

certain equipment costs in order to qualify for additional subsidies.⁸⁰⁴ Teleport, Ad Hoc Telecom. Users, and GCI in the 80-286 NPRM proceeding recommended a gradual elimination of this program over five years to comply with the principles stated in the 80-286 NPRM.⁸⁰⁵

iv. Long Term Support

236. No party appears to have attempted to refute the NPRM's tentative conclusion that LTS represents an impermissible implicit support mechanism.⁸⁰⁶ A few commenters assert that the collection of LTS could be restructured to be consistent with the 1996 Act's non-discrimination requirements.⁸⁰⁷ Missouri PSC argues that retaining the LTS mechanism in some form will increase interexchange competition in rural and high cost areas.⁸⁰⁸ Several argue that any elimination of LTS should occur over time or through some other type of transition mechanism.⁸⁰⁹ Finally, a few commenters contend that proposals to change LTS payments are outside the scope of the universal service proceeding.⁸¹⁰

c. Proxy Models

237. In General. Numerous parties propose to determine the cost of service on

⁸⁰⁴ Sprint 80-286 NPRM comments at 7-8.

⁸⁰⁵ Ad Hoc Telecom. Users 80-286 NPRM comments at 1; GCI 80-286 NPRM comments at 2-5; Teleport 80-286 NPRM comments at 4-5.

⁸⁰⁶ See NPRM at para. 115.

⁸⁰⁷ Missouri PSC comments at 21; Pennsylvania PUC comments at 24; Winnebago Tel. comments at 1.

⁸⁰⁸ See Missouri PSC comments at 20-21. Missouri PSC observes that the LTS system has historically served to reduce pressure on IXCs to de-average rates. *Id.* The 1996 Act requires IXCs to charge geographically averaged rates, however, and the Commission recently adopted rules implementing this provision. 47 U.S.C. § 254(g); See also *Policy and Rules Concerning the Interstate, Interexchange Marketplace*, Report and Order, CC Docket No. 96-61, FCC 96-331 (rel. August 7, 1996). Missouri PSC argues that, under a mandate to deaverage rates and absent access charges equalized by LTS, IXCs might choose not to serve high cost areas. Missouri PSC comments at 21.

⁸⁰⁹ Citizens Utilities comments at 7-9; Florida PSC comments at 22; Montana Indep. Telecom. comments at 7; West Virginia Consumer Advocate comments at 12-13.

⁸¹⁰ Rural Iowa Indep. Tel. Ass'n comments at 6; Fred Williamson comments at 17-18.

which to base universal service support on a proxy model, rather than embedded costs.⁸¹¹ They argue that the use of forward-looking costs in a proxy model, rather than historic costs, best represents the costs for providing universal service over an efficient network.⁸¹² NTIA argues that forward-looking costs should be used since a subsidy based on book costs weakens the carrier's incentive to be efficient in the deployment of its network.⁸¹³ Proponents also argue that use of a proxy model is competitively neutral because it does not use the costs of the incumbent carrier to determine support levels, but instead uses the projected costs for an efficient new entrant into that market.⁸¹⁴ Some parties, however, note that until proxy models incorporate wireless technology cost structures their results may be too high because they are not predicated on the use of the most efficient network to deliver services.⁸¹⁵ Commenters also argue that use of a proxy model is administratively efficient since it would not require incumbent carriers to keep accounting records at levels below the current study area and would not require new entrants, who may not have reporting requirements, to file cost reports with regulators.⁸¹⁶

238. Other parties contend, however, that proxy models do not satisfy the requirements of the 1996 Act that support be specific, predictable, and sufficient.⁸¹⁷ They argue that, unless the universal service support covers the embedded cost of the carrier to provide service in the area, it is not sufficient support under the 1996 Act.⁸¹⁸ Opponents state that, because the models project the costs of facilities needed to connect the serving wire center to customers if the network were to be built now, rather than the recorded costs of

⁸¹¹ See, e.g., Citizens Utilities comments at 13-14; Frontier comments at 6; Ad Hoc Telecom. Users reply comments at 6.

⁸¹² See, e.g., ALTS comments at 11; Ohio PUC comments at 5; AARP reply comments at 19; AirTouch reply comments at 5.

⁸¹³ NTIA reply comments at 16-17. See also TCI comments at 11-12; CPI reply comments at 7.

⁸¹⁴ See, e.g., Florida PSC comments at 10; NYNEX comments at 10; MFS reply comments at 6.

⁸¹⁵ Texas OPUC comments at 14; WinStar reply comments at 2.

⁸¹⁶ See, e.g., Citizens Utilities comments at 13; CPI reply comments at 7; Cathey, Hutton reply comments at 7. *Contra* Telec Consulting comments at 8-9 (FCC will face administrative burdens in handling complaints by those who claim they are aggrieved by proxy cost determination).

⁸¹⁷ See 47 U.S.C. § 254(b)(5), (d).

⁸¹⁸ See, e.g., Rural Iowa Indep. Tel. Ass'n comments at 4; Cathey, Hutton reply comments at 6-7; Century reply comments at 7; Minnesota Indep. Coalition reply comments at 7-8.

facilities that are being used, proxy models are not based on a "real" network.⁸¹⁹ They argue that incumbent carriers often cannot realize the efficiencies assumed in a proxy model because they have built their networks over time.⁸²⁰ They also argue that the proxy models are not reliable, and point to the divergent costs calculated by the various proxy models for the same service area and the difference between those results and the costs currently embedded by the carriers for determining universal service support today.⁸²¹ GSA claims that, because of the wide variations in the costs calculated through proxy models and the historic costs of service, some high cost areas that need support would not be served because the proxy indicates no subsidy is warranted, while other areas would get unneeded support.⁸²²

239. Some commenters also argue that, before a proxy model can be used, it will need to be thoroughly tested and produce results that are consistent with a carrier's embedded costs.⁸²³ Ameritech argues that, before a proxy model is adopted, the Commission should undertake a systematic evaluation of the models and put the results in the public record for industry-wide review.⁸²⁴ ITC argues that support should be cost-based so that carriers are obligated to install plant as a condition precedent to receiving any funding.⁸²⁵ Some parties also expressed concern that the results of proxy models, unlike embedded costs, are not auditable.⁸²⁶ Western Alliance is concerned that the use of proxies will discourage investment in high cost areas.⁸²⁷

240. Small, rural telephone companies are particularly concerned about the use of a proxy model to determine universal service support for high cost areas.⁸²⁸ In addition to the general concerns set out above, the small companies argue that the proxy models are not

⁸¹⁹ See BellSouth comments at 2; CBT comments at 9.

⁸²⁰ See Fred Williamson comments at 12-13; Dell Tel. reply comments at 6.

⁸²¹ See Mon-Cre comments at 3-4; Minnesota Indep. Coalition reply comments at 11-12.

⁸²² GSA reply comments at 11.

⁸²³ See, e.g., Ardmore Tel. comments at 4; Blountsville Tel. comments at 4; Farmers Tel. comments at 3-4.

⁸²⁴ Ameritech comments at 12.

⁸²⁵ ITC comments at 4.

⁸²⁶ See Harris comments at 10; Michigan Library Ass'n comments at 10.

⁸²⁷ Western Alliance comments at 5. See also GVNW comments at 12.

⁸²⁸ See, e.g., SDITC reply comments at 3,5; Siskiyou reply comments at 3-4; TCA reply comments at 5; Virginia CC reply comments at 2.

appropriate for them because these were developed for large companies.⁸²⁹ According to the small companies, the averages used in a proxy model would adversely affect them since they have a smaller customer base over which to spread costs.⁸³⁰ Consequently, they contend that only large companies should be required to use proxy models.⁸³¹

241. Some of the LEC proponents of the proxy models agree, and propose that proxy models be used only for large carriers, with small, rural carriers continuing to use their embedded costs to determine universal service support levels.⁸³² Winnebago Tel. argues that small telephone companies should be allowed, but not required, to use proxy models.⁸³³ CPI proposes the use of three groupings for carriers. Large carriers, those with over 2 percent of the nation's access lines, would move to a total service long run incremental cost (TSLRIC) approach immediately. The smallest LECs would continue to use embedded costs for one year, and then be transitioned to TSLRIC over seven years. Medium-size carriers, those with less than 2 percent of the nation's access lines, would have a four-year transition to a TSLRIC approach.⁸³⁴

242. Other parties argue that the same methodology should be used to determine universal support for all carriers, although they diverge over which system should be used -- embedded costs or proxy models.⁸³⁵ Ameritech argues that universal service support should be based on the characteristics of the service area, not the size of the carrier.⁸³⁶ GCI and MCI

⁸²⁹ See, e.g., CITA comments at 4; Telec Consulting comments at 8; Century reply comments at 7.

⁸³⁰ See Montana Tel. Ass'n comments at 5-6; Park Region Tel. comments at 4.

⁸³¹ See, e.g., Evans Tel. comments at 12; Alaska PUC further comments at 3-4; USTA cost model comments at 5.

⁸³² See, e.g., NYNEX comments at 10 (asserting that BCM should only be used to calculate support amounts for LECs subject to price cap regulation); PacTel further comments at 32 (stating that bifurcation may be most practical way to move to new support mechanism); U S West further comments at 15-16 (urging that price cap company support be based on proxy model, while non-price cap companies receive support based on embedded costs).

⁸³³ Winnebago Tel. comments at 1. See also Montana Tel. Ass'n comments at 6; Vitelco reply comments at 5; GTE further comments at 34-35 (arguing that company should have one-time option to proxy model determination of costs).

⁸³⁴ CPI *ex parte* at 5-6 (Oct. 4, 1996).

⁸³⁵ See, e.g., BellSouth further comments at 36; Bell Atlantic further comments at 10; NCTA further comments at 8.

⁸³⁶ Ameritech further comments at 28. See also Pacific Telecom comments at 6 (asserting that the Joint Board and Commission should separately undertake to study the proxy models).

raise concerns that a bifurcated system could encourage the sale of exchanges to maximize the subsidy received for those areas.⁸³⁷ Some parties argue that small carriers should not be required to use a proxy model initially, either from a concern about potential disruption to the carriers' support or because the proxy models need to be further refined for use for small carriers before they move to proxy models.⁸³⁸ OITA-WITA argues that the transition should not occur until the proxy models have been refined to reflect the cost structure of small companies.⁸³⁹ Other commenters propose that companies move from embedded costs to a proxy model when a competitor enters the market or after a set period of time.⁸⁴⁰ Most parties agree that, if a bifurcated system is used, the Commission should apply the 1996 Act's definition of "rural telephone company"⁸⁴¹ to determine which telephone companies would continue to draw universal service support based on their book costs.⁸⁴²

243. Parties in Alaska and insular areas are particularly concerned that the proxy models are inappropriate for determining the costs of service for those areas. These groups note that Alaska and insular areas were not even included in the original BCM.⁸⁴³ U S West notes that BCM2 includes all fifty states, as well as Puerto Rico, the Virgin Islands and Micronesia.⁸⁴⁴ Alaska PUC claims, however, that the conditions in Alaska are so unique (e.g., permafrost, glaciers, extreme remoteness) that the factors used in the BCM2 cannot

⁸³⁷ GCI further comments at 9; MCI further comments at 14.

⁸³⁸ OITA-WITA comments at 13.

⁸³⁹ See, e.g., Century further comments at 20; Maine PUC further comments at 18-19; RTC further comments at 20.

⁸⁴⁰ See, e.g., AT&T further comments at 27 (transition when another carrier determined to be eligible for support); CFA further comments at 15 (three year transition); MCI further comments at 15 (three year transition); NCTA further comments at 8 (three year transition).

⁸⁴¹ 47 U.S.C. § 153(37).

⁸⁴² See, e.g., Alaska Tel. further comments at 9; Citizens Utilities further comments at 10; NECA further comments at 22; RTC further comments at 20. But see AT&T further comments at 27 (arguing in favor of the use of the definition in 47 U.S.C. § 251(f)(1)); U S West further comments at 16 (arguing that whether company is regulated under price caps should determine whether proxy model defines universal service support).

⁸⁴³ See, e.g., Alaska Tel. comments at 5; CNMI comments at 17; Matanuska Tel. Ass'n comments at 2-3.

⁸⁴⁴ U S West further comments at 19. See also Sprint further comments at 12. MCI also submitted estimates for Alaska, Hawaii, Puerto Rico, Guam, and the Mariana Islands using the Hatfield model. MCI notes, however, that the cost per line was approximated by taking the weighted average for the RBOCs in the Hatfield model, and are not specific to those areas. Consequently, according to MCI, the estimates for these areas are only "ballpark estimates." Letter from Kimberly M. Kirby, Senior Manager, FCC Affairs, MCI, to William F. Caton, Acting Secretary, FCC (dated Oct. 25, 1996).

adequately capture the costs incurred in serving Alaska.⁸⁴⁵ Likewise, Vitelco argues that insular areas are not adequately represented because none of the models reflects their unique circumstances, such as the added corrosion from sea water or damage from hurricanes and other tropical storms.⁸⁴⁶ Because of those unique characteristics, those parties argue that insular areas and Alaska should continue to use embedded costs to calculate universal service support, even if other areas use proxy models.⁸⁴⁷

244. Some of the states have noted that they are currently reviewing versions of the proxy models proposed in this proceeding in their state proceedings on universal service. The California PUC filed an Administrative Law Judge's (ALJ) proposal that discussed a version of the Hatfield model and the CPM that were filed in the state proceeding.⁸⁴⁸ The ALJ proposed to use the CPM, with modifications to the model's inputs, as the basis for determining the costs on which to base the California state universal service fund for large carriers in the state.⁸⁴⁹ (Subsequently, the California PUC adopted an order which uses the CPM to calculate the cost of service in particular geographic areas in California, but makes several modifications to the model as submitted by PacTel in that proceeding.⁸⁵⁰) New York and Pennsylvania are also currently reviewing versions of the Hatfield model that have been submitted in their respective state universal service proceedings.⁸⁵¹

245. The Benchmark Costing Model. The BCM was filed in the record of the CC Docket No. 80-286 proceeding, and was incorporated into this proceeding.⁸⁵² The BCM is an engineering cost model designed to produce "benchmark" costs for the provision of basic telephone service in each CBG within a state. According to its proponents, the model uses current technology and efficient engineering and design criteria to build a state-of-the-art loop

⁸⁴⁵ Alaska PUC cost model comments at 3.

⁸⁴⁶ Vitelco further comments at 9-11.

⁸⁴⁷ See, e.g., Alaska Tel. further comments at 11-12; Alaska PUC further comments at 5-8; Puerto Rico Tel. Co. further comments at 13-14. See also NYNEX further comments at 33 (to extent insular areas and Alaska are served by small telephone companies, they should continue to have support based on embedded costs).

⁸⁴⁸ California PUC cost model comments (attaching Proposed Decision of ALJ Wong, Cal. P.U.C. R.95-01-020/1.95-01-021 (Aug. 5, 1996)).

⁸⁴⁹ Small carriers would remain under the current state universal service mechanism, which is based on their embedded costs as reported to the California PUC.

⁸⁵⁰ Cal. P.U.C. R.95-01-020/1.95-01-021 (Oct. 25, 1996).

⁸⁵¹ New York DPS comments at 7-8; Pennsylvania PUC comments at 6.

⁸⁵² See NPRM at para. 31.

and switching network to serve consumers from existing incumbent switching locations.⁸⁵³ The model is meant to identify CBGs with higher than average costs of providing service.⁸⁵⁴

246. Its proponents explain that the BCM develops investment costs for loop plant and switches, and then adds an annual charge factor. The estimation of the outside plant cost begins with the determination of the distance between the center of the CBG and the nearest wire center. The feeder cable is sized on the basis of the number of loops to be served and an estimate of spare capacity. The fill factor, the number of wire pairs in use as a percent of the total wire pairs placed, determines the spare capacity. The distribution cable is sized based on the assumption that customers are uniformly distributed within the CBG. There is a separate fill factor for the distribution cable. The cost of support structures (conduit and poles) and placement (e.g., digging the trenches) is determined by multiplying the cable investment by various factors. These factors are functions of soil conditions, depth of water table, and other geographic conditions. Switching costs are estimated assuming all lines are served by Northern Telecom DMS 100 digital switches. Costs include a fixed cost per switch plus a cost that varies according to the number of lines served.⁸⁵⁵ An annual charge factor for determining expenses and overhead loadings associated with basic telephone service is then applied to determine the cost of service for a CBG. The BCM presents monthly costs results using two alternative annual charge factors. One is based on historical accounting data, and the other is based on a Hatfield/MCI study.⁸⁵⁶

247. Several parties, including some of the BCM's proponents, suggest modifications to the model. MCI, for instance, notes that the BCM assumes a uniform distribution of households within a CBG. It states that this presumption is probably not true for rural areas.⁸⁵⁷ NCTA commissioned a study of the BCM by Economics and Technology, Inc. (ETI) that, while commending the proponents, suggests several changes to the BCM to correct what ETI terms key engineering/economic assumptions and input data upon which the BCM is constructed. Among the modifications proposed by ETI are: adjustments to the fill factors on the assumption that residential service does not require the excess capacity needed to offer

⁸⁵³ See MCI comments at 10-11; NYNEX comments at Exh. A; Sprint comments at 12-14; U S West comments at 8.

⁸⁵⁴ See NYNEX comments at 10; Sprint comments at 12-13; U S West reply comments at 8-9; *but cf.* MCI comments at 10 (BCM can be used to determine the universal service support level).

⁸⁵⁵ See MCI Communications, Inc, NYNEX Corporation, Sprint/United Management Co., and U S West., Inc, *Benchmark Costing Model: A Joint Submission*, Copyright 1995, CC Docket No. 80-286, filed Dec. 1, 1995 at section IV.

⁸⁵⁶ See *Id.* at 1-2; NYNEX comments at Exh. A, p.1.

⁸⁵⁷ MCI comments at 11.

other services, such as business service, and using a forward-looking, rather than historic, expense factor. ETI also argued that the BCM does not use an economic least cost method for determining the fiber-copper cross-over point in deciding how the feeder line would be deployed. ETI also states that the model unrealistically deploys DMS 100 switches in all instances and uses a historical cost per switch.⁸⁵⁸

248. In their reply comments, the proponents, while stating their continued support for the BCM, acknowledge some of these criticisms of the model, and state that many of those concerns will be addressed in a subsequent version of the BCM.⁸⁵⁹ They argue that it is inappropriate for parties to criticize the BCM for developing cost numbers that are different from the ILEC's embedded costs.⁸⁶⁰ U S West explains that the model was not meant to calculate the historic costs of service, but merely to identify high cost areas.⁸⁶¹ U S West notes that the BCM does not include many components necessary to provide local service, and that urban distribution costs are underestimated.⁸⁶² It also defends the use of CBGs, stating that CBGs should be used rather than wire centers. According to U S West, using wire centers would allow new entrants to receive high cost support without necessarily serving high cost customers, by serving only customers located near the wire center.⁸⁶³

249. The Benchmark Costing Model Version 2. On July 3, 1996, Sprint Corporation and U S West submitted BCM2.⁸⁶⁴ According to its proponents, BCM2 was developed to respond to the comments on the BCM in this proceeding and a series of workshops held by the proponents, and to address the misuse of the model as a proxy for historic costs.⁸⁶⁵ They contend that BCM2 significantly enhances the engineering and costing assumptions in the

⁸⁵⁸ NCTA comments at 9, Att. A ("The Cost of Universal Service: A Critical Assessment of the Benchmark Cost Model," Susan M. Baldwin, Lee Selwyn (April 1996)).

⁸⁵⁹ See MCI reply comments at 7-8; U S West reply comments at 5.

⁸⁶⁰ See MCI reply comments at 4-7; U S West reply comments at 3.

⁸⁶¹ U S West reply comments at 7.

⁸⁶² *Id.* at 8-9; U S West further comments at 24.

⁸⁶³ U S West reply comments at 3-4; U S West further comments at 24-25. See also Sprint further comments at 15.

⁸⁶⁴ See Letter from Jay C. Keithley, Sprint, and Glenn Brown, U S West, to William F. Caton, Acting Secretary, FCC, in regard to CC Docket 96-45 (dated July 3, 1996).

⁸⁶⁵ U S West further comments at 27; Sprint cost model comments at 6; U S West cost model comments at 3.

original version, and allows users to input their own underlying cost factors and user prices.⁸⁶⁶

250. BCM2 follows the same organizational structure as the original model, but makes several changes to the assumptions upon which the model is based. According to the proponents, BCM2, unlike the BCM, includes all cost elements necessary for the provision of basic telephone service. Among the changes made, BCM2 no longer assumes a uniform distribution of households in low-density areas. Instead it assumes that all households are located within 500 feet of either side of roadways and adjusts the CBGs to remove areas with little or no households. BCM2 also increases the feeder and distribution fill factors, and uses estimates of total residential lines and business lines rather than equating lines to households. The model now uses five different digital switch sizes, each with unique fixed or start-up costs. Urban cost elements, e.g., conduit, street cutting, boring, are now included. In addition, BCM2 uses four annual expense factors, which are based on 1995 ARMIS data. BCM2 constrains loop costs to be less than \$10,000.00; it assumes that wireless technologies would be an economically reasonable substitute for loops of higher costs.⁸⁶⁷

251. Most of the commenters agree that the BCM2 is an improvement over the original version. BellSouth and GTE state that the cost numbers generated by BCM2 are close to their embedded costs of providing service.⁸⁶⁸ SWBT notes that the BCM2 shows significantly higher service costs than the original model.⁸⁶⁹ NECA filed studies, however, that show that the average loop cost calculated by BCM2 is higher than the average under the existing universal service support mechanism, and on a service area basis the loop costs calculated using BCM2 ranges from 90 percent below the current support levels to 728 percent above.⁸⁷⁰

252. NYNEX finds that, while BCM2 is an improvement, there are still further refinements that could be made to approximate the costs of the local network more closely. For example, NYNEX contends that BCM2 still does not take into account all of the additional costs incurred to install cable in urban areas.⁸⁷¹ AT&T states that BCM2 still has

⁸⁶⁶ Sprint cost model comments at 6; U S West cost model comments at 3.

⁸⁶⁷ See Sprint cost model comments at 5-7; U S West cost model comments at 3-4.

⁸⁶⁸ BellSouth cost model comments at 3-4; GTE cost model comments at 5, 20. See also Maine PUC further comments at 23; *but cf.* Alaska PUC cost model comments at 5-6 (under BCM2, Alaska would receive substantially less universal support than the state receives under the current system).

⁸⁶⁹ SWBT further comments at 32.

⁸⁷⁰ NECA cost model comments at 5.

⁸⁷¹ NYNEX cost model comments at 6.

many of the problems of the original model, including unrealistic fill and capacity assumptions.⁸⁷² MCI complains that the source of the business line estimate used in BCM2 is not identified.⁸⁷³ Maine PUC argues that BCM2 still vastly underestimates the impact on loop length caused by slope.⁸⁷⁴ RTC and Maine PUC also question the model's assumption that households are located within 500 feet of a roadway, and that the model adequately identifies costs associated with terrain and other factors.⁸⁷⁵ The commenters also question the assumption in BCM2 that, if loop costs exceed \$10,000.00, wireless technologies would be used.⁸⁷⁶

253. In response to the Common Carrier Bureau's information request,⁸⁷⁷ the proponents, U S West and Sprint, provided additional information about the model and cost runs using BCM2.⁸⁷⁸ The response includes cost runs showing the difference in cost calculations between BCM2, CPM, and the current universal service cost information provided by NECA. They also provided study area comparisons between the original BCM and BCM2 for the three study areas requested by the Bureau.⁸⁷⁹ The proponents also submitted results for those study areas using the Commission's Part 32 uniform system of accounts. They explained that switching costs were calculated using generic switch investments because it was not possible to use detailed pricing due to the proprietary nature of manufacturers' switch prices. In addition, the proponents provided examples of cable and wire statistics for the original BCM and BCM2. Finally, the proponents stated that the significant enhancements to the original BCM found in BCM2 reflect actual engineering practices followed in the

⁸⁷² AT&T cost model comments at 24.

⁸⁷³ MCI cost model comments at 5.

⁸⁷⁴ Maine PUC cost model comments at 3, 5.

⁸⁷⁵ *Id.* at 8; RTC cost model comments at 14.

⁸⁷⁶ NCTA further comments at 14; Maine PUC cost model comments at 8; NYNEX cost model comments at 6.

⁸⁷⁷ Letter from John S. Morabito, Deputy Chief, Accounting and Audits Division, Common Carrier Bureau, to Glenn Brown, Executive Director-Public Policy, U S West (dated Aug. 2, 1996).

⁸⁷⁸ Letter from Glenn H. Brown, U S West, and Warren D. Hannah, Sprint Corporation, to William F. Caton, Acting Secretary, FCC (dated Aug. 22, 1996).

⁸⁷⁹ The Bureau requested that all the proponents of the three different proxy models provide study area results for Pacific Bell, GTE SW-Arkansas, and Southwestern Bell-Texas. See Letters from John S. Morabito, Deputy Chief, Accounting and Audits Division, Common Carrier Bureau to (1) Glenn Brown, Executive Director-Public Policy, U S West, Inc., (2) Alan Ciamporcero, Vice President-Federal Regulatory Relations, Pacific Telesis, (3) Mike Pelcovits, Chief Economist, MCI Telecommunications, Inc., and Joel Lubin, Vice President-Law and Government Affairs, AT&T Corporation (dated Aug. 2, 1996).

development of a local network and also cause the increase in projected costs over the costs projected by the original version of the model.⁸⁸⁰

254. The Cost Proxy Model. The CPM was filed as part of PacTel's comments in this proceeding. In its comments, PacTel notes that the California PUC was currently conducting a proceeding to establish a new state universal service mechanism that would be nondiscriminatory and competitively neutral.⁸⁸¹ According to PacTel, in its proceeding the California PUC was considering two proxy models, including the CPM, which was jointly developed by Pacific Bell and INDETEC, International.⁸⁸² PacTel suggests that the CPM could be used at the federal level to implement a competitively neutral model for high cost area funding,⁸⁸³ and submits a design overview of the model.⁸⁸⁴

255. According to PacTel, the major advantage of the CPM is its flexibility. PacTel states that a variety of inputs can be used with the model, including publicly available information.⁸⁸⁵ As described by PacTel, the CPM examines the network components that are combined to form the customer's service, e.g., cost per foot of aerial and buried copper, cost per-line terminations, cost per switched minutes of use. Customer information is derived from using approximately four-tenths of a square mile (3,000 ft by 3,000 ft) grids and census data to determine the location of households, and the distance from the households to the carrier's switches. The values of the cost components are adjusted based on the specific characteristics of the grid area, including density, terrain, and soil type. Using that information, the investment cost for the household is determined. Once investment costs are derived, company-specific estimates of operating costs per line are applied, e.g., average monthly repair costs. Once the costs are derived for the grids, they can be aggregated to correspond to any larger geographic unit, such as CBGs or serving wire centers (SWCs).⁸⁸⁶

256. Many parties argue that the major advantage of the CPM over other proxy models is its use of grid cells, rather than CBGs, to calculate the cost of providing service.

⁸⁸⁰ See Letter from Glenn H. Brown, U S West, and Warren D. Hannah, Sprint Corporation, to William F. Caton, Acting Secretary, FCC (dated Aug. 22, 1996).

⁸⁸¹ PacTel comments at 15 (citing Cal. P.U.C. D.95-07-050 (July 19, 1995)).

⁸⁸² PacTel comments at 16.

⁸⁸³ *Id.* at 17.

⁸⁸⁴ *Id.* at App. D.

⁸⁸⁵ PacTel comments at 16-17.

⁸⁸⁶ See *Id.* at App. D.

The commenters argue that the use of grid cells allows for more precision in determining where households are, particularly in sparsely-populated areas, and consequently will lead to more accurate distances of the loops between the households and switches -- the basis upon which the costs in the model are derived.⁸⁸⁷ PacTel notes that use of grid cells along with wire center boundaries minimizes the likelihood of misassigning households to the wrong wire center or to the wrong carrier.⁸⁸⁸ GTE advocates a hybrid approach that uses CBGs for high-density areas and grids for low-density areas.⁸⁸⁹ NCTA, however, states that use of grid cells does not improve the accuracy of customer locations of terrain.⁸⁹⁰ NECA states that, while grids provide more accuracy in identifying population distribution in sparsely populated areas, there still remains mapping problems for some areas served by small carriers.⁸⁹¹ Sprint notes that talks are ongoing between the proponents of BCM2 and PacTel to integrate the use of grid cells into BCM2.⁸⁹²

257. MCI argues that CPM should not be used because it relies upon proprietary data, and has only been developed for California, not the entire nation.⁸⁹³ NCTA agrees that the CPM is not suitable for use outside of California because it is based on Pacific Bell's network.⁸⁹⁴ NASUCA states that the BCM is superior to the CPM because, unlike CPM, it relies on public data. NASUCA claims that parties in the California proceeding have not been able to verify how the CPM derived the costs in that proceeding because of its use of proprietary data.⁸⁹⁵ PacTel replies that the CPM can be used to calculate the costs of service on a national level; all that is needed is to obtain the proper household-location data for the nation.⁸⁹⁶ PacTel also argues that, while it used company-specific data to calculate costs in

⁸⁸⁷ See BellSouth further comments at 52; Maine PUC further comments at 29.

⁸⁸⁸ PacTel further comments at 54-55.

⁸⁸⁹ GTE cost model comments at 6-8.

⁸⁹⁰ NCTA further comments at 21-22.

⁸⁹¹ NECA further comments at 35.

⁸⁹² Sprint further comments at 17. See also NYNEX further comments at 42 (an industry task force is exploring integrating the grid cell structure into BCM2); USTA cost model comments at 4 (incumbent exchange industry is working together to harmonize the two models).

⁸⁹³ MCI cost model comments at 12-13. See also CPI reply comments at 7.

⁸⁹⁴ NCTA further comments at 22-23.

⁸⁹⁵ NASUCA comments at 20-21.

⁸⁹⁶ PacTel further comments at 56.

the California proceeding, the CPM allows for variable inputs through which a user can modify the cost inputs to reflect either a carrier's specific cost structure or average costs.⁸⁹⁷

258. In reviewing the CPM in response to the Cost Models Public Notice, parties discuss many specific concerns. For instance, AT&T claims that the CPM is inconsistent in its use of terrain modifying factors, which artificially inflate loop investment costs.⁸⁹⁸ AT&T also states that the CPM bases central office switch and feeder costs solely on average population density of the grid, ignoring the number of lines served by the switch, and uses unrealistically short depreciation lives.⁸⁹⁹ BellSouth compared the results of BCM2 and CPM for Georgia and Florida and found that, when the two models are compared on a wire center basis, they arrive at similar results.⁹⁰⁰ GTE raises a concern that switching costs in the CPM do not fully capture the difference in unit costs between large and small switches. GTE also notes that the costs used by PacTel in the CPM are not representative of those experienced by other carriers because they reflect PacTel's negotiated prices.⁹⁰¹

259. In response to the Common Carrier Bureau's information request,⁹⁰² PacTel provides additional information and cost runs on the model. For some of the material it submitted, however, PacTel requested confidential treatment because the information contains Pacific Bell's cost studies for California.⁹⁰³ PacTel provides a comparison between the costs calculated using CPM, and the current universal service costs provided by NECA only for Arkansas, California, and Texas.⁹⁰⁴ PacTel has subsequently provided the costs calculated by the CPM for all fifty states and the District of Columbia.⁹⁰⁵ PacTel also argues that, contrary

⁸⁹⁷ PacTel reply comments at 5-6. PacTel further comments at 58.

⁸⁹⁸ AT&T cost model comments at 30.

⁸⁹⁹ *Id.* at 31.

⁹⁰⁰ BellSouth cost model comments at 4-5. Att. 1.

⁹⁰¹ GTE cost model comments at 18.

⁹⁰² Letter from John S. Morabito, Deputy Chief, Accounting and Audits Division, Common Carrier Bureau, to Alan Ciamporero, Vice President-Federal Regulatory Relations, Pacific Telesis (dated Aug. 2, 1996).

⁹⁰³ Letter from Nancy C. Woolf, Attorney, Pacific Telesis, to John S. Morabito, Deputy Chief, Accounting and Audits Division, Common Carrier Bureau, FCC (dated Aug. 16, 1996).

⁹⁰⁴ Letter from Nancy C. Woolf, Attorney, Pacific Telesis, to John S. Morabito, Deputy Chief, Accounting and Audits Division, Common Carrier Bureau, FCC (dated Aug. 22, 1996).

⁹⁰⁵ Letter from Alan C. Ciamporero, Vice President, Pacific Telesis, to William F. Caton, Acting Secretary, FCC (dated Oct. 17, 1996).

to the assertions of critics, the CPM is a stand-alone model, and that for future runs for the whole nation the model will not rely on PacTel proprietary data.⁹⁰⁶

260. In California, the California PUC has recently decided to use the CPM to calculate costs for the state universal service program.⁹⁰⁷ Comparing the CPM and Hatfield models,⁹⁰⁸ the California PUC found that the CPM is a more appropriate model for estimating the cost of providing basic service in California than the Hatfield model, in part because CPM's grid cell design is more conducive to an accurate representations of costs.⁹⁰⁹ The California PUC, however, made a number adjustments to the CPM as submitted by PacTel.⁹¹⁰ For example, the California PUC changed the fiber-copper break point for feeder from 9,000 feet to 12,000 feet. This change resulted in a \$78 million decrease in the annual support requirement as calculated by the CPM.⁹¹¹ The California PUC also changed the allocations for shared and common costs that PacTel had proposed in the CPM, with the result of decrease of \$400 million in the support requirement.⁹¹² The result of the adjustments to the CPM mandated by the California PUC was to decrease the amount of support determined by the model by \$1.116 billion.⁹¹³

261. The Hatfield Model. The Hatfield model has been developed by Hatfield Associates, Inc under the sponsorship of AT&T and MCI.⁹¹⁴ On June 7, 1996, the proponents submitted the Hatfield 2.2, Release 1 model for the Joint Board's consideration in this proceeding.⁹¹⁵ They have subsequently submitted a later version, Hatfield 2.2, Release 2.⁹¹⁶

⁹⁰⁶ Letter from Nancy C. Woolf, Attorney, Pacific Telesis, to John S. Morabito, Deputy Chief, Accounting and Audits Division, Common Carrier Bureau, FCC (dated Aug. 16, 1996).

⁹⁰⁷ Cal. PUC R.95-01-020/I.95-01-021 (Oct. 25, 1996).

⁹⁰⁸ The California PUC reviewed a Hatfield Model which is based on the BCM. *See Id.* at 113.

⁹⁰⁹ Cal. PUC R.95-01-020/I.95-01-021 at 124.

⁹¹⁰ *See id.* at 124-161.

⁹¹¹ *Id.* at 137.

⁹¹² *Id.* at 156-157.

⁹¹³ *See id.* at 124-125, App. C. Overall, all the changes required by the California PUC, including raising the benchmark, result in the size of the California state fund being reduced from \$1.7 billion, as submitted by PacTel, to \$352 million.

⁹¹⁴ There have been several prior versions of the Hatfield model. *See* AT&T cost model comments at 4 n.5.

⁹¹⁵ Letter from Leonard S. Ceca, MCI, to William F. Caton, Acting Secretary, FCC (dated June 7, 1996).

262. According to AT&T, the Hatfield model is "a flexible, publicly available engineering model that estimates the economic costs of providing basic narrowband telephone services to consumers in any and all geographic areas in the United States."⁹¹⁷ As described by the proponents, the Hatfield model uses seven modules to compute the costs of the network. The Input Data File module contains information on households, businesses, terrain, and the location of central offices. Estimates of the loop costs for each CBG are determined by the Loop Module and the Data Module, which calculate feeder, sub-feeder, and distribution cable lengths.⁹¹⁸ The Wire Center Module computes the costs associated with switching, signaling, and interoffice transport, based on the outputs from the Loop and Input Data modules. The Convergence Module combines the investment computed in the Loop and Wire Center Modules and adds investment in servicing area interfaces, the network interface devices, and the subscriber drops. The Expense Module takes that investment and converts it into monthly costs based on asset lives and capital cost, and adds certain administration costs.⁹¹⁹ According to the proponents, the use of this modular architecture allows users to modify data inputs as necessary to reflect new or state-specific data.⁹²⁰

263. Critics of the Hatfield model make several arguments against using the model for calculating the cost of providing universal service. Initially, many parties complain that it has been difficult to analyze the Hatfield model because it is constantly changing and contains algorithms that have not been disclosed.⁹²¹ Parties also argue that, since Hatfield is based, at least in part, on BCM, it, like BCM, is flawed.⁹²² The proponents, however, claim that the

⁹¹⁶ Letter from Richard N. Clarke, AT&T, to William F. Caton, Acting Secretary, FCC (dated Aug. 27, 1996). *See also* letter from Richard N. Clarke, AT&T, to William F. Caton, Acting Secretary, FCC (dated Sept. 10, 1996).

⁹¹⁷ AT&T cost model comments at 3.

⁹¹⁸ The Data and Loop Modules use components of a BCM derivative, "BCM+," developed by MCI. BCM+ has user-adjustable inputs, uses 1995 household data, bases zone density categories on the number of lines in a CBG, and modifies BCM's estimate of business lines. AT&T cost model comments at 4 n.4, Appendix A.

⁹¹⁹ *See* AT&T cost model comments at 4-14; MCI cost model comments at 2-4. The changes between Hatfield 2.2.1 and 2.2.2 are outlined in AT&T cost model comments at App. A. The default inputs used in Hatfield 2.2.2 are set forth in AT&T cost model comments at App. B.

⁹²⁰ AT&T cost model comments at 5.

⁹²¹ *See, e.g.*, BellSouth further comments at 44; PacTel cost model comments at 17; U S West cost model comments at 5.

⁹²² *See, e.g.*, BellSouth further comments at 39; RTC cost model comments at 11.

model is publicly available, uses public data, and allows for user specific inputs.⁹²³ They also note that the model no longer relies on input from BCM, but uses refined inputs, which they call "BCM+."⁹²⁴

264. GTE argues that the Hatfield model is not really a forward-looking cost model. According to GTE, Hatfield's use of historical expense factors makes it backward-looking.⁹²⁵ PacTel also argues that Hatfield uses embedded cost factors.⁹²⁶

265. LECs also complain that the Hatfield model uses an unrealistic network configuration to calculate costs.⁹²⁷ According to SWBT, these flawed assumptions about ILECs' networks lead to faulty cost-factor assumptions and invalid estimates of capital and operating expenses.⁹²⁸ PacTel argues that Hatfield does not model the way that distribution plant is actually engineered.⁹²⁹ RTC opposes the Hatfield model, in part, because it assumes that all ILECs have fully deployed SS7, when, according to RTC, some small, rural carriers have not deployed SS7.⁹³⁰ MCI responds that it is irrelevant that the model may not reflect an ILEC's actual network because it is meant to calculate the cost of an efficient network, not the cost of an existing network.⁹³¹ AT&T states that the model does not start with a "blank slate," but uses actual minutes of use and access lines embedded by ILECs and models the network from the existing wire centers and STP locations.⁹³²

266. Parties also argue that Hatfield uses improper cost inputs, which leads to unrealistic cost calculations. For example, NYNEX argues that the model uses excessive fill

⁹²³ AT&T further comments at 36; AT&T cost model comments at 3. 5.

⁹²⁴ See AT&T cost model comments at 4, App. A p. 1-2.

⁹²⁵ GTE cost model comments, Att. 1 ("A Critique of the Hatfield Model" by Gregory M. Duncan, NERA) at 8.

⁹²⁶ PacTel cost model comments at App. B, p. 3.

⁹²⁷ See BellSouth cost model comments, Att. 3 (Comments of William E. Taylor and Anirudda Banerjee, NERA) at 7-8;

⁹²⁸ SWBT cost model comments at 12.

⁹²⁹ PacTel cost model comments at 10.

⁹³⁰ RTC cost model comments at 19.

⁹³¹ MCI cost model comments at 4. See also AT&T cost model comments at 20.

⁹³² AT&T cost model comments at 15.

factors.⁹³³ PacTel argues that the Hatfield model understates switch investment and switching prices.⁹³⁴ They also argue that the depreciation rates used in the model are too low.⁹³⁵ MCI states that the model uses depreciation lives and cost of capital that have been approved by the Commission and state commissions.⁹³⁶ AT&T claims that the model reflects all the forward-looking costs of installing, maintaining, and operating facilities to provide residential service, including a reasonable share of joint and common costs.⁹³⁷

267. In response to the Common Carrier Bureau's information request,⁹³⁸ the proponents -- AT&T and MCI -- provide additional information and costs runs on Hatfield 2.2.2. The proponents state that from Hatfield 2.2.1 to Hatfield 2.2.2 there have been significant improvements to the modeling logic and descriptive outputs. Among those changes Hatfield 2.2.2 uses an MCI-developed derivative of the original BCM called BCM+.⁹³⁹ The changes allows Hatfield 2.2.2 to compute investment explicitly for aerial, buried, and underground cable, for both feeder and distribution facilities. The proponents also argue that the improvements embedded in Hatfield 2.2.2 make it superior to BCM2. For example, they contend that Hatfield 2.2.2 has more detailed cost components than BCM2. Hatfield 2.2.2 also includes investment in Serving Area Interfaces that BCM 2 does not. The proponents explain the fill factors used in Hatfield 2.2.2, noting that the effective fill factor is substantially lower than the maximum engineered fill.⁹⁴⁰ The proponents also compare the

⁹³³ NYNEX cost model comments at 11, Att. C (Rebuttal Statement of Timothy J. Tardiff) at 610-14. See also SWBT cost model comments at 12; U S West cost model comments at 8.

⁹³⁴ PacTel cost model comments at 10.

⁹³⁵ NYNEX cost model comments at 11; PacTel cost model comments at 11; SWBT cost model comments at 12.

⁹³⁶ MCI cost model comments at 4.

⁹³⁷ AT&T cost model comments at 16.

⁹³⁸ Letter from John S. Morabito, Deputy Chief, Accounting and Audits Division, Common Carrier Bureau, to Mike Pelcovits, Chief Economist, MCI Telecommunications, Inc., and Joel Lubin, Vice President-Law and Government Affairs, AT&T Corporation (dated Aug. 2, 1996).

⁹³⁹ BCM+ has user-adjustable inputs, uses 1995 household data, bases zone density categories on the number of lines in a CBG, and modifies BCM's estimate of business lines. See Letter from Michael Pelcovits, Chief Economist, MCI Telecommunications Corporation and Joel Lubin, Regulatory Vice President, AT&T Corp., to John S. Morabito, Deputy Chief, Accounting and Audits Division, Common Carrier Bureau, FCC (dated Aug. 19, 1996).

⁹⁴⁰ Letter from Michael Pelcovits, Chief Economist, MCI Telecommunications Corporation and Joel Lubin, Regulatory Vice President, AT&T Corp., to John S. Morabito, Deputy Chief, Accounting and Audits Division, Common Carrier Bureau, FCC (dated Aug. 19, 1996).

costs calculated by Hatfield 2.2.2 for the BOCs and for SNET. They explain that, because the model uses ARMIS data that are only embedded by Class A LECs, the proponents are currently unable to run the model for non-Class A LECs.⁹⁴¹

3. Discussion

a. Overview

268. We cannot recommend that any of the proxy models submitted in this proceeding thus far -- the BCM, the BCM2, the CPM, and the Hatfield model -- should be used to determine universal service support levels. While the proxy models continue to evolve and improve, none of those submitted in this proceeding are sufficiently developed to allow us to recommend a specific model at this time. We do believe, however, that a properly crafted proxy model can be used to calculate the forward-looking economic costs for specific geographic areas, and be used as the cost input in determining the level of support a carrier may need to serve a high cost area. The Joint Board therefore recommends that the Commission continue to work with the state commissions to develop an adequate proxy model that can be used to determine the cost of providing supported services in a particular geographic area, and in calculating what support, if any, a carrier should receive for providing services designated for universal service support.

269. We recommend that a proxy model be developed such that it can be adopted by the Commission by May 8, 1997, the statutory deadline for the Commission to implement our recommendations in this proceeding. It is understood that, in the time between this Recommended Decision and the Commission's final order, the Commission "shall afford the State members of the Joint Board an opportunity to participate in its deliberations . . ."⁹⁴² As a practical matter, this means that the federal and state staffs should coordinate and consult to the fullest extent necessary, and that the State members of the Joint Board are free to communicate their views, orally or in writing, together or separately, at any time. In particular, it is expected that the state and federal staffs will work collaboratively to conduct workshops with interested parties on the issues associated with the proxy models. To the extent that there may be independent State views on the proxy models, the state members of the Joint Board shall, at a minimum, submit a report on the outcome of the Joint Board staff efforts with sufficient time for the Commission to review prior to the issuance of an Order implementing this Recommended Decision. Such input would supplement the ongoing cooperative, consensus-oriented teamwork of the Joint Board members and staff.

⁹⁴¹ Letter from Michael Pelcovits, Chief Economist, MCI Telecommunications Corporation and Joel Lubin, Regulatory Vice President, AT&T Corp., to John S. Morabito, Deputy Chief, Accounting and Audits Division, Common Carrier Bureau, FCC (dated Aug. 26, 1996).

⁹⁴² 47 U.S.C. §410(c).

270. We find that forward-looking economic costs should be used to determine the cost of providing universal service. Those costs best approximate the costs that would be incurred by an efficient competitor entering that market. We believe that support should be based on the cost of an efficient carrier and should not be used to offset the costs of inefficient provision of service, or costs associated with services that are not included in our definition of supported services, such as private lines, interexchange services, and video services. For purposes of administering a national universal service system, proxy models are the most efficient method for determining forward-looking costs, and provide other benefits, such as the ability to determine costs at smaller geographic levels than would be practical using the existing cost accounting system. The actual level of support that a carrier receives from federal universal service support mechanisms, if any, would be based on the difference between the cost of service as determined by a proxy model and the benchmark amount, which we discuss in section VII.C.

271. While we recommend the use of proxy models in general, we recognize that the operations of some carriers could be placed at risk if their support was immediately determined by the use of a proxy model. As suggested by various commenters, the proposed proxy models' designs do not reflect the special characteristics of these carriers. First, none of the models adequately represents the costs for rural carriers as all the models are currently based on expense data for large LECs, serving predominantly urban areas. Second, small carriers, with their limited revenue streams, will be significantly affected if the model does not accurately reflect their costs. Third, the proxy models should be refined and modified to reflect the special characteristics of rural carriers before requiring those carriers to move to a proxy model for determining universal service support.

272. We therefore recommend that rural telephone companies, as defined in the 1934 Act, as amended,⁹⁴³ be allowed to continue using embedded costs as the basis for calculating universal service support for three years after the non-rural companies begin to use proxy models, which we anticipate would be on January 1, 1998. This would allow time to make any necessary refinements to the proxy model to tailor the model for rural companies. We recommend that the Commission include a review of the proxy model to ensure the appropriateness of the proxy model for rural carriers before requiring them to use a proxy model. In order to minimize any disruption or adverse impact of this change on the rural carriers, we recommend that during this three-year period rural carriers receive support from the high cost assistance, DEM weighting, and LTS based on historical per line amounts. At the end of the three-year period, rural companies would begin a transition to the use of a proxy model for determining their costs of providing the supported services. That transition would occur over three years. The unique nature of service in Alaska and the insular areas causes us to recommend that rural companies in those areas should not be shifted to a proxy model at that time, but should continue to receive support based on their embedded costs per

⁹⁴³ 47 U.S.C. § 153(37).

line pending further review of their situation.

b. Which costs to support

273. We recommend basing the universal service support for the non-rural eligible carriers on the forward-looking cost of providing the network used to provide the services included in our list of services recommended for universal service support pursuant to section 254(c)(1). The Joint Board recommends that the forward-looking economic cost of providing supported services should include all of the costs of the telephone network elements that are used to provide supported services. We acknowledge that the loop is essential for the provision of all services, not just those supported by the federal universal service mechanisms. We note, however, that supported services include not only local service but also access to interexchange service. The cost of loop can vary depending on the type of services provided. We recognize that the provision of ISDN and video services could increase the cost of the loop, but the additional loop costs incurred to provide these services should be excluded from costs considered here.⁹⁴⁴ In the proxy models, the fiber-copper cross-over point determines the relative share of fiber in the loop plant. We believe that the reasonable cross-over point should reflect the least cost provision of the supported services rather than the provision of video or advanced services.

274. Bell Atlantic and CompTel argue that the cost of providing supported services does not vary with non-loop costs, and thus, these costs do not affect average cost enough to change the amount of support received by any carrier.⁹⁴⁵ We disagree with their argument. Even if non-loop costs do not vary across density zones, we must still include non-loop costs in the cost estimate in order to estimate the total cost of providing the supported services. We note that, if any parts of the switch can be separately identified as required for only specific advanced services, such as a packet switch auxiliary used to process the ISDN signaling channel, then the costs associated with that part of the switch should not be included as costs of supported services.

c. Use of a proxy model

275. In order to ensure that a universal service support mechanism provides the

⁹⁴⁴ See, e.g., SWBT further comments at 5; USTA further comments at 8. We note that the Commission intends to initiate another proceeding to address the directive in Section 254(k) to "establish any necessary cost allocation rules, accounting safeguards and guidelines to ensure that services included in the definition of universal service bear no more than a reasonable share of the joint and common costs of facilities used to provide those services." 47 U.S.C. § 254(k).

⁹⁴⁵ Bell Atlantic further comments at 2; CompTel further comments at 9. Non-loop costs include switching, transport, signaling, corporate overheads, and billing and collection and other retail costs.

correct signals for entry, investment, and innovation in the long-run. It is vital that the Commission use forward-looking economic costs as the basis for determining support levels. If support is based on embedded costs for the long-run, then incumbents and new entrants alike will receive incorrect signals about where they should invest. Where embedded costs are above forward-looking costs, support of embedded costs would direct carriers to make inefficient investments that may not be financially viable when there is competitive entry. Where embedded costs are below forward-looking costs, support only of embedded costs will drive firms from the market, because the revenue per customer plus the support will be less than the forward-looking cost of providing the supported services. Therefore, support based on embedded costs could jeopardize the provision of universal service.

276. We conclude that setting support at forward-looking economic cost levels will allow us to construct a universal service support mechanism that will preserve and advance universal service and encourage efficiency. Competitive firms will provide service using an approximately efficient level of resources because, in those instances when revenues are not sufficient, the support mechanism will provide the additional funds required to maintain service. In principle, using cost estimates generated by proxy models is a reasonable technique for determining forward-looking costs. Proxy models, because they are not based on any individual company's costs, provide a competitively neutral estimate of the cost of providing supported services. In addition to estimating the forward-looking economic cost of deployment and operation of network facilities used to provide services supported under section 254(c), any proxy model adopted by the Commission should also include an estimate of forward-looking common costs so that universal service support based on such a model will cover a reasonable share of common costs and that together all services allow for recovery of all forward-looking costs.

277. We recommend that the Commission consider the following criteria in order to evaluate the reasonableness of any proxy model that it would use to estimate the forward-looking economic cost of providing the supported services:

- (1) Technology assumed in the model should be the least-cost, most efficient and reasonable technology for providing the supported services that is currently available for purchase, with the understanding that the models will use the incumbent LECs' wire centers as the center of the loop network for the reasonably foreseeable future.
- (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 forward-looking costs should be included. The costs should not be the embedded cost of the facilities, functions or elements.

- (4) The model should measure the long-run costs of providing service by including a forward-looking cost of capital and the recovery of capital through economic depreciation expenses. The long run period used should be a period long enough that all costs are treated as variable and avoidable.
- (5) The model should estimate the cost of providing service for all businesses and households within a geographic region. This includes the provision of multi-line business services. Such inclusion allows the models to reflect the economies of scale associated with the provision of these services.
- (6) A reasonable allocation of joint and common costs should be assigned to the cost of supported services. This allocation will ensure that the forward-looking costs of providing the supported services do not include an unreasonable share of the joint and common costs incurred in the provision of both supported and non-supported services, e.g., multi-line business and toll services.
- (7) The model and all underlying data, formulae, computations, and software associated with the model should be available to all interested parties for review and comment. All underlying data should be verifiable, engineering assumptions reasonable, and outputs plausible.
- (8) The model should include the capability to examine and modify the critical assumptions and engineering principles. These assumptions and principles include, but are not limited to, the cost of capital, depreciation rates, fill factors, input costs, overhead adjustments, retail costs, structure sharing percentages, fiber-copper cross-over points, and terrain factors. The models should also allow for different costs of capital, depreciation, and expenses for different facilities, functions or elements.

278. The parties have brought three models to our attention in this proceeding. In general, the models submitted are based on a local exchange telephone network designed to meet the total demand on the network, where demand is measured by the number of lines served and minutes of use. The network consists of outside plant facilities and central office equipment. Investment is expressed as an annual expense by applying annual charge factors to the models' estimates of investment. Joint and common costs and retail costs are added to the plant related costs to define the total cost of service.⁹⁴⁶

279. While the models hold much promise, at this time, we cannot endorse a

⁹⁴⁶ Letter from Glenn Brown, U S West, to William F. Caton, Acting Secretary, FCC (dated Sept. 4, 1996). Letter from Richard N. Clarke, AT&T, to William F. Caton, Acting Secretary, FCC (dated Sept. 10, 1996). PacTel comments at App. D.

specific model as the tool the Commission should use for calculating costs of supported services. We conclude that the BCM2 and the Hatfield Model Version 2.2. Release 2 (Hatfield Model) are the best available basis for future development of an acceptable proxy model at this time. We cannot evaluate the CPM at this time, because a complete working version of the model, that includes all formulae and data, has only recently been filed in this proceeding.⁹⁴⁷ The CPM suffers from the flaw that significant amounts of input values and information are considered proprietary.⁹⁴⁸

280. Appendix F contains a cursory review of the models and highlights some of the differences between BCM2 and the Hatfield model. Among the issues that will need to be addressed before a specific proxy model can be accepted are the different assumptions regarding basic input levels; the relationships between the inputs; why certain functionalities included in one model are not present in the other models; and the unique set of engineering design principles in each model. Until we can establish reasonable values for the assumptions and technical relationships that underlie the models we cannot recommend the adoption of a particular model or combination of the models.

281. We urge the Commission to conduct a series of workshops at which federal and state staff can work with industry participants to refine the models so that it could become possible to select or create a proxy model that could then be used in calculating universal service support. We recommend that these workshops begin no later than January 1997.

282. The state members of the Joint Board will submit a report to the Commission on the use of proxy models and their application in this proceeding for funding universal service. The report of the state members will be filed prior to a Commission decision in this proceeding on proxy models. The Commission and state members should continue to work cooperatively and remain integrally involved in the development of an acceptable proxy model.

d. Rural Carriers

283. While we recommend using forward-looking economic costs calculated through the use of a proxy model to determine high cost support for all carriers, we are concerned that moving small, rural carriers to a proxy model too quickly may result in large changes in the

⁹⁴⁷ On October 25, 1996, PacTel filed a demonstration CD ROM disk of the national run of the CPM. However, because, according to PacTel, the software contains trade secrets, PacTel filed it with a Request for Confidential Treatment, and included a software license agreement that parties must sign before being able to obtain a copy of the CD ROM. See Letter from Alan Ciamporcero, Vice President, Pacific Telesis, to William F. Caton, Acting Secretary, FCC (dated Oct. 25, 1996).

⁹⁴⁸ Letter from Alan F. Ciamporcero, Pacific Telesis, to William F. Caton, Acting Secretary, FCC (dated Oct. 25, 1996).

support that they receive. Since rural carriers generally serve fewer subscribers relative to the large incumbent LECs, serve more sparsely populated areas, and do not generally benefit from economies of scale and scope as much as non-rural carriers, they often cannot respond to changing operating circumstances as quickly as large carriers.⁹⁴⁹ We therefore recommend that those carriers not move immediately to a proxy model, but transition to a proxy over six years. For three years, starting on January 1, 1998, high cost assistance, DEM weighting and LTS benefits for rural carriers will be frozen based on historical per line amounts. Rural carriers would then transition over a three year period to a mechanism for calculating support based on a proxy model. Prior to that transition, however, we recommend that the Commission, working with the state commissions, review the proxy model to ensure that it takes into consideration the unique situations of rural carriers. We emphasize our recommendation that, after the transition, the calculation of support for rural telephone companies should be based on a proxy model, although we recognize that alternative support mechanisms, such as competitive bidding, may also promote efficient service provision. Further, we recommend that, on request, any rural carrier should be permitted to elect to use a proxy model to determine its support level, and that any carriers electing to use the proxy model not be allowed to use the embedded cost approach thereafter.

284. As we stated in discussing the use of a proxy model, we conclude that a properly designed cost proxy model would allow carriers serving high cost areas to charge affordable rates. We thus disagree with those who contend that using embedded costs is the only way to set the level of universal service support needed to accomplish affordable rates because no statutory or economic reason exists for calculating high cost support based on embedded costs. We are also not persuaded that, as Cincinnati Bell asserts, a carrier of last resort must recover its costs through an embedded cost methodology.⁹⁵⁰

285. We find, however, that, because of the difficulty in precisely modelling small, rural carriers' costs, they should continue to draw high cost support calculated based on an embedded cost methodology until we have more experience with the proxy models. We therefore recommend that rural carriers transition to the proxy methodology adopted for calculating high cost support in areas served by non-rural incumbent LECs. The Joint Board recommends that rural carriers should begin shifting to a proxy-based system three years after the implementation of a proxy-based methodology for non-rural LECs and the Commission, working with the state commissions, has reviewed the appropriateness of using a proxy model for rural carriers. At that time, rural carriers will begin draw an increasing percentage of their high cost support based upon a proxy-based system during the subsequent three years. The Joint Board concludes, however, that rural companies operating in Alaska and insular areas

⁹⁴⁹ See, e.g., Alaska Tel. comments at 4; Harris comments at 11; OITA-WITA comments at 11-12; SDITC reply comments at 5.

⁹⁵⁰ See Cincinnati Bell comments at 11.

should not be required at this time to use a proxy model until further review. Thus, at the end of a six-year period after proxies are initiated for large LECs, all LECs including rural LECs, but excepting LECs in Alaska and insular areas, will be on a proxy-based system.

286. The Joint Board recommends, however, that rural carriers be able to move to a proxy-based system earlier if they choose to do so. We recognize that rural carriers will choose to move earlier only when the proxy cost is greater than the embedded cost. Providing the rural carriers this opportunity is necessary to ensure that rural carriers have an incentive to invest in the facilities required to provide the supported services. The alternative, limiting rural carriers to embedded costs when forward-looking economic costs are greater than embedded costs, would encourage rural carriers to withdraw service in high cost areas or require rural carriers to incur an economic loss in the provision of the supported services.

287. We recommend that the Commission define "rural" as those carriers that meet the statutory definition of a "rural telephone company."⁹⁵¹ In order for the administrator to know which carriers are to receive support payments based on the proxy model or their embedded costs, we recommend that carriers notify the Commission and the state commissions that for purposes on universal service support determinations they meet the definition of a "rural telephone company." Carriers should make such a notification each year prior to the beginning of the payout period for that year. The carriers may also use that notification as the means by which to let the Commission, the state commissions, and the administrator know if they have chosen to voluntarily move to a proxy model before the end of the transition period.

288. Although many of the suggestions on how to improve the existing high cost support mechanisms provided by the commenting parties have merit, we do not find it appropriate to radically change the method of calculating such support in light of the short time period that will elapse between now and when rural carriers receive support based on a proxy methodology. We also find that LTS payments constitute a universal service support mechanism. As the Commission noted in the NPRM, LTS payments serve to equalize LECs' access charges by raising some carriers' charges and lowering others'. While some commenters have noted the beneficial purposes currently served by LTS, no commenter argued that LTS was not a support flow.

289. We therefore recommend that beginning in 1998 and continuing to the end of the year 2000, support payments for high cost assistance, DEM weighting and Long Term Support, be frozen for each carrier at the same amounts paid on a per line basis to qualifying carriers. High cost support would be based on the assistance received in 1997, and DEM weighting and LTS benefits received during calendar year 1996. Beginning in the year 2001, and through the year 2003, we recommend that support be gradually shifted to a proxy-based

⁹⁵¹ 47 U.S.C. § 153(37).