The NCCTA did not address this issue with specificity in its Brief.

ATTORNEY GENERAL: The Attorney General did not address this issue with specificity in his Brief.

PUBLIC STAFF: The Public Staff did not address this issue with specificity in its Proposed Order.

DISCUSSION

Structure mix represents the percentage of aerial, buried, and underground cable for distribution cable, copper feeder cable, and fiber feeder cable. The ILECs used structure mix percentages that are based on the Companies' experience of operating in North Carolina. AT&T and MCI used the HM inputs that are based on the recommendation of the Hatfield Inputs Group.

Structure mix is input based on distribution plant, copper plant, and fiber plant. Additionally, structure mix is input based on soil conditions (normal, soft, or hard) and density of area.

During cross-examination by AT&T, BellSouth witnesses Madan, Dirmeier, and Newton confirmed that BellSouth's structure mix percentages are based on the BellSouth-North Carolina loop sample reconfigured to reflect forward-looking technology in a scorched-node approach.

Based on the evidence of record in this proceeding, the Commission finds the structure mix percentages used by the ILECs reasonable and appropriate.

CONCLUSIONS

The Commission concludes that the structure mix percentages used by BellSouth, Carolina/Central, and GTE are reasonable and appropriate for use in this proceeding.

3(h): FILL FACTORS / DENSITY CABLE SIZING FACTORS

POSITIONS OF PARTIES

BELLSOUTH: BellSouth utilized fill factors based on projected actual utilization rates specific to BellSouth facilities in North Carolina. No BellSouth data is available to provide varying fill factors by density zone. BellSouth

used cable sizing factors in BCPM to produce actual fill levels approximately equal to BellSouth's projected fill levels for copper cable. These factors are used to determine the appropriate cable sizes to be deployed.

CAROLINA/CENTRAL: Carolina/Central reflected fill factors that are based on projected utilization rates specific for Carolina/Central's operations in North Carolina. The projected rates used reflect the anticipated growth rate of the area served, the spare capacity necessary to comply with the service obligations mandated by the Commission, and the economic placement and sizing of cable facilities.

GTE: Cost studies should reflect an average level of utilization for distribution and feeder for the specific company conducting the study. GTE's feeder and distribution-cable fill factors of 65% and 40%, respectively, represent the upper bounds for average fills for these types of investment.

AT&T: AT&T recommended that the HM default inputs be used. AT&T stated that the cables sized by the fill factors in HM 5.0 have sufficient spare capacity to accommodate reasonable administration, maintenance, defective pair, and customer churn requirements.

MCI: MCI did not address this issue with specificity in its Proposed Order. MCI recommended that the HM default inputs be used.

NCCTA: The NCCTA stated that the appropriate fill or cable sizing factors used by the Commission in the cost proxy model should balance current and expected demand levels for the supported universal services as well as accommodate the requirements for administrative and modular related spare capacity over the economic life of the feeder and distribution facilities.

ATTORNEY GENERAL: The Attorney General stated that the costs of some excess plant is needed, but in this instance, input values for distribution plant utilization, which are closer to the HM inputs than the GTE or BellSouth inputs, may be appropriate inputs to use.

PUBLIC STAFF: The Public Staff stated that there was a significant difference between GTE's cable-sizing factors and those of BellSouth and Carolina/Central, especially with regard to distribution. The Public Staff recommended that the appropriate cable sizing factors for GTE should be 69% for feeder and 65% for distribution.

DISCUSSION

BellSouth witness Caldwell testified that in developing the cost of the network, BCPM requires a cable sizing factor which, along with standard cable sizes and number of distribution pairs per housing unit [Part No. 3(i)] determines cable requirements. BellSouth used North Carolina specific cable sizing factors consistent with BellSouth engineering guidelines to determine cable sizes. BellSouth's inputs for cable sizing factors are designed to produce an actual utilization equal to BellSouth's projection of actual fill, based on experience over time, for North Carolina. BellSouth argued that its projections of actual fill are the appropriate utilization levels which should be used to determine universal service costs since BellSouth's utilization levels represent a realistic view of efficient utilization of telephone plant.

Average fill rates must be considered in order to ensure full recovery of the costs of cable, including spare. BellSouth stated that its cable fill percentages have not changed significantly in the past and are not projected to change in the future. Therefore, one would expect forward-looking cable fill percentages to be maintained at the same level as current fill percentages.

Carolina/Central reflected fill factors that are based on projected utilization rates specific for Carolina/Central operations in North Carolina. The projected rates used reflect the anticipated growth rate of the area served, the spare capacity necessary to comply with the service obligations mandated by the Commission, and the economic placement and sizing of cable facilities.

GTE reflected fill factors that are based on an average level of utilization for distribution and feeder cable. GTE used feeder and distribution cable sizing factors that represented the upper bounds for average fills for these types of investment.

AT&T and MCI recommended that the HM default inputs be used. AT&T stated that the cables sized by the fill factors in HM 5.0 have sufficient spare capacity to accommodate reasonable administration, maintenance, defective pair, and customer churn requirements.

AT&T argued that the BCPM proponents are using actual or average utilization which is based on the inefficiencies of the embedded network and backward looking engineering guidelines. It is AT&T's opinion that the BCPM, by using actual cable utilization as the cable sizing factor, grossly overstates cable sizing requirements. AT&T stated that BellSouth's fill factors are inflated, for example, 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. Additionally, AT&T stated that GTE has incorrectly utilized its average distribution utilization as the fill factor in BCPM.

On cross-examination by AT&T, BellSouth witness Caldwell testified that the smallest cable size BellSouth deploys is a 25-pair cable which is related to "inventorying and just having the facilities there". She also stated that the cost of cable as you go from 18 to 25-pair is not significant.

The Attorney General observed that while it is true that a well-managed telecommunications company will install excess cable in the ground to save costs when new customers are added later, it is equally true that forward-looking economic cost studies must use reasonable assumptions when calculating the costs for universal service support. The Attorney General agreed that the costs of some excess plant or spare capacity is certainly needed in a FLEC study to reflect the need for maintenance and repair of distribution plant. However, the Attorney General stated that in this instance, input values for distribution plant utilization which are closer to the HM inputs than the GTE or BellSouth inputs may be the appropriate inputs to use.

The NCCTA stated that the appropriate fill or cable sizing factors used by the Commission in the cost proxy model should balance current and expected demand levels for the supported universal services as well as accommodate the requirements for administrative and modular related spare capacity over the economic life of the feeder and distribution facilities.

The cable sizing factors used in the BCPM are derived to produce the utilization ratios that the ILECs currently experience and believe are reasonable on a forward-looking basis. The following table shows the ILECs' cable sizing factor inputs along with the BCPM default values and the HM default values:

ILEC / MODEL	Feeder	Distribution
BellSouth	73.1%	66.7%
Carolina/Central	69%	85%
GTE	65%	40%
BCPM Default (based on density zone)	75% - 85%	40% - 80%
HM Default (based on density zone)	65% - 80%	50% - 75%

All three ILECs represented to the Commission that their inputs are correct. In its Proposed Order, the Public Staff stated that the record contains no justification, however, for the significant difference between GTE's cable sizing factors and those of the others. Concluding that GTE's factors should be adjusted upward to more reasonable levels, the Public Staff determined that GTE's feeder cable sizing factor should be comparable to Carolina/Central's, given the relative densities of their service territories, and that GTE's cable sizing factor for distribution should be somewhat lower than its factor for feeder. (Carolina/Central's cable sizing factor for distribution, while higher, is near the upper end of the default range.) The Public Staff recommended that the appropriate cable sizing factors for GTE should be 69% for feeder and 65% for distribution.

Considering the relative densities of GTE's and Carolina/Central's service territories and the range of cable sizing factors for feeder and distribution cable, the Commission believes that the Public Staff's proposal is reasonable.

CONCLUSIONS

The Commission adopts the Public Staff's recommendation in this regard. The Commission concludes that the

appropriate cable sizing factors for GTE are 69% for feeder and 65% for distribution.

3(i): DISTRIBUTION PAIRS PER RESIDENTIAL HOUSING UNIT

POSITIONS OF PARTIES

BELLSOUTH: BellSouth used a factor of 1.6 in its FLEC study filed in this proceeding.

CAROLINA/CENTRAL: Carolina/Central used the BCPM default value of 2.0 pairs per housing unit.

GTE: GTE used the BCPM default value of 2.0 pairs per housing unit.

AT&T: AT&T recommended that the BCPM 3.1 input value for distribution pairs per residential housing unit be reduced to conform to BellSouth's policy based on 1.4 to 1.6 pairs per house or living unit.

MCI: MCI did not address this issue with specificity in its Proposed Order.

NCCTA: The NCCTA did not address this issue with specificity in its Brief.

ATTORNEY GENERAL: The Attorney General did not address this issue with specificity in his Brief.

PUBLIC STAFF: The Public Staff recommended that an input value higher than 1.4 is not justified for residential locations.

DISCUSSION

The model input value for average number of distribution pairs per residential housing unit affects the engineering and sizing of outside cable plant to connect subscribers to wire center switching equipment. AT&T witness Wells testified that BellSouth currently designs its distribution plant based on 1.4 to 1.6 pairs per house or living unit and has used a factor of 1.6 in the study filed in this proceeding. Witness Wells recommended that the BCPM 3.1 input value for distribution pairs per residential housing unit be reduced to conform to BellSouth's policy. He also recommended that Carolina/Central and GTE, both of which used the BCPM default value of 2.0 pairs per housing unit in their studies, make a commensurate reduction.

The Commission agrees with the position taken by the Public Staff in its Proposed Order that no explanation can be found in the record for the differences between the input values used by the ILECs in their studies. Calculations based on BCPM summary report data show the ratios of the number of residential lines in service to the total number of households served were 1.02 for Central, 1.09 for Carolina, and 1.12 for GTE and BellSouth, well below the proposed 1.6 to 2.0 factors. In light of these ratios, the Commission concurs with the Public Staff that a factor of 1.4 appears to be entirely reasonable for determining the forward-looking costs of all of the ILECs. Furthermore, it is worth remembering that the BCPM models a network to serve all housing units whether or not they currently have telephone service. Applying a 1.4 factor to 100% of all housing units when statewide penetration rates are around 93% results in an effective factor of 1.5. Even if penetration rates improve to 97% with the promotion of Lifeline and Link-Up programs, the effective factor would be 1.44.

CONCLUSIONS

The Commission concludes that an input value higher than 1.4 is not justified for residential locations and that BellSouth, GTE, and Carolina/Central should adjust this input value accordingly in each of their respective studies.

3(j): SWITCHING

POSITIONS OF PARTIES

BELLSOUTH: BellSouth did not address this issue with specificity in its Proposed Order or Brief. BellSouth supports the BCPM and used North Carolina-specific switch costs.

CAROLINA/CENTRAL: Carolina/Central did not address this issue with specificity in their Proposed Order or Brief. Carolina/Central support the BCPM and used North Carolina-specific switch costs.

GTE: GTE did not address this issue with specificity in its Proposed Order or Brief. GTE used the BCPM default inputs for switch costs.

AT&T: AT&T did not address this issue with specificity in its Proposed Order or Brief.

MCI: MCI did not address this issue with specificity in its Proposed Order.

NCCTA: The NCCTA did not address this issue with specificity in its Brief.

ATTORNEY GENERAL: The Attorney General did not address this issue with specificity in his Brief.

PUBLIC STAFF: The Public Staff recommended that Carolina/Central's proposed inputs to the Switching Discount Factor Table should be used by GTE as its inputs to the BCPM 3.1, rather than the default values used by GTE. Additionally, for switch related investments, the Public Staff recommended that Carolina/Central's proposed inputs for land loading, building loading, and the common equipment/power factors should be used by GTE, rather than the default values.

DISCUSSION

GTE used the BCPM 3.0 default values as the inputs to the Switching Discount Factor Table used in calculating the level of switching investment needed to provide universal service. A comparison of the default values to the service area specific values used by Carolina/Central reveals that the default percentages are lower. The discount percentages should be representative of the actual vendor discounts applied when switching equipment is purchased by GTE. Because of certain similarities, the Public Staff believes that GTE should be able to purchase switching equipment at discounts comparable to those received by Carolina/Central. Therefore, the Public Staff concluded that Carolina/Central's proposed inputs to the Switching Discount Factor Table should be used by GTE as its inputs to the BCPM 3.1.

GTE also proposed the BCPM 3.0 default values as the inputs for determining additional switch related investments. The Public Staff also recommended that GTE should use the inputs developed by Carolina/Central for land loading, building loading, and the common equipment/power factor.

The ILECs' Switching Discount Factor Tables for switch costs were provided by BellSouth and Carolina/Central as proprietary information. Accordingly, the switching discount factors are not shown in this Order.

The following table shows the ILECs' inputs for land loading, building loading, and the common equipment/power factor inputs for determining additional switch related investments :

ILEC	LAND LOADING	BUILDING LOADING	COMMON EQUIP./ POWER FACTOR
BellSouth	0.0119	0.1607	0.0874
Carolina/Central	0.0128	0.1479	0.0476
GTE	0.0117	0.0738	0.0682

In consideration of the similarities between GTE and Carolina/Central, such as both having substantial purchasing power, similar demographic characteristics, having 65.6%-GTE and 67.2%-Carolina/Central of their respective exchanges serving less than 5,000 access lines, and having 93.8%-GTE and 93.5%-Carolina/Central of their respective exchanges serving less than 20,000 access lines, and considering that GTE used default values rather than developing North Carolina-specific inputs in this regard, the Commission believes that the Public Staff's proposal is reasonable.

CONCLUSIONS

The Commission adopts the Public Staff's recommendation in this regard. The Commission concludes that Carolina/Central's proposed inputs to the Switching Discount Factor Table should be used by GTE as its inputs to the BCPM 3.1 and that GTE should use the inputs developed by Carolina/Central of 0.0128 for land loading, 0.1479 for building loading, and 0.0476 for the common equipment/power factor.

3(k): DEPRECIATION

POSITIONS OF PARTIES

BELLSOUTH: BellSouth reflected estimated lives and salvage values that represent BellSouth's expected economic lives for newly placed plant, instead of FCC prescribed lives. Lives were last prescribed by the FCC for North Carolina in 1995 and are much too long, particularly for technology-sensitive accounts.

CAROLINA/CENTRAL: Carolina/Central stated that the depreciation lives and salvage estimates prescribed by the FCC for embedded assets deployed in a monopoly environment are inappropriate for a FLEC study. Carolina/Central reflected the economic life for some network assets such as cable, switching equipment, and conduit taken from estimates developed by Technology Futures, Inc. (TFI). Where the projected life approved by the North Carolina Utilities Commission was within the range projected by TFI, the life estimate authorized by the North Carolina Utilities Commission was used.

GTE: GTE proposed the use of GTE's economic depreciation lives as model inputs. These lives reflect the physical life of the associated assets, as well as the changes in market value due to changing demand conditions and technology and are the same lives used on its financial books.

AT&T: AT&T recommended that the Commission find that the projected lives most recently prescribed by the FCC for BellSouth North Carolina and GTE North Carolina are the most realistic, specific estimates of economic lives. Further, AT&T recommended that the Commission find that the ILECs' book lives are inappropriate for use in calculating universal service costs.

MCI: MCI reflected the lives and salvage values prescribed by the FCC for BellSouth-North Carolina in 1995 and GTE-North Carolina in 1996 and nationwide averages of FCC prescriptions for Carolina/Central.

NCCTA: The NCCTA recommended that the Commission reject BellSouth's, Carolina/Central's, and GTE's proposal to apply economic lives outside of the FCC's prescribed range and substitute in their place economic lives and net salvage percentages within the FCC-authorized range.

ATTORNEY GENERAL: The Attorney General took no position on what depreciation inputs are appropriate to adopt in this proceeding. The Attorney General suggested that if the FCC defaults are used for cost of capital, then the FCC defaults should also be used for depreciation.

PUBLIC STAFF: The Public Staff recommended that the ILECs be allowed to select any inputs that are within the FCC's prescribed range for economic lives and salvage values. For buildings, in which no range exists, the ILECs may use their proposed inputs.

DISCUSSION

Paragraph 250 of the FCC's USO outlines the ten criteria a FLEC study must meet in order to be used to determine the cost of universal service for a particular state. Criterion No. 5 states:

"Economic lives and future net salvage percentages used in calculating depreciation expense must be within the FCC-authorized range...We intend shortly to issue a notice of proposed rule making to further examine the Commission's depreciation rules."

BellSouth witness Caldwell stated in direct testimony that there appears to be a conflict in the FCC guidelines.

Witness Caldwell stated that the FCC's USO requires studies to be based on forward-looking economic costs, however, the FCC-authorized range of lives are clearly not forward-looking economic lives.

However, BellSouth witness Caldwell stated in rebuttal testimony that BellSouth did not file the supporting depreciation studies to document its recommended projected lives and future net salvage values.

Carolina/Central stated, in their Proposed Order, that the North Carolina Utilities Commission has traditionally allowed depreciation rates higher than those authorized by the FCC. Carolina/Central argued that because of this, North Carolina enjoys one of the most modern telecommunications infrastructures anywhere in the nation. The Companies' stated that they have included in the recommended BCPM cost study the life and salvage estimates for network assets that reflect the greater technological obsolescence that will result in the future from an increasingly competitive market. The BCPM, the Companies' argued, incorporates a depreciation policy that encourages investment in new technology.

GTE asserted in its summary of input differences that the FCC's depreciation lives and net salvage values should not be considered as they are not forward-looking, because they are based on Orders by the FCC issued prior to the passage of the Telecommunications Act.

AT&T, in its Proposed Order, argued that the FCC rates are realistic and unbiased toward any party to the proceeding. AT&T stated that the FCC has been tracking technology changes since the early 1980's, and the collective experience of the FCC in determining appropriate rates is well-established. AT&T also stated, in its Proposed Order, that a comparison of the FCC-prescribed North Carolina lives to the historic lives that BellSouth and GTE attached to their testimony confirms that the FCC has shortened lives considerably to reflect rapidly changing technology. AT&T stated that BellSouth used lives based on the "book lives" BellSouth utilizes for public reporting purposes which are based on Generally Accepted Accounting Principles (GAAP). GAAP, AT&T argued, requires ILECs to err on the side of shorter lives to eliminate any possibility that BellSouth could overstate the value of its assets to stockholders.

The Attorney General recommended that if the FCC's default depreciation rates are used, then the FCC's default for cost of capital should also be used.

Public Staff witness Garrison presented a schedule in the record of evidence in this proceeding which outlines the projected lives and future net salvage values supported by BellSouth, GTE, and Carolina/Central versus the projected lives and future net salvage values prescribed by the FCC (Exhibit No. JTG-5 - Revised, Pages 1-2 as attached to revised direct testimony of witness Garrison). In its Proposed Order, the Public Staff advocated that the Commission has no choice but to require depreciation rate inputs that are within the FCC's range for purposes of the FLEC studies that will be submitted to the FCC.

Based on the FCC's criterion, in order for any FLEC study submitted by the North Carolina Utilities Commission to be adopted by the FCC, the economic lives and salvage values must be within the FCC-authorized range. Therefore, based on the USO, the rates proposed by the ILECs must be revised to fall within the FCC-authorized range.

CONCLUSIONS

The Commission concludes that it is appropriate to require the ILECs to select economic lives and future net salvage percentages that are within the FCC-authorized range in order to comply with FCC Criterion No. 5 of the FCC's prescribed ten, cost-study criteria. For buildings, in which no range exists, the Commission concludes that the ILECs may use their proposed inputs.

3(1): SHARED AND COMMON COSTS

POSITIONS OF PARTIES

BELLSOUTH: In BCPM 3.1, BellSouth assigned a portion of certain general expense categories to universal service by using ARMIS data to develop relationships of expenses assigned to common line and local switching relative to the Company's total regulated expenses. This provides a much more appropriate method of assignment of these expenses than does a ratio based on revenues.

CAROLINA/CENTRAL: Carolina/Central did not specifically address this issue in their Brief or Proposed Order.

GTE: GTE defers to BellSouth and Sprint, developers of the BCPM.

AT&T: The Commission should reject BellSouth's shared and common cost factors because these factors reflect costs incurred in BellSouth's embedded network, do not comport with least-cost, forward-looking principles, and do not make appropriate forward-looking adjustments for even known efficiencies which BellSouth intends to incorporate in its operations going forward. The Hatfield Model, sponsored by AT&T, systematically assigns "joint and common" costs to the services and/or network elements being studied. Expenses that traditionally (and incorrectly) have been treated as fixed overhead expenses have been assigned directly as variable expenses in proportion to investments or line counts as appropriate.

MCI: Hatfield 5.0 systematically assigns so-called "joint and common" costs to the services and/or network elements being studied.

NCCTA: The NCCTA did not specifically address this issue in its Brief.

ATTORNEY GENERAL: The Attorney General did not specifically address this issue in his Brief.

PUBLIC STAFF: The Public Staff recommended downward adjustments to GTE's expenses, including allocation of costs to universal service.

DISCUSSION

One of the FCC criteria for approval of a state-conducted cost study is that a reasonable allocation of joint and common costs must be assigned to the cost of supported services. BellSouth presented its discussion of its assignment of general expenses in the Supplemental Direct Testimony of witness Caldwell. Witness Caldwell testified that the total expenses filed in the BCPM 3.1 study have not changed from those filed in the BCPM 2.5 study. Also, plant-specific expenses expressed as a percentage of investment have not changed. However, the portion of the general expenses (expressed as an expense per line per month in BCPM) assigned to universal service has changed. In previous BCPM filings, BellSouth assigned a portion of expenses to universal service based on a ratio of Basic Local Service Revenues to Total Operating Revenues. In order to better attribute an appropriate portion of these expense accounts to universal service, this ratio based on revenues is no longer used. In BCPM 3.1, BellSouth used ARMIS cost data to assign expenses to universal service. The expense accounts affected include Network Support, General Support, Other Property and Plant Equipment, Network Operations, Marketing, Services, Executive and Planning, and General and Administrative. BellSouth assigned a portion of these general expense categories to universal service by using ARMIS data to develop relationships of expenses assigned to common line and local switching relative to the Company's total regulated expenses. Witness Caldwell testified that this provides a much more appropriate method of assignment of these expenses than does a ratio based on revenues.

AT&T maintained that the joint and common costs proposed by BellSouth are too high and do not reflect possible improvements and efficiencies. AT&T's points were made through rebuttal testimony of witness Lerma. Witness Lerma stated that the Commission should not rely on the method by which BellSouth, GTE, and Carolina/Central have calculated the operating expenses reflected in basic cost per line for two reasons. First, the operating expense inputs are based largely on historic costs and are not reflective of competitive costs. Second, the factors used to calculate the basic service portion of total operating expenses are overstated and are not adequately supported or proven to be reasonable. With regard to his second point, witness Lerma noted that BellSouth has changed its methodology. In earlier versions of BCPM, BellSouth had used a factor of 38%, which represented basic local service revenues as a percent of total revenues. In the current version, BellSouth used individual factors for the various costs that are not documented or supported. Witness Lerma objected to BellSouth using new factors that result in higher costs. He recommended that if the Commission adopts BCPM it should use the 38% factor that represented basic local service as a percent of total revenue, the methodology that BellSouth had used previously.

Witness Lerma stated that his recommended input changes would not fix all the problems with the operating expense inputs to the BCPM model, and he recommended that the Commission adopt the Hatfield Model as supported

by AT&T and MCI.

With respect to GTE, the Public Staff's Proposed Order includes an adjustment in Services expenses attributable to universal service. This adjustment is discussed in Part No. 3(b), Expense Inputs.

CONCLUSIONS

The Commission has previously concluded that the company-specific inputs submitted by the ILECs should be used where they are forward-looking and reasonable. This appears to be the case for BellSouth and Carolina/Central with respect to the costs considered in this issue. The Public Staff has not suggested adjustments for BellSouth and Carolina/Central, and the Commission does not find persuasive witness Lerma's testimony that BellSouth should revert to its previous methodology for calculating operating costs attributable to basic local service. The testimony of BellSouth witness Caldwell is more credible on this issue.

3(m): TAX RATES

POSITIONS OF PARTIES

BELLSOUTH: BellSouth reflected the following tax rates: federal income tax rate of 35%; state income tax rate of 7.5% (updated from 7.75%); and gross receipts tax rate of 3.19%. Tax rates were not discussed with specificity in BellSouth's Proposed Order or Brief.

CAROLINA/CENTRAL: Carolina/Central reflected the following tax rates: federal income tax rate of 35%; and state income tax rate of 6.9% (updated from 7.5%). Tax rates were not discussed with specificity in Carolina/Central's Proposed Order or Brief.

GTE: GTE reflected the following tax rates: federal income tax rate of 35%; and state income tax rate of 7.5% (updated from 7.75%). Tax rates were not discussed with specificity in GTE's Proposed Order or Brief.

AT&T: AT&T reflected the following tax rates: combined federal income tax rate and state income tax rate of 39.25%; and gross receipts and ad valorem rate of 5%. Tax rates were not discussed with specificity in AT&T's Proposed Order or Brief.

MCI: MCI did not address this issue with specificity in its Proposed Order. MCI co-sponsored the HM 5.0 with AT&T.

NCCTA: The NCCTA did not address this issue with specificity in its Brief.

ATTORNEY GENERAL: The Attorney General did not address this issue with specificity in his Brief.

PUBLIC STAFF: The Public Staff recommended the following tax rates: federal income tax rate of 35%; state income tax rate of 6.90%; gross receipts tax rate of 3.22%; and regulatory fee rate of 0.09%.

DISCUSSION

BellSouth reflected a state income tax rate of 7.5% (compared to the rate of 7.75% originally used) in its revised cost study filed with its Proposed Order and Brief. BellSouth witness Caldwell stated in rebuttal testimony that BellSouth does not agree that the appropriate state income tax factor to be used is 6.9% as recommended by Public Staff witness Garrison. Witness Caldwell stated that the 6.9% rate is not scheduled to be effective until the year 2000, and the BellSouth cost study reflects state income tax cost expectations for the period 1997-1999.

In rebuttal testimony, BellSouth witness Caldwell stated that BellSouth had used a composite tax factor for gross receipts of 3.19% that includes both the gross receipts tax rate of 3.22% and a regulatory fee rate of 0.085%. Witness Caldwell stated that BellSouth's 3.19% factor results from combining actual gross receipts tax paid and the regulatory fee applied to the appropriate percentage of revenue.

In revised testimony, Public Staff witness Garrison stated that the North Carolina corporate income tax rate is set at 7.25% for the 1998 calendar year; however, that the rate will decrease to 6.9% for the year beginning January 1, 2000. Witness Garrison also testified that the federal corporate income tax rate is currently set at a maximum of 35% for taxable income exceeding \$18,333,333. In its Proposed Order, the Public Staff recommended the use of the current gross receipts tax rate of 3.22% for telecommunications companies and the current regulatory fee rate of 0.09%.

The Commission notes that funding from the universal service fund being decided in this case will not begin until January 1, 1999, which is only one year prior to the 6.9% state income tax rate becoming effective. Additionally, the Commission believes that it is reasonable to include in a forward-looking cost study the known state income tax rate that will be applied in the year 2000 and possibly forward.

Current state statute reflects the following state income tax rates: 1997 - 7.5%; 1998 - 7.25%; 1999 - 7.00%; and 2000 - 6.90%.

The Commission further notes that the current gross receipts tax rate for telecommunications companies in North Carolina is 3.22%. Additionally, the Commission notes that the current regulatory fee rate of 0.09% became effective on July 1, 1997, and will be effective until at least June 30, 1999. Finally, the Commission notes that no party disputes the use of the 35% federal income tax rate.

CONCLUSIONS

The Commission concludes that the appropriate tax rates and regulatory fee rate to be used in the cost models are as follows: federal income tax rate of 35%; state income tax rate of 6.90%; gross receipts tax rate of 3.22%; and regulatory fee rate of 0.09%.

3(n): COST OF CAPITAL

POSITIONS OF PARTIES

BELLSOUTH: BellSouth stated that it used the FCC's recommended overall cost of capital of 11.25% but used its own capital structure components.

CAROLINA/CENTRAL: Carolina/Central stated that the FCC-authorized interstate overall rate of return of 11.25% is appropriate and was included in the model inputs.

GTE: GTE utilized a risk-adjusted cost of capital of 13.12% that is based on the weighted average cost of capital for companies included in the Standard & Poor's 500.

AT&T: AT&T requested that the Commission determine the appropriate cost of capital for ILECs in North Carolina and proposed an overall cost of capital of 9.43% for BellSouth, 9.53% for Sprint, and 9.60% for GTE.

MCI: MCI adopted the cost of capital recommendations made by AT&T.

NCCTA: The NCCTA recommended that the Commission adopt a capital structure and cost of capital for use in the universal service cost proxy model that recognizes the ILECs' network economies of scale and scope and the fact that there is no meaningful competition for basic local exchange service from facilities-based providers at this time. On a forward-looking basis, the weighted average cost of capital is likely to be closer to that endorsed in the Hatfield Model rather than the assumptions made in the BCPM.

ATTORNEY GENERAL: The Attorney General deferred to the cost of capital calculated by the Public Staff as the amount to use for the cost of capital input to the FLEC study.

PUBLIC STAFF: The Public Staff recommended that the forward-looking overall cost of capital associated with providing universal service in North Carolina is 9.94% based on a capital structure consisting of 58% common equity and 42% debt, a cost of debt of 7.38%, and a cost of common equity of 11.80%.

DISCUSSION

The FCC's Overall Rate of Return

The FCC's fourth criterion which a state-conducted study must meet in order to be approved for use in calculating federal universal service support concerns the rate of return on investment or cost of capital used in a state's FLEC study. According to Paragraph 250 of the FCC's Universal Service Order:

(4) The rate of return must be either the authorized federal rate of return on interstate services, currently 11.25%, or the state's prescribed rate of return for intrastate services. We conclude that the current federal rate of return is a reasonable rate of return by which to determine forward looking costs. We realize that, with the passage of the 1996 Act, the level of local service competition may increase, and that this competition might increase the ILECs cost of capital. There are other factors, however, that may mitigate or offset any potential increase in the cost of capital associated with additional competition. For example, until facilities-based competition occurs, the impact of competition on the ILECs risks associated with the supported services will be minimal because the ILECs facilities will still be used by competitors using either resale or purchasing access to the ILECs unbundled network elements. In addition, the cost of debt has decreased since we last set the authorized rate of return. The reduction in the cost of borrowing caused the Common Carrier Bureau to institute a preliminary inquiry as to whether the currently authorized federal rate of return is too high, given the current marketplace cost of equity and debt. We will re-evaluate the cost of capital as needed to ensure that it accurately reflects the market situation for carriers.

The 11.25% overall rate of return was authorized by the FCC's Order in CC Docket No. 89-624, adopted on September 19, 1990, for the interstate access services of local exchange carriers. The 11.25% overall rate of return was based on the FCC's findings that the embedded cost of debt was 8.8%, the capital structure ratios consisted of 55.8% equity and 44.2% debt, and the range of reasonable estimates of the LEC interstate access cost of equity was 12.5% to 13.5%. Using these findings, the FCC calculated that a range of reasonable estimates of the overall cost of capital equaled 10.85% to 11.4%. After consideration of evidence concerning factors such as the condition and future of the telecommunications infrastructure and the state of competition in the interstate access market, the FCC concluded that an 11.25% overall rate of return was appropriate.

Evidence in this Proceeding

BellSouth and Carolina/Central witness Staihr testified that the BCPM 3.1 submitted by these parties used the prescribed federal overall cost of capital listed in the FCC's Universal Service Order of 11.25%. These parties stated that the FCC reiterated their position on rate of return in the FCC's February 27, 1998, Public Notice in which FCC Criterion No. 4 stated that "the rate of return should be either the authorized federal rate of return on interstate services, currently 11.25%, or the state's prescribed rate of return for intrastate services." BellSouth and Carolina/Central stated that since they are not rate-of-return regulated in North Carolina, these parties utilized the FCC's recommended rate of return of 11.25%.

After examining the BellSouth and the Carolina/Central FLEC studies submitted in this proceeding for compliance with the FCC's fourth criterion, Public Staff witness Garrison testified that the inputs used by BellSouth and by Carolina/Central use costs of capital and a capital structure which produce the FCC's overall prescribed interstate rate of return. However, witness Garrison pointed out that BellSouth's and Sprint's costs of capital and capital structure do not match those adopted by the FCC in FCC Docket No. 89-624. With respect to GTE's FLEC study, he testified that the costs of capital and capital structure used by GTE do not produce the FCC's prescribed rate of return, and therefore, GTE would not meet this criterion unless the Commission adopted GTE's proposed costs of capital and capital structure on an intrastate basis.

In rebuttal, BellSouth witness Caldwell testified that BellSouth's study is based on BellSouth's own forward-looking capital structure, cost of debt, and cost of equity as supported by the testimony of BellSouth witness Billingsley. She explained that while BellSouth accepts the use of the FCC's overall recommended cost of capital, BellSouth appropriately used its own capital structure components. It was her testimony that since the FCC's prescribed capital structure is at a nationwide level, it would not be appropriate for use by BellSouth in the FLEC cost study. According to workpapers filed in this docket on January 16, 1998, which show BellSouth's inputs, BellSouth used a capital structure consisting of 60% equity and 40% debt, a cost of debt of 8.0%, and a return of equity of 13.4% in the

FLEC cost study which it submitted in this proceeding.

BellSouth rebuttal witness Billingsley used three approaches to determine BellSouth's cost of equity. In the first approach, he applied a quarterly Discounted Cash Flow (DCF) model, which included an adjustment to account for flotation costs, to a group of 20 comparable risk companies. A cluster analysis based on dimensions of the financial and operating risk of BellSouth was used to identify the comparable risk companies. Based on his DCF analysis, witness Billingsley determined a cost of equity of 15.23% to 15.24%. In the second approach, he used a Capital Asset Pricing Model (CAPM) applied to the same comparable group of firms. The CAPM approach indicated a cost of equity of 14.66% to 14.80%. Finally, he conducted a risk premium analysis which indicated a cost of equity for the Standard & Poor's (S&P) 500 between 14.15% to 14.96%. From these approaches, witness Billingsley concluded that the cost of equity to BellSouth is within 14.66% to 15.24%.

BellSouth rebuttal witness Billingsley also evaluated the reasonableness of BellSouth's use of an overall cost of capital of 11.25% in its FLEC cost study using two tests. One test used BellSouth's actual capital structure at December 31, 1997, which consisted of 57.14% equity and 42.86% debt, BellSouth's embedded cost of debt of 6.36%, and an overall cost of capital of 11.25%. Using these parameters, he calculated an implied cost of equity equal to 14.91%. The other test used an equity ratio of 60% and a debt ratio of 40%, his own estimate of BellSouth's forward-looking cost of debt under current market conditions which equaled 6.90%, and the 11.25% overall cost of capital. Using this second set of parameters, witness Billingsley calculated an implied cost of equity equal to 14.15%. Since the 14.91% and 14.15% implied costs of equity calculated from these two tests were each below or within the cost of equity range of 14.66% to 15.24% as determined using the three approaches discussed above, witness Billingsley concluded that BellSouth's use of an 11.25% overall cost of capital was reasonable.

Carolina/Central witness Potter testified that the FCC authorized interstate overall rate of return of 11.25% was included in its FLEC study model. According to workpapers filed in this docket by Carolina/Central on January 20, 1998, which show the Carolina/Central inputs, Carolina/Central used a capital structure consisting of 62.9% equity and 37.1% debt, a cost of debt of 6.4% and a return on equity of 14.1% in the FLEC cost study which they submitted in this proceeding.

GTE witness Robinson testified that GTE used a risk-adjusted, forward-looking overall rate of return of 13.12%. He explained that a risk-adjusted rate of return is needed and that GTE's investors faced increased risk due to several factors. Such factors included: the prospect of increased competition and attendant loss of market share; the uncertainty surrounding prices for resale services and unbundled network elements; the magnitude of implementation costs and whether such costs will be recovered; the loss of geographical diversification of regulatory risk due to the simultaneity of arbitration proceedings among the states; and the possibility that prudently made historical investments will not be recovered.

In rebuttal, GTE witness Jacobson presented testimony to support the capital structure and overall weighted average cost of capital used in GTE's cost studies in this proceeding. To determine the cost of equity for GTE, witness Jacobson employed a quarterly DCF model, which included a 5% flotation cost adjustment, applied to the S&P Industrials. Based on his DCF analysis, he recommended a cost of equity for GTE of 14.68%. He also testified that the cost of debt in GTE's cost study was based on the average yield for newly-issued "A"-rated Industrial Bonds as reported in the July 1997 issue of Moody's Bond Record which equaled 7.64%. Finally, witness Jacobson recommended a capital structure for GTE consisting of 77.82% equity and 22.18% debt. This capital structure was calculated using the average of the market-based values of equity and the book value of debt for the S&P Industrials.

AT&T and MCI witness Wood testified that these parties are requesting that the Commission make a determination regarding the appropriate cost of capital for the ILECs. According to his testimony, the Hatfield Model included the proposed intrastate cost of capital as recommended by AT&T witness Hirshleifer.

AT&T witness Hirshleifer testified on the forward-looking economic cost of capital appropriate for the provision of universal service that should be used for BellSouth, Carolina/Central, and GTE. According to his testimony, 30-year Treasury bond rates have fallen from 9.03% to 6.6% since the FCC prescribed the overall rate of return of 11.25% which implies that the cost of capital has fallen since the 11.25% was determined in 1990. To determine the overall cost of capital, witness Hirshleifer first estimated the current cost of debt for BellSouth, Carolina/Central, and GTE to be 7.06%, 7.19%, and 7.22%, respectively. These estimates were determined by calculating a weighted average cost of the

yield-to-maturity of each of these company's outstanding major debt issues as listed in the S&P Bond Guide. Witness Hirshleifer then estimated the cost of equity using a three-stage DCF model applied to a screened group of telephone operating companies from the S&P Industry Survey. He also used a CAPM. Averaging the results of his DCF and CAPM estimates, witness Hirshleifer recommended that the cost of equity for BellSouth, Carolina/Central, and GTE equaled 11.02%, 11.10%, and 11.19%, respectively. Finally, witness Hirshleifer developed a capital structure by averaging the book value and market value weights of equity and debt for the group of comparable companies. This average produced a capital structure consisting of 60% equity and 40% debt. Based on his determinations of the cost of debt, cost of equity, and capital structure, witness Hirshleifer recommended an overall cost of capital of 9.43% for BellSouth, 9.53% for Carolina/Central, and 9.60% for GTE.

Public Staff witness Hinton testified that the 11.25% overall rate of return authorized by the FCC was inappropriate to use for the forward-looking cost of capital in this proceeding. According to his testimony, since the FCC adopted the 11.25% overall rate of return in 1990, yields on 30-year Treasury bonds had declined over 300 basis points, the average annual rate of inflation has fallen over 400 basis points, and investors' expectations of future inflation are currently lower than in 1990. He also testified that the allowed returns on equity for telephone companies have fallen from an average annual rate of 12.9% in 1990 to a rate of 11.6% for the nine months ended September 1997.

To determine the overall cost of capital which he recommended in this proceeding, witness Hinton first determined a forward-looking capital structure by averaging Value Line Investment Survey's projected percentages of common equity for ten publicly traded telephone companies which are primarily involved in providing local exchange telecommunications services. The average projected capital structure consisted of 58% common equity and 42% debt. Witness Hinton testified that such a capital structure was reasonable since this level of debt leverage would allow for an "A" to "AA"-bond rating according to current financial ratio benchmarks published by S&P. Witness Hinton determined the forward-looking cost of debt by calculating a weighted average of the yield-to-maturity for 20 to 40-year debt recently issued by companies in this comparable risk group. This yield data was taken from the S&P Bond Guide and averaged for the last three months as of November 1997 and excluded the yields for noncallable bonds. The cost of debt determined in this manner equaled 7.38%. To determine the cost of equity, witness Hinton applied the annual DCF model to his comparable group of ten telephone companies and another group of companies outside the regulated utility industry that exhibit risk measures similar to the comparable group of ten telecommunications companies. Witness Hinton concluded that the cost of equity from his DCF analysis was 11.8% which was the midpoint of his 11.3% to 12.3% cost of equity range. He also used the CAPM to check the results of his DCF study and concluded that his CAPM analysis indicated that the 11.8% cost of equity determined by his DCF analysis was within reason.

Summary

The following table sets forth the capital structure, cost of debt, cost of equity, and the overall cost of capital from the FCC's Order in Docket No. 89-624 and those percentages recommended or included in the FLEC studies by the various parties to this proceeding.

	FCC	BellSouth	Carolina/ Central	GTE	AT&T/MCI	Public Staff
Capital Structure %						
Equity	55.8	60	62.9	78.8	60	58
Debt	44.2	40	37.1	22.2	40	42
TOTAL	100	100	100	100	100	100
Cost of Debt %	8.8	8.0	6.4	7.6	7.06%-BellSouth 7.19%- CT&T/Central 7.22%-GTE	7.38
Cost of	12.5- 13.5	13.4	14.1	14.7	11.02%-BellSouth	11.8

Equity %					11.1%- CT&T/Central 11.19%-GTE	
Overall Cost of Capital	11.25	11.25	11.25	13.13	9.43%-BellSouth 9.53%- CT&T/Central 9.60%-GTE	9.94

CONCLUSIONS

The Commission concludes that the FCC's prescribed interstate overall rate of return of 11.25% is not appropriate for purposes of this proceeding. The FCC adopted this overall rate of return in 1990 in Docket No. 89-624. Evidence in the record shows that current interest rates, current inflation rates, and the national average of the allowed returns on equity for telephone companies for the first nine months of 1997 are less than in 1990. Further, this proceeding involves the determination of forward-looking economic costs in the provision of universal service while the FCC's 11.25% overall rate of return was based, in part, on an embedded cost of debt. In addition, the FCC's overall rate of return was specifically based upon its findings that the embedded cost of debt equaled 8.8%, the capital structure ratios consisted of 55.8% equity and 44.2% debt, and the range of reasonable estimates of the LEC interstate access cost of equity was 12.5% to 13.5%. In contrast, although BellSouth and Carolina/Central also employed an overall cost of capital of 11.25%, each of these parties used a cost of debt, capital structure ratios, and a cost of equity which differs from those used as the very basis for the FCC's overall rate of return of 11.25%. While not pointed out by the parties to this proceeding, the Commission notes that the 11.25% overall rate of return proposed by both BellSouth and Carolina/Central would generate a higher cost for universal service than the 11.25% overall rate of return of the FCC. This higher cost would occur because BellSouth and Carolina/Central each used a higher equity ratio and a higher cost of equity than did the FCC. Thus, more income tax dollars would be required.

Having concluded that the FCC's prescribed overall rate of return is inappropriate for the reasons stated above, the Commission must turn to the evidence in the record in this proceeding to establish the State's prescribed rate of return for intrastate services. After careful consideration of the entire record, the Commission concludes that the capital structure, cost of debt, and cost of equity recommended by the Public Staff should be adopted for purposes of this proceeding.

As shown in the previous table, the Public Staff's recommended capital structure consists of 58% equity and 42% debt. This capital structure was determined by averaging the equity ratio projected by Value Line for ten telecommunications companies. In comparison, BellSouth uses a capital structure containing 60% equity, although BellSouth witness Billingsley testified that BellSouth Telecommunication's actual capital structure at December 31, 1997, contains 57.14% common equity. AT&T's recommended capital structure also contains 60% equity and was based on the average of the book value and market value weights of debt and equity for a group of companies. Carolina/Central used a capital structure which contains 62.9% equity. GTE's recommended capital structure contains 77.8% equity and was based on the market value of equity and the book value of debt of the S&P Industrials.

The cost of debt recommended by the Public Staff equals 7.38%. This debt cost was determined by averaging the yield-to-maturity for recently issued 20 to 40-year long-term debt for ten telecommunications companies as described in more detail above. In comparison, BellSouth used a debt cost of 8.0%, although BellSouth witness Billingsley stated that BellSouth's embedded cost of debt equals 6.36% and also testified that he believed that BellSouth Telecommunications' forward-looking cost of debt is 6.90%. Carolina/Central used a cost of debt of 6.4%. AT&T recommended a separate cost of debt for each ILEC based on the weighted-average cost of the yield-to-maturity of each ILEC's major debt issues. GTE's recommended debt cost of 7.64% was based on the average yield of newly issued "A"-rated Industrial Bonds.

The cost of equity recommended by the Public Staff of 11.8%, which was the center of the range of 11.3% to 12.3%, was based on a DCF for ten telecommunications companies. The return on equity used by BellSouth and Carolina/Central was essentially a "plugged," or mathematically derived, figure given an overall rate of return of 11.25%, the capital structure and debt cost rates used by these companies. As reflected in the preceding table, AT&T recommended a separate cost of equity for each ILEC: 11.02% for BellSouth, 11.10% for Carolina/Central, and

11.19% for GTE. Finally, GTE recommended a 14.7% return on equity based on a DCF for the S&P Industrials.

The Commission believes that the evidence contained in the testimony of the Public Staff with respect to the rate of return issue is the most credible evidence in the record in this proceeding. Therefore, the prescribed cost of capital for intrastate services in North Carolina which is reasonable and appropriate for use in determining the forward-looking economic costs associated with providing universal service is 9.94%, based on the following capital structure and cost rates:

Component	Ratio	Cost Rate	Weighted Cost Rate
Long-term debt	42%	7.38%	3.10%
Common equity	58%	11.80%	6.84%
Total	100%		9.94%

PART NO. 4: OTHER ISSUES

4(a): FCC CRITERIA COMPLIANCE

POSITIONS OF PARTIES

BELLSOUTH: BellSouth contended that BCPM 3.1 meets the FCC's ten criteria.

CAROLINA/CENTRAL: The BCPM model complies with the FCC's ten criteria.

GTE: GTE advocated BCPM on an interim basis, populated with company-specific inputs.

AT&T: AT&T stated that the HM 5.0 meets the FCC's ten criteria.

MCI: MCI stated that the HM 5.0 meets the FCC's ten criteria.

NCCTA: Both HM 5.0 and BCPM 3.1 serve the purpose for which they are intended and meet the FCC requirements; although the NCCTA expressed dubiety concerning the inputs.

ATTORNEY GENERAL: The Attorney General suggested that the differences between BCPM 3.1 and HM 5.0 appear de minimis and either would be acceptable provided the models are cost appropriate.

PUBLIC STAFF: The Public Staff stated that the FLEC studies using BCPM 3.1 with inputs reflecting the reasonable forward-looking costs of Carolina/Central, BellSouth, and GTE are appropriate and comply with all ten of the FCC criteria. The only likely exception is the requirement in the first criterion that average loop length reflect the ILEC's actual average loop length because it cannot be reasonably determined for all classes of service.

DISCUSSION

The Commission believes that there is merit to the proposition that HM 5.0 and BCPM 3.1 are converging and that they are becoming less distinct. Both models appear to meet the FCC's criteria. Therefore, the Commission has selected the model which, on the whole, it believes to be more appropriate. In that regard, the Commission concluded in Part No. 2(a) of this Order that BCPM 3.1 is more reasonable, more accessible, and more appropriate than the Hatfield Model for determining the forward-looking economic cost of providing universal service in North Carolina. Further, the Commission believes that the revised cost studies, as required by this Order, will comply with and meet all ten of the criteria prescribed by the FCC for state-conducted FLEC studies.

CONCLUSIONS

The Commission concludes that the BCPM 3.1 model, conducted in accordance with the provisions of this Order.

meets all ten of the USO criteria prescribed by the FCC for state-conducted FLEC studies.

4(b): REVISED STUDIES AND COMPLIANCE FILINGS

The FCC has given detailed instructions to the states regarding the format to be used in submitting their FLEC studies. These instructions, which are available on the World Wide Web at http://www.fcc.gov/ccb/universal_service/welcome.html, include the submission of a text document and two spreadsheets.

In order to complete the task of adopting North Carolina studies and submitting them to the FCC, the Commission hereby directs Carolina/Central, BellSouth, and GTE to rerun their cost studies with company-specific inputs as modified by this Order. The studies should be rerun using Carolina/Central's version of the BCPM 3.1, which is the only version before the Commission that is capable of producing results below the wire center level.

Carolina/Central, BellSouth, and GTE shall file the revised studies in electronic form and in accordance with the text document format and spread sheet requirements for inputs and outputs set forth in the FCC's Public Notice DA98-217, issued February 27, 1998. Portions of the text document such as Section A.7, supporting information, and Section B, demonstration that the studies fulfill the FCC criteria for state cost studies, may be filed jointly. The revised cost studies, text, and spreadsheets will be subject to review and comment by the Public Staff and any further revisions required by the Commission prior to their submission to the FCC.

4(c): SERVICES INCLUDED IN THE DEFINITION OF UNIVERSAL SERVICE

POSITIONS OF PARTIES

BELLSOUTH: BellSouth stated in its Proposed Order and Brief that the FCC specified a list of basic services as the set of supported services under the Act.

CAROLINA/CENTRAL: Carolina/Central advocated in their Proposed Order and Brief that the Commission should adopt the FCC's list of services to be included in the definition of "universal service".

GTE: GTE stated in its issues matrix that the FCC's defined services should be used, except that the cost of white pages and telephone relay services should also be included.

AT&T: AT&T stated in its Proposed Order that the Commission should find that the FCC's defined services should be included in the calculation of the cost of universal service.

MCI: MCI did not address this issue with specificity in its Proposed Order.

NCCTA: The NCCTA did not address this issue with specificity in its Brief.

ATTORNEY GENERAL: The Attorney General did not address this issue with specificity in his Brief.

PUBLIC STAFF: The Public Staff did not address this issue with specificity in its Proposed Order.

DISCUSSION

The issue of the services to be included in the definition of universal service will be addressed by the parties and the Commission in Docket No. P-100, Sub 133g. Direct testimony already filed in Docket No. P-100, Sub 133g, indicates that the parties have addressed that issue in the context of that docket. Carolina/Central included a discussion in their Proposed Order in this instant docket that recommends the Commission find that the services designated by the FCC in Paragraph 56 of the USO be used in the definition of universal service. Carolina/Central also recommended in their Proposed Order that the Commission find that the services defined by the FCC be supported by the North Carolina Universal Service Fund.

CONCLUSIONS

The Commission concludes that the issue of defining services to be included in the definition of universal service will be addressed and decided in the context of Docket No. P-100, Sub 133g.

4(d): COST MODEL FOR INTRASTATE UNIVERSAL SERVICE FUND

POSITIONS OF PARTIES

BELLSOUTH: BellSouth stated in its Proposed Order and Brief that using the same cost model and cost methodology to calculate both the federal and state fund will simplify the state fund calculation.

CAROLINA/CENTRAL: Carolina/Central stated in their Proposed Order and Brief that using the same cost model and cost methodology to calculate both the federal and state fund will simplify the state fund calculation.

GTE: GTE did not address this issue with specificity in its Proposed Order or Brief.

AT&T: AT&T did not address this issue with specificity in its Proposed Order or Brief.

MCI: MCI did not address this issue with specificity in its Proposed Order.

NCCTA: The NCCTA stated that the FCC's USO specifies that if a state cost study is used to determine federal universal service support levels, that state's cost study "must be the same cost study that is used by the state to determine intrastate universal service support levels." The NCCTA also stated that the FCC further reiterated its statements in Public Notice DA 97-2383. The NCCTA stated that the decision in this proceeding will also determine which model must be used for purposes of the state universal service subsidy calculation.

ATTORNEY GENERAL: The Attorney General did not address this issue with specificity in his Brief.

PUBLIC STAFF: The Public Staff stated in its Proposed Order that the FCC asserted that a state-conducted cost study must be the same study that is used to determine intrastate universal service support levels pursuant to Section 254(f) of the Act.

DISCUSSION

Issues related to the need for and establishment of an intrastate universal service fund will be addressed by the parties and the Commission in Docket No. P-100, Sub 133g. Carolina/Central included a discussion in their Proposed Order in this instant docket that recommends the Commission state in its Order in this proceeding that using the same cost model and cost methodology to calculate both the federal and state fund will simplify the state fund calculation. Paragraph 251 of the FCC's USO states:

"In Order for the Commission to accept a state cost study submitted to us for the purposes of calculating federal universal service support, that study **must be the same cost study that is used by the state to determine intrastate universal service support levels** pursuant to 254(e)." [emphasis added]

Additionally, the FCC's Public Notice, DA 97-2383 states, in part:

"A state cost study that is submitted to determine federal support levels **will not be accepted if a state changes the way that its cost study computes forward-looking cost for its state universal service program**. For example, a state could not alter the study's cost calculations to compute intrastate support, such as by changing the area over which support is calculated, and still expect the study to be used to determine federal support levels." [emphasis added]

The Commission notes that the issues related to the need for and establishment of an intrastate universal service fund will be decided by the Commission in Docket No. P-100, Sub 133g. However, the Commission also notes that the FCC has dictated that a state must use the same cost study to calculate both the federal universal service support and the cost for a state's universal service program.

CONCLUSIONS

The Commission concludes that using the same cost model and cost methodology to calculate both the federal and state fund will simplify the state fund calculation, if such a fund is found necessary.

4(e): MODEL FOR PRICING UNBUNDLED NETWORK ELEMENTS (UNEs)

POSITIONS OF PARTIES

BELLSOUTH: BellSouth did not address this issue with specificity in its Proposed Order or Brief.

CAROLINA/CENTRAL: Carolina/Central did not address this issue with specificity in their Proposed Order or Brief.

GTE: GTE did not address this issue with specificity in its Proposed Order or Brief.

AT&T: The Commission should use the same cost studies for pricing UNEs and for determining universal service support subsidies. The HM is the only model that can be used for both purposes.

MCI: The cost proxy model selected by the Commission should consistently be used for pricing UNEs and for determining universal service support. MCI believes that the HM 5.0 is the only model that consistently calculates both.

NCCTA: The NCCTA stated that the costing methodology selected in this proceeding should be consistent with the methodology selected in the UNE proceeding in order to eliminate market dislocations and reduce arbitrage opportunities.

ATTORNEY GENERAL: The Attorney General did not address this issue with specificity in his Brief.

PUBLIC STAFF: The Public Staff did not address this issue with specificity in its Proposed Order.

DISCUSSION

AT&T stated that the standard for both pricing of UNEs and determining levels of universal service support is the same: the forward-looking, economic cost of the facilities. AT&T and MCI believe that there is no reason that the same methodology should not apply to both. They recommended approval of the HM for use in both the pricing of UNEs and in determining levels of universal service support. However, on cross-examination, AT&T/MCI witness Gillan testified that in terms of determining what the total cost of universal service is for retail purposes, there would be retail costs associated with such determination that might not necessarily be a part of the UNE cost, such as billing and collection expenses.

By Order issued August 12, 1997, in Docket No. P-100, Sub 133b, the Commission stated that it ". . . believes that it is best at this time to limit the issues in this proceeding to those relevant in deciding on an appropriate FLEC study to be used in determining the cost of universal service in North Carolina." Consistent with that Order and considering the issue raised concerning retail costs, the Commission believes that it would be inappropriate to decide this matter at this time.

CONCLUSIONS

The Commission concludes that it is appropriate to decide the matter of the appropriate cost model for UNE pricing, in Docket No. P-100, Sub 133d, now pending.

IT IS, THEREFORE, ORDERED as follows:

1. That the BCPM 3.1 is the appropriate model to use in determining the forward-looking economic cost of providing universal service for Carolina/Central, BellSouth, and GTE in North Carolina.

2. That Carolina/Central, BellSouth, and GTE shall file revised cost studies, text, and spreadsheets, conducted in accordance with the input provisions and requirements of this Order, no later than Thursday, April 30, 1998.

3. That the Public Staff shall file comments on the revised cost studies, text document, and spreadsheets filed by Carolina/Central, BellSouth, and GTE no later than Friday, May 8, 1998.

ISSUED BY ORDER OF THE COMMISSION.

This the 20th day of April, 1998.

NORTH CAROLINA UTILITIES COMMISSION
Geneva S. Thigpen, Chief Clerk

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Commissioner Allyson K. Duncan presided during decisionmaking in this docket, but did not participate in the discussion of, or vote on, the issues addressed in this Order.

Commissioner Robert V. Owens, Jr., did not participate.