(1) Network Interface Device (NID)

The demarcation point between the local carrier's network and the customer's inside wiring. This device terminates the drop wire and is an access point that may be used to isolate trouble between the carrier's network and the customer's premises wiring.

(2) Drop

The copper wire extending from the NID at the customer's premises to the block terminal at the distribution cable that runs along the street or the lot line.

(3) Block Terminal

The interface between the drop and the distribution cable. With aerial distribution cable, the block terminal is attached to a pole in the subscriber's backyard or at the edge of a road. If the distribution cable is buried, the block terminal is contained within a pedestal.

(4) Distribution Cable

The cable that runs from each of the block terminals to the Serving Area Interface (SAI), also called a "cross box" or Serving Area Concept (SAC) box or connection. Distribution cable connects the feeder cable with all customer premises within a Census Block Group (CBG). The model assumes that each CBG is divided into four quadrants, with an SAI in the middle of each quadrant. Distribution structure components may consist of poles, trenches and conduit. Manholes are not used for distribution facilities.

(5) Feeder Facilities

The transmission system that extends from the wire center to the SAIs. These facilities may consist of either pairs of copper wire or a digital loop carrier (DLC) system that uses fiber optic cables as the transmission medium.[1] In a DLC system, the analog signals for multiple individual lines are converted to a digital format and multiplexed into a composite digital bit stream. The Hatfield Model assumes that there is a standard (but user-adjustable) feeder distance beyond which optical feeder cable will be installed and Digital Loop Carrier (DLC) equipment will be used to serve subscribers.

Feeder structure components also include poles, trenches and conduit. Manholes or pullboxes are also normally installed in conjunction with underground feeder cable. Manhole spacing is a function of population density and the type of feeder cable used. Pullboxes installed for underground fiber cable are normally farther apart than manholes used with copper cables -- because the lightness and flexibility of fiber cable permits it to be pulled over longer lengths than copper cable. The costs of structure components normally are shared among several utilities, e.g., electric utilities, local exchange companies (LECs), interexchange carriers (IXCs) and cable television (CATV) operators.

In situations in which the Hatfield model employs DLC, an integrated DLC system is used. This allows the digital signal carried by the DLC system to feed directly to a digital switch, without intervening demultiplexing having to occur. Because there is no need for any demultiplexing of the signal before switching occurs, a switching/feeder network incorporating integrated DLC is lower cost than a switching/feeder network using non-integrated DLC.

---

1 Although there are DLC systems that use copper wire for the transmission medium, the model assumes the use of fiber optics transmission, consistent with the use of forward-looking technology. A large majority of DLC systems currently being deployed are fiber optics systems.

There are four types of inputs to the Hatfield model. First are demographic, geographic and geological characteristics of CBGs, which are used to segment groups of customers requiring telephone service, as well as to determine the degree of difficulty associated with the installation of outside plant in the CBG. Second are interoffice distances between end offices, tandems, and STPs, which are used to determine the required amount of route miles for interoffice transmission facilities. Third are the 1995 ARMIS data reported by the LECs, which provide investment, traffic, and expense information. The fourth set of inputs are user-adjustable inputs, whose preset default values are based on the engineering judgement of Hatfield Associates augmented by selected subject matter experts, that allow users to set carrier- or locale-specific parameters, and to perform various sensitivity analyses.

Using these four sets of inputs, the Hatfield model estimates costs for each geographic area, based on the characteristics of that area. For the Tier 1 LECs, for whom all of these data are available, the Hatfield model computes directly the costs of their network. For the non-Tier 1 LECs, the only company-specific data needed for the Hatfield model which is not available is the ARMIS data. Costs for these companies are estimated using an aggregate ratio computed from the ARMIS data filed by independent companies, whose cost characteristics are most likely to resemble those of the small rural companies. To the extent the Commission wishes to further refine the estimate of the non-Tier 1 companies' costs from the Hatfield model, these companies would have to provide ARMIS-type data.

A number of significant changes have been made to the prior Hatfield models in developing Hatfield 3.0. Certain results can now be displayed by wire center and/or individual CBG, in addition to by density zone. Additional density zones have been added. The highest density zone -- greater than 2500 lines per square mile -- has been split into three new zones: 2,500 - 5,000; 5,001 - 10,000, and more than 10,000 lines per square mile. This better differentiates between dense downtown and dense suburban areas. The second lowest density zone -- 5-200 lines per square mile -- is subdivided into two zones: 5-100 and 101-200 lines per square mile, thereby providing a finer-grained distinction in low-density areas.

In addition, each of the nine density zones is further split into two groups of CBGs. The first consists of all CBGs sufficiently close to the wire center to use copper feeder. The second consists of CBGs sufficiently distant from the wire center to require Digital Loop Carrier (DLC) and fiber feeder.

Each CBG is now assigned to the wire center which serves the most NPA/NXX combinations in that CBG. In previous versions of the model, CBGs were assigned to the wire center closest to the centroid of the CBG. The revised method provides a more accurate determination of the existing wire center that actually serves the given population group.

Methods of estimating the number of business lines per CBG have been refined. These refinements, for example, account for differences in the demand for business lines per employee based on characteristics of the industries that employ these workers.

An improved, more precise, treatment of distribution cable numbers and lengths better comports with the actual population distributions. The new treatment takes account of a variety of demographic situations. These include the presence of high-rise residential/business buildings in high density zones, multi-tenant units in all zones, and towns and unpopulated areas in low-density zones.

A number of refinements have been made to the engineering of network plant. Copper loops in excess of 18,000 feet use a different gauge of cable and conditioning as necessary. The calculation of drop and Network Interface Device (NID) costs has been refined by adding a drop length component to the drop cost, allowing the drop to be aerial or buried, and specifying NIDs of varying capabilities. The switching system cost model is more sophisticated. It treats BOCs and large independents separately from small independents, and considers switch line card administrative fill. The interoffice transport network assumes the use of SONET fiber rings where appropriate, and treats transmission terminal investments in a more detailed manner. The treatment of structure cost sharing between feeder and interoffice plant has been refined to better reflect available economies. Finally, investments in buildings, motor vehicles, garage work equipment, and other work equipment have been added to the general support category.

Depreciation expense calculations have been changed to reflect the use of mid-year investments and to adjust for net salvage value. Also, land has been removed from the depreciation calculation. The costs of certain labor-intensive investment installations may now be adjusted by the user to reflect regional labor cost differences.

Other miscellaneous modifications have also been incorporated. There are multiple SAIs in a CBG. Additional conduit is provisioned if the copper feeder cable size exceeds 4200 pairs. Conduit is no longer shared between utilities, and spare conduit is added to distribution and feeder conduit.

As important as these changes are, it is also important to emphasize several aspects of the model that have been retained in Hatfield 3.0. The model incorporates the economic principles that the Joint Board identified as appropriate in estimating the cost of universal service,[2] namely consideration of all costs associated with all elements necessary to provide universal service, including all major categories of network components (i.e., loop, switching, transport, signaling), and all detailed components within those categories (e.g., network interface devices, drops, terminals and splices, wire center components in addition to switching, interoffice terminals, etc.);. It assumes the use of least cost, most efficient and reasonable technology currently available to LECs, and use of existing ILEC wire centers. It considers only forward-looking costs, not embedded or sunk costs, and uses forward-looking cost of capital and economic depreciation expenses. The model estimates the cost of providing service to all businesses and households within a geographical area, including first and second residential lines, business lines, public access lines, and special access lines, and also makes a reasonable allocation of joint and common costs. All data, computations, and software associated with the model are available to all parties for review, with the ability to examine and, as appropriate, modify over 400 inputs. Finally, the model estimates costs related to a narrowband network capable of supporting universal service, as defined by the Joint Board, and of narrowband UNEs in a single model, using a consistent methodology and a consistent set of inputs.

The staff report asks whether a network specifically dedicated to universal service objectives differs in a significant way from the summation of network elements envisioned in Section 251. There is no significant difference between the network built for universal service

---

[2] These are also consistent with the principles set forth in the Commission's Order pertaining to the pricing of UNEs.

and for UNEs. If UNEs are costed and therefore priced inconsistently from the universal service that they are used to provide, then either uneconomic arbitrage opportunities will arise (e.g., if UNEs are costed using a model that produces costs that are below those calculated by the proxy model used to cost universal service support, uneconomic opportunities will exist for carriers to provide universal service through the purchase of below-cost unbundled elements from the LEC), or new carriers will be dissuaded from offering universal service (e.g., if unbundled elements are costed using a model that produces costs that are above those calculated by the proxy model used to cost universal service support).

Similarly, there need be no difference in the treatment of common costs in the different applications of the model, such as universal service, access, or UNEs purchased by competitive local exchange carriers (CLECs). There is no reason to assign different levels of common costs to different services. Indeed, if different levels of common costs were assigned in the different applications of the model, that could distort the market through arbitrage. For example, if more common costs were assigned to CLEC-purchased UNEs than to the access services that are crafted from UNEs, that would give entrants greater incentive to purchase access, rather than to purchase UNEs and enter the local market.

The staff report also asks whether, if broadband networks become prevalent, a single model would be capable of measuring the costs of providing universal service, which is provided over a narrowband network, and access services or UNEs that are provided over a broadband network. The Hatfield model reflects primarily a narrowband network, because that is the network in place today, and it appears to be the most economical known technology for providing narrowband services.[3] Voice telephony will be primarily provided over narrowband networks for the foreseeable future. Broadband networks will be put in place primarily to handle services other than voice, e.g., data or video services. Provision of voice service over that broadband network will occur only if it is cheaper to do so than to use a narrowband network. Consequently, the cost of providing voice-grade services over a broadband network should not exceed, and, indeed, should be lower than, the costs of providing voice grade services over a narrowband network.

II. INDEPENDENT VERIFICATION

The staff report suggests several options for independently verifying the reasonableness of the level of network investment predicted by the models. Of the methods proposed, the suggestion of comparing the results from a representative sample of CBGs with an engineering study of existing networks seems to hold the most promise.

The staff report proposes that verification could be performed by comparing engineering studies for a representative sample of CBGs to engineering plans used to build actual networks using today's technology. Any such study would have to be performed by selecting a sample of CBGs, and then hiring an independent third party engineer to verify that current best practices were used to design the network. If the engineering plans for actual networks indicated that the engineering studies estimated a different level of investment than the engineering plans, that might indicate merely that the existing network is not the most

---

3 The Hatfield model reflects the use of SONET rings for transport in those areas where it would be most efficient.

efficient network possible. It would not necessarily mean that the engineering studies were incorrect. Accordingly, the results of such a study would have to be carefully interpreted.

As an alternative, the staff report suggests comparing estimates of the loop costs produced by the model with competitive bids for installing loops. Both the equipment and labor costs used in the Hatfield model for estimating the cost of loops are based on current information on costs of plant installations, so these results should match fairly well. In addition, Hatfield 3.0 allows the labor cost of placing outside plant to vary by geographic region. Nonetheless, installation costs can vary significantly from job to job, based on local conditions of, e.g., labor supply and demand or soil type. Thus, individual loop installations may not provide an accurate comparison with the overall cost of loops, if the conditions do not match the "average" conditions for the loop built in the models. For the same reasons, cable systems' costs of installing similar elements would not necessarily provide a comparable estimate in most circumstances.

Other possibilities for verification suggested by the staff report are unlikely to provide useful information. For instance, the staff report suggests that the results of the cost models could be verified by comparing physical measures of network investment, such as loop length, with independent sources of such data. The sponsors of Hatfield 3.0 knows of no such data by CBG or wire center which are publicly available. In addition, econometric studies are unlikely to provide a reasonable check on model results. Econometric studies are necessarily based on data that are derived from historical relationships, and these data would not reflect the forward-looking mix of plant estimated by the model. Since companies are likely to book their costs slightly differently, comparison of results across companies would need to be carefully interpreted.

Finally, examination of telephone plant price indices (TPPIs) to measure the effect of changing input prices on the needed investment would require adjustment of the results for the different mix of technology reflected in the embedded plant versus the forward-looking technology mix that is reflected in the cost studies. A simple comparison of embedded plant, adjusted only by the TPPIs, to the plant estimated by the cost models would not be a valid apples-to-apples comparison.

III. PUBLIC VERSUS PROPRIETARY DATA

The staff report seeks comment on the relative advantages of using only publicly available data versus relying to some extent on proprietary data. The cost models should rely only on publicly available data, or on data that is made publicly available. Such data would be verifiable by all parties, and is more likely to use consistent definitions. Proprietary data is more likely to employ different definitions, it would be difficult for all parties to examine, and, therefore, the parties would not be able to test the accuracy or reliability of the data. Thus, the party providing proprietary data, which in most cases would be the incumbent LEC, would have too much control of the process. Any proprietary data used should be rigorously defined, and made available on the public record without proprietary protection.

IV. SWITCHING LOCATION

The Joint Board's recommended decision called for the cost models to use a "scorched node" approach, i.e., an approach where the switch locations were taken as fixed and the outside plant was placed to the end users from those locations. This approach, as opposed to the "scorched earth" approach, which assumes that none of the telephone plant is in place and selects the optimal number of switches to serve demand, estimates a higher level of cost.

There is a substantial inefficiency cost in the scorched node assumption, in that additional feeder and concentrator costs will be incurred. However, at a minimum, switch sizes per location should be optimized. This means that the type of switch in each location may vary from the type of switch currently in place. The number and type of switches should be chosen so as to optimize the cost structure of the network.

Any cost model should minimize cost. While wireless loops may be the least-cost alternative for some geographic areas, it is not appropriate simply to set a threshold which loop costs cannot exceed. The cost of the wireless loops may also be greater than the threshold, and thus setting the cost at that threshold would understate the cost, particularly if not deployed in sufficient scale. Further development work is necessary to resolve this issue.

There is a trade-off to be made in the selection of the geographic area of analysis. A smaller area, such as the grids used in the Cost Proxy Model, allow a more detailed estimate of the cost of the network. However, that precision is bought at the price of greater complexity and computational needs of the model. In addition, a finer geographic area may give a false sense of greater precision; if costs do not differ within a larger geographic area, such as a CBG or wire center, then there is no advantage to estimating costs below those areas. In addition, if publicly available data are not available for the smaller areas, then the additional precision is bought at the price of less certainty about the inputs, as discussed <u>supra</u>.

Hatfield 3.0 further refines the approach taken in earlier versions of the Hatfield model for determining customer locations, by accounting for unpopulated areas within CBGs, and for clustering of customers within populated areas. The Hatfield developers are exploring techniques which would provide even greater precision in determining customer location.

V. SPECIFICATION OF DEMAND

The Hatfield model determines the cost of a network which is sized to meet current demand, with enough additional capacity to allow for efficient network administration and expected demand fluctuations. To develop the cost, Hatfield takes the information on demand and engineered maximum fill factors, and selects the cable and switch sizes necessary to meet that demand. All line types are included; residence, business, public payphone, and special access. Because all line types are included in sizing the network, and because the network is sized to meet total demand for an area, the fill factors used do not reflect different values for, e.g., business and residence usage. The single network is designed to provide a given level of service for all users of the network. No fill differential is necessary.

To determine the number of business lines, prior versions of the Hatfield model relied on data on number of employees per census tract. A factor that provided the number of lines per employee was then used to determine the number of business lines, and these lines were assigned proportionately to CBGs within the census tract. In Hatfield 3.0, the sponsors are introducing a new method of computing business lines that determines employees by CBG, and that accounts for the different telephone usage pattern in different industries and size of company, e.g., stock brokers use telephones more intensively than factories. This allows a more accurate determination of business demand, and thus leads to a more accurate determination of the cost of the network.

VI. FILL FACTORS

In addition to the question of different fill factors for residence and business users, there is a question of whether the fill factors should represent the average fill factor over the usable life of the plant. When plant is originally placed, demand may be fairly small and require only fairly small switches and cable. However, over the life of the network cable, the neighborhood may grow, and additional cable or more switch capacity may be needed. It may be more cost-effective to lay in additional cable or install a larger switch than is justified by current demand, to avoid greater costs of adding to capacity later.

In deciding whether to build in the extra capacity, the company must make a trade-off between the capital costs of carrying the excess capacity and the cost of adding capacity later. Building the capacity now will require current customers to pay for plant that they do not need or use. On the other hand, later customers cannot be charged a higher price if additional, higher-cost capacity must be added. Nevertheless, the cost of excess capacity for demand growth should be paid by the cost causers, i.e., the later demand growth. Current customers should not face higher (unit) costs to pay for the anticipated demand of future customers.

The Hatfield model is a unit cost model -- thus, additional capacity will be built only if the cost of building today is lower than the cost of building twice. Therefore, appropriate building for future demand can result only in a lower unit cost. Accordingly, the unit costs computed in the Hatfield model are conservative. Because of the Hatfield model's cable sizing algorithm, however, the default fill factors used in Hatfield allow ample capacity for foreseeable growth.

Fill factors will vary between feeder and distribution. Distribution is the cable between the SAI and the Drop. Feeder takes the loop from the SAI to the Main Distributing Frame at the LEC central office. Several distribution cables, with their attendant fill factor(s), feed into a feeder cable. Because the feeder cable carries several distribution cables, the spare capacity necessary to ensure that all households have a working loop can be lower for feeder plant. Therefore, the default fill factors for feeder cable are somewhat higher than for distribution.

In addition, fill factors are applied in the Hatfield model only to copper plant. Because fiber capacity can be added to simply by adding higher capacity electronics onto the fiber, there is no effective capacity constraint on fiber. Thus, no fill factor is applied to fiber.

Fill factors need not be adjusted to take account of anticipated competitive interactions among firms. The Hatfield model is designed to estimate the cost of an efficient network. A new entrant will either resell the LECs' services, build its own network, or purchase UNEs from the LECs. If the new entrant uses resale or purchases UNEs, the fill on the LECs' network will be unaffected. The new entrant will build its own network when its cost of doing so is less than the cost of the existing network. In that situation, there are no economies of scale. Therefore, no change in unit costs of the network will occur as new entrants enter the market. In addition, overall industry growth may more than offset any facilities-based competitive losses by the LECs, leaving its economies of scale unaffected.

Finally, the staff report seeks comment on whether fill factors should vary due to population density, network reliability standards, or the effect of special service obligations associated with a carrier's eligibility for Universal Service support payments. The network reflected in the Hatfield model is engineered to meet current industry reliability standards and the universal service obligation in all areas. Thus, no variation in fill factors is needed for these factors. Fill factors do vary by population density, if only because cable comes in discrete increments, which means low-density areas, with their typically smaller cables, may have a larger percentage excess capacity.

VII. STRUCTURE COSTS

The staff report raises several questions regarding the structure inputs used in the proxy models.[4] The Hatfield model allows the user to input the percentage of plant which is aerial, and buried, and computes the amount of plant that is underground.[5] In addition, the Hatfield model allows the user to specify what percentage of the structure costs are assigned to the telephone company, e.g., if poles within an area carry telephone, cable TV, and electric wires, then only one third of pole costs in that area are assigned to the telephone network. The default values used for structure sharing vary by density zone and type of structure (aerial, underground, and buried), and reflect forward-looking economic practices. In most cases, this means that about one third of the structure costs are assigned to the telephone network. However, for some structures, such as trenches used for underground conduit, a

---

4 Structure costs are the costs of trenching, conduit, poles, etc. that are used to support the cable and wire facilities used in loops and transport.

5 Since all plant in the model is either aerial, buried, or underground, the percentage of underground plant is equal to one minus the percentages aerial and buried.

higher percentage is assigned to telephony, because it is less likely that those types of structure will serve as many types of users. In addition, because cable TV may be less common in the less dense zones, structure is assumed to be shared between fewer carriers.

The staff report asks what portion of plant is built in new developments as opposed to being built in established areas, on the grounds that placement costs would be higher in areas that are already established, because the company would have to dig up and then repair streets and sidewalks. The costs of placement used in the Hatfield model vary by density zone, at least in part on the basis that denser areas require more disturbance of existing infrastructure such as streets. Therefore, this suggested change is already partly accommodated by Hatfield 3.0.

The staff report also argues that further investigation is needed by the model sponsors on the sharing fraction used, claiming that both the Hatfield model's default value of one third and the BCPM's default value of 100 percent to telephony are wrong. The Hatfield version 3.0 default values have been adjusted to reflect the fact that the percentage structure shared will vary by density zone and by type of structure. The level of sharing used in the model will likely not reflect current practice, as past practices are likely not to be the most efficient.

The existing structure sharing percentage should be only a lower bound for forward-looking sharing levels. All sharing that is technically and practically feasible should be assumed to occur, for purposes of developing the forward-looking cost of the telephone network. Otherwise, the LEC will receive a universal service subsidy and UNE rates that are higher than they need to be, solely because in the past the LEC chose not to share its structure costs where it could have done so.

VIII. SWITCHING COSTS

The Hatfield model currently selects the switch(es) of the size necessary to serve the demand in the geographic area. The staff report asks whether the selection of the type of switch should not also depend on the type of traffic expected in an area. Switch costs have different proportions of traffic sensitive (TS) costs, e.g., the central processor, and non-traffic sensitive (NTS) costs, e.g., the line and dedicated trunk ports. In addition, different areas might have different call characteristics, specifically lengths of call. Thus, the staff report states, a cost-minimizing company would install a switch that is consistent with its traffic, e.g., a company whose traffic was composed of longer calls might install a switch with higher NTS costs, thereby reducing its costs.

The Hatfield model selects the size of switch based on the number of lines served, the number of busy hour call attempts (which measures the maximum number of calls the switch must process), and the Busy Hour call seconds (which measures the maximum number of minutes the switch must process at one time). Once the number of lines a switch must serve is determined, a per-line investment is applied to determine the switch cost.[6] Implementing the staff report's suggestion would require that different per-line estimates be determined for switches with different NTS and TS characteristics. Given the scarcity of public record data on switch costs, the sponsors of Hatfield 3.0 doubts that such an estimate could be performed.[7]

---

6 This per line cost is determined from regression estimates of switch costs. Two different costs curves were estimated; one for large LECs and one for small LECs.

7 In addition, the Hatfield model's approach of using a "generic" switch avoids the possibility of giving the LEC an incentive to use a particular type of switch in an area to

IX. CAPITAL COSTS (DEPRECIATION AND COST OF MONEY)

a. Cost of Capital

One important source of the difference between the results of the Hatfield model and the BCPM is the choice of depreciation rates and cost of capital. The forward-looking cost of capital should be based on market-determined costs for debt and equity as well as long-run debt-equity ratios chosen by firms. As discussed infra, the cost of capital used in the Hatfield model reflects these factors. Similarly, the depreciation lives used in the Hatfield model reflect current LEC projected lives, and thus represent the best estimate of depreciation lives.

The default cost of capital used in the Hatfield model is based on a study of LEC cost of capital.[8] Cost of debt is determined from the LECs' cost of outstanding debt. The cost of equity is computed using both the discounted cash flow (DCF) method and the capital asset pricing method (CAPM). These two methods give similar results. The cost of equity used in the Hatfield model is an average of these two estimates. This methodology for computing the cost of capital is the same as the Commission used in setting the LECs' current 11.25 percent rate of return, and is the same methodology used to support the cost of capital used in the BCPM.[9]

---

meet the results of the model, rather than using the best type of switch for that area.

8 See "Estimating the Cost of Capital of Local Telephone Companies for the Provision of Network Elements," by Bradford Cornell, attached to Letter from Richard Clarke to William F. Caton, February 12, 1997, in CC Docket No. 96-45.

9 It is also similar to the methodology used by MCI in its rate of return (ROR) studies filed in the price cap review docket and the ROR represcription docket. See MCI Comments filed May 9, 1994, in CC Docket No. 94-1, and MCI Comments filed March 11, 1996, in Preliminary Rate of Return Inquiry, AAD 96-28 and AAD 95-172.

Once the cost of debt and the cost of equity are determined, the total cost of capital is computed by taking a weighted average of the two. It is in the relative weights of debt and equity that Hatfield and BCPM differ most. In the BCPM, the weight of equity is higher than in the Hatfield study. The main source of this difference appears to be due to whether equity is weighted based on book value or market value. The study on which the Hatfield estimate is based notes that using book value the relative weight of debt is 57 percent, whereas under the market value method the relative weight is 75 percent.

There is no consensus in the academic literature on which of these two methods is the theoretically correct measure to use. However, market-value weights probably understate long-run, forward looking weights for two reasons. First, the rise in the LEC stock price in 1995 pushed up the market value of equity significantly and unexpectedly. Second, although debt values also rose when interest rates fell in 1995, this rise in bond prices is not reflected in the debt on the LECs' books, because debt is always valued at book. Therefore, it is inappropriate to use the current market value debt/equity ratios. The book value gives the best estimate of the long-run capital structure.

b Depreciation Rates

The depreciation lives used in the Hatfield model are the projected depreciation lives, adjusted for net salvage, that the LECs are currently using. The staff report asks whether the

---

Those studies found that, in 1994 and 1995, the LEC cost of capital was about 9.5 percent. The study used in Hatfield finds a cost of capital of 10.01 percent. The increase in the cost of capital is consistent with the general belief that the LECs' risk has increased since the passage of the Telecommunications Act, and thus that their cost of capital has increased.

depreciation rates reported by LECs for financial purposes may provide information to determine the appropriate economic lives of facilities.

The projected lives currently employed by the LECs represent the best estimate of economic lives. In approving the LECs' projection lives, the Commission takes into account the LECs' business plans and projections of plant retirements. Thus, the projection lives reflect the LECs' actual behavior in retiring plant, rather than their claims about retirements they need to make.

The lives the LECs use for financial purposes do not necessarily capture the equipment's true life. The LECs may be writing off equipment from their books for reasons other than the plant's usefulness to provide universal service or narrowband networks. Voice telephony customers should not pay higher rates because the LEC wishes to retire its narrowband network sooner to allow it to build a broadband network to serve other types of customers, such as video.

The depreciation rates used for universal service should not differ from those used to price unbundled elements, even if unbundled elements use broadband service. Broadband networks are not necessary to provide voice grade service. Only if the broadband network is adopted solely to provide voice grade service should the depreciation rates for voice services be adjusted. Since broadband networks will be built for voice traffic only if it is cheaper than narrowband, no increase in costs would be needed. Thus, the LECs should not be allowed to accelerate the depreciation of their narrowband network to allow them to replace it with a broadband network whose primary purpose will be services other than voice telephony.

X. EXPENSES

The Hatfield model computes some expenses based on historical ARMIS ratios of expense to investment. As the staff report notes, this approach is not a completely forward-looking methodology. The staff report suggests several alternative methods which might be more forward-looking.

First, a factor could be computed as the ratio of current expenses to current investment, where current investment equals the embedded investment at current input prices. The staff report suggests using Telephone Plant Price Indexes (TPPIs) to compute the current input prices for investment. There are two problems with this method. First, the investment used in the models is not the same mix of investments that is reflected in the LECs' current networks. Thus, repricing the existing embedded plant to current prices will not give the correct level of investment. Second, even if the adjusted investment levels are correct, current expenses will also reflect many old technologies. For example, maintenance expense reported in the LECs' books reflect maintenance for analog circuit equipment and copper cable that may require greater expenses than the forward-looking digital circuit equipment and fiber technology would require. Thus, use of such a ratio would still give a conservatively high estimate of expenses

Another possibility is to estimate the expense to investment ratio using an econometric estimate of expenses as a function of investment and output. This does not seem to provide an improvement over the existing embedded ratio, because this method too would be based on the historical relationships between expenses and investment.

XI. JOINT AND COMMON COSTS

The Hatfield model assigns joint and common costs by adding 10.4% to all other expenses. This mechanism is intended to capture only corporate operations expenses. This percentage is based on an econometric study of the relationship of joint and common costs and direct expenses. However, there are a number of other expenses that are normally considered joint and common that are included explicitly in the Hatfield model. General support expenses are explicitly modeled, as are expenses for billing, bill inquiry, and white pages listings. Thus, the Hatfield model assigns a reasonable level of overhead expenses to universal service.

XII. CONCLUSION

The Commission and Joint Board have correctly concluded that cost proxy models should be used to set both the prices of UNEs and universal service support levels. The Hatfield model incorporates the criteria for cost models laid out by the Joint Board. Use of forward-looking principles to determine costs will ensure that rates are set at economically efficient levels.

Respectfully submitted,

Chris Frentrup
MCI Telecommunications Corporation
1801 Pennsylvania Avenue, NW
Washington, DC 20036
(202) 887-2731

Richard N. Clarke
AT&T
295 N. Maple Ave Rm. 5462C2
Basking Ridge, NJ 07920
(908) 221-8685

February 18, 1997

STATEMENT OF VERIFICATION

I have read the foregoing and, to the best of my knowledge, information, and belief, there is good ground to support it, and it is not interposed for delay. I verify under penalty of perjury that the foregoing is true and correct. Executed on February 18, 1997.

Chris Frentrup
1801 Pennsylvania Avenue, NW
Washington, D.C. 20006
(202) 887 2731

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

RECEIVED

FEB 1 8 1997

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

In the Matter of Federal-State Joint Board on Universal Service	CPD Docket No. 97-2

JOINT COMMENTS OF BELL ATLANTIC AND NYNEX

Joseph Di Bella

1300 I Street, N.W., Suite 400 West
Washington, DC 20005
(202) 336-7894
Attorney for The NYNEX
Telephone Companies

Lawrence W. Katz

1320 North Court House Road, 8th Floor
Arlington, VA 22201
(703) 974-4862
Attorney for the Bell Atlantic
Telephone Companies

Edward D. Young, III
Betsy L. Anderson
Of Counsel

Dated: February 18, 1997