IV. Validation

Staff also inquires about a number of model validation issues, such as consistency of model results with independent estimates and the potential for independent evaluation.[16]

While the standardization of proxy model input values may bring their statewide average results closer together,[17] the key question is how well these costs relate to those of a dynamically efficient actual firm, at both the statewide and sub-state (e.g., wire center) levels of detail. For those companies that file ARMIS reports, ARMIS provides a good starting point for developing forward-looking expenses because the most recent experience of actual firms provides the best prediction of future expenses. For those companies that do not file ARMIS reports, it should be determined whether there are suitable reports the companies file (e.g., reports with state commissions) that provide similar information. However, ARMIS or similar sources, are not likely to provide a good prediction of forward-looking investment costs.

Booked capital values (i.e., telephone plant in service) are not likely to provide a good prediction of forward-looking investment costs because booked values are based on historic costs, not current or forward-looking costs. Booked

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[16] Staff Analysis, pp. 5-7.

[17] In the recent FCC workshops on proxy cost models, we found that three key input assumptions accounted for most of the difference between the Hatfield and BCM2 models: inclusion of exclusion of non-Bell territories, assumptions regarding the sharing of structures with non-telephone utilities, and the assignment of overhead costs.

values for plant in service are also affected by regulatory depreciation rates that likely reflect longer lifetimes than economic depreciation rates would. At the very least, an adjustment to booked values is needed to reflect the true economic value of plant in service. These adjusted values may provide a good starting point for assessing the appropriate forward-looking network investments. In addition, an engineering assessment of forward-looking network investment is required.

The validation of forward-looking network investments requires an engineering assessment of the network design produced by the models to ensure that the models construct networks that meet the demands of the customer base to be served at the appropriate service quality levels.[18] This is particularly true at sub-state levels of detail. Getting it right "on average" can still result in significant deviations for serving areas below the state level. For example, it was pointed out in the FCC Cost Proxy workshops that for some specific serving areas analyzed, the Hatfield model does not provide enough distribution plant to provide service all customers in the area. Also, even though BCM2 has modeled non-Bell territories, more needs to be done to ensure the accuracy of network designs in lower-density serving areas for both Bell and non-Bell companies.

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[18] An example of such an engineering assessment is the report "Engineering Evaluation of Cost Proxy Models for Determining Universal Service Support: Hatfield Model 2.2, Release 2" prepared by Price Technical Services, Inc. and Austin Communications Education Services, Inc. and filed by the USTA on February 5, 1997.

The fact is almost every company has unique serving areas that will not be adequately captured by any proxy model. This is important to realize when contemplating the use of such models. As we discussed in the previous section, such limitations are particularly important if the models are considered for setting price levels of unbundled network elements or restructuring access service rates. This is especially critical for those telephone companies who have a relatively greater dependence on affected services, such as access, as a source of revenue.[19]

A number of steps could be taken to assess the accuracy of the models in laying out their networks. For example, specific serving areas for various density groups could be independently analyzed by a group of expert network engineers and the results of each proxy model could be compared to this standard. Additionally, statistics on loop miles or other physical measures of the network could be compared with the model results to determine if the network layout produced by the models is adequate.

I. Conclusion

In responding to Section III of the Staff Analysis, we have focused on three issues: the appropriate interpretation of forward-looking economic costs;

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[19] The USTA has noted that access revenues account for approximately 60 percent of revenues, on average, for rate of return companies, and reach as high as 80 percent. See Comments of the United States Telephone Association, CC Dockets 96-262, 94-1, 91-213, 96-263, January 29, 1997, p. 11.

the ability to use proxy models for multiple objectives; and the validation of proxy models.

We demonstrate that the appropriate economic viewpoint is that of a dynamically efficient actual firm, not a hypothetical statically efficient firm. The common, but incorrect, "blank slate" interpretation of an efficient entrant does not represent the achievable performance of an efficient incumbent or entrant. The consequences of applying the "blank slate" interpretation is that actual firms, even if they are perfectly efficient, will not be able to recover their costs. Moreover, potential entrants would find themselves in a similar predicament if they entered. Thus, holding to this interpretation would deter entry into these markets in contrast to the stated goals of the 1996 Telecommunications Act.

Proxy models are usable, at best, for distinguishing high-cost from low-cost areas for universal service funding purposes. Currently, the proxy models on the record cannot perform multiple functions, such as determine the costs and rates of unbundled network elements or the new rate structure for access services. In addition to lacking sufficient design and input detail, the FCC's interpretation is transforming costing models into pricing formulae. As markets for unbundled elements and access services become more competitive, prices will be determined by market forces, not costing models.

Because input assumptions have a significant impact on proxy model results, input validation is critical. However, models must also be checked against network engineering standards to ensure the models accurately portray

efficient networks, capable of providing high-quality service to all customers they are designed to serve. In particular, much more effort needs to be concentrated on modeling lower-density, sub-state regions.

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In the Matter of	)	DA 97-56
	)	CPD Docket 97-2
Federal-State Joint Board on Universal Service	)	
	)	CC Docket No. 96-45
Implementation of the Local Competition Provisions of the Telecommunications Act	)	CC Docket No. 96-98

COMMENTS OF WORLDCOM, INC. ON FORWARD-LOOKING ECONOMIC COST PROXY MODELS

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Dated: February 18, 1997

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COMMENTS OF WORLDCOM, INC. ON FORWARD-LOOKING ECONOMIC COST PROXY MODELS

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COMMENTS OF WORLDCOM, INC. ON FORWARD-LOOKING ECONOMIC COST PROXY MODELS

INTRODUCTION AND SUMMARY

WorldCom, Inc., through its subsidiary, MFS Communications Company, Inc. ("MFS"), by its undersigned counsel and pursuant to the Common Carrier Bureau's ("Bureau") request for comments released on January 9, 1997 in the above captioned proceeding, submits these comments on the Staff's analyses of forward-looking economic cost proxy models.[1/]

MFS believes that cost proxy models are an appropriate mechanism for determining the level of universal service support in high-cost areas and for determining the price of unbundled network elements. Because they use public data and the assumptions are generally explicit, cost proxy models are vastly superior to the proprietary models that incumbent carriers have traditionally used to analyze their costs. Moreover, using cost proxy models to determine universal service support and set the price of unbundled network

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1/ *The Use of Computer Models for Estimating Forward-Looking Economic Costs: A Staff Analysis* (January 9, 1997) (hereafter cited as "Staff Cost Report").

elements generally "delinks" the incumbent providers' embedded costs from high-cost support and the price of unbundled elements and, with the adjustments MFS suggests, such costs will emulate the costs that would prevail in a competitive environment.

MFS recommends that cost proxy models reflect the costs of an efficiently configured new entrant and the dynamic characteristics of a competitive market. Specifically:

- Cost proxy models should reflect the minimum costs of a new competitor and not the costs of a monopoly provider that builds a network capable of serving all segments of the entire market. Cost proxy models should also reflect geographic cost differences.
- Cost proxy models should reflect the incremental (not stand-alone) costs of providing the minimum grade of service required by Congress (*e.g.*, the network design standard set for rural carriers by statute) and the Commission (*e.g.*, service quality standards set to encourage deployment of access to advanced services, or service standards set for unbundled network components). Because cost proxy estimates are estimates of the forward-looking costs of efficient competitors, they should not reflect the costs (if any) of upgrading an incumbent's network to meet minimum network standards.
- Cost proxy estimates should be lower than the prices willingly offered by incumbents and lower than the incumbent carrier's embedded costs.
- Cost proxy estimates should be periodically reduced to reflect the incentives that competition creates to reduce costs and improve efficiencies.

In these comments, MFS also offers its suggestions regarding various input values and appropriate loop design. In general, MFS suggests that input values reflect the values of efficiently configured competitive firms rather than the values of the incumbent provider.

I. CRITERIA FOR EVALUATING ECONOMIC COST PROXY MODELS

The Bureau requested comments on the criteria for evaluating an economic cost model, specifically asking commentors to identify the criteria they believe are most important. In the sections that follow, MFS recommends:

- ***Economic proxy cost models should reflect the forward-looking economically relevant costs of efficient market entrants that operate in a competitive market.*** Specifically, cost proxy models should reflect the costs of competitive firms that serve segments of the market (geographic and otherwise) rather than the costs of a monopolist that builds a network to serve the entire market demand. At a minimum, economic cost models should reflect the cost differences of geographic areas.
- ***Cost proxy models should also reflect the incremental (not stand-alone) costs of a forward-looking network design*** capable of satisfying the statutory requirements for rural carriers (1Mb transmission speeds and video), the advanced design standards that the Commission requires for unbundled loop facilities (loop conditioning capable of supporting advanced services like ADSL), and the design standards that the Commission might require to advance explicit statutory requirements for access to advanced telecommunications services. As described below, MFS believes that an all copper design would produce the lowest total loop plant cost and, as MFS demonstrated at the Commission's Bandwidth Forum, with appropriate electronics such loops can be used to provide high-speed digital services.
- ***Cost proxy estimates should be bounded by ceilings that reflect real-world competitive information.*** Cost proxies that reflect competitive costs should never be

higher than the prices willingly offered by incumbent carriers for unbundled network elements, and never higher than the embedded costs incumbent carriers assert they are entitled to recover.

- ***Cost proxy estimates should be periodically adjusted to reflect the incentives competition creates to reduce costs***. MFS suggests either a price-cap like adjustment mechanism that would reduce cost proxy estimates similar to how the productivity factor in price caps reduces the price caps cost proxy (GNP-PI), or a requirement that cost proxies be no higher than the lowest price offered by competitors of a specific size (*e.g.*, greater than 5%) in a specific geographic market.

A. Economic Cost Proxy Models Should Reflect the Geographically Deaveraged Forward-Looking, Economically Relevant Costs of Efficient Market Entrants Operating in a Dynamic Competitive Environment

In its report, the Staff concludes that "[i]n dynamic, competitive markets, firms base their actions on the relationship between market-determined prices and forward-looking economic costs."[2] In its recommended decision in the universal service docket, the Joint-Board recommends that forward-looking economic costs should be used to determine the costs of providing universal service. It describes forward-looking costs as the costs that an efficient competitor would incur to provide service.[3] Likewise, in its *Interconnection Order*, the

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[2] *Staff Cost Report* at ¶ 9.

[3] *In the Matter of Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, FCC 96J-3, Recommended Decision, at ¶ 270 released Nov. 8, 1996 (hereafter cited as "*Joint-Board Recommended Decision*"). "We find that forward-looking economic costs should be used to determine the cost of providing universal service. Those (continued...)

Commission described its costing methodology for interconnection, unbundled elements and collocation as a methodology that "best replicates, to the extent possible, the conditions of a competitive market."[4] Consistent with those decisions, a cost proxy model should develop estimates of the geographically deaveraged economically relevant costs of a competitive market.

1. *Cost Proxy Models Should Develop Cost Estimates of Efficiently Configured Competitors*

Obviously, the cost estimates produced by a cost proxy model are not necessarily the total costs that an individual carrier -- incumbent or new entrant -- actually experiences given its network, demand and services. Cost proxy models should not be intended to develop estimates of the incumbent carrier's aggregate costs, but rather, should develop an estimate of the costs that would prevail in a competitive environment. Said differently, it is important not to confuse the economic cost proxies and efforts by incumbent carriers to guarantee

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[3] (...continued)
costs best approximate the costs that would be incurred by an efficient competitor entering the 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 of 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."

[4] *In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, CC Docket 96-98, First Report and Order at ¶ 679 (released Aug. 8, 1996). (hereafter cited as "*Interconnection Order*")

recovery of their individual costs generated by their past inefficient network deployment decisions. In a competitive environment, no firm is guaranteed recovery of its costs . Firms recover their costs only by offering services and technologies at least as efficient as their competitors and only if they successfully attract sufficient numbers of customers.

A cost proxy model used to estimate the forward-looking economic costs of efficiently configured competitors should do more than determine the static engineering characteristics of an efficiently configured network. The costs and scale of efficient competitors are fundamentally different than monopolists. An efficient monopolist builds a network designed to serve the entire market demand. In contrast, an efficient competitor may build a network to serve a particular geographic area or customer segment of the entire market. Thus, to reflect the costs of efficient competitors, a cost proxy model should not estimate the total costs of building a monopoly network, but should estimate the costs of competitors that each serve a segment of the market.

Also, carriers' costs are, in part, determined by the demand for its services and the technology it uses to serve its market segment. For example, MFS can economically serve customers who are located near its network, but it may be prohibitively expensive to serve customers who are far from MFS's network. Likewise, a wireless carrier may have a system that is technologically capable of economically serving a portion of the market, but the costs may be prohibitive to use such technologies to meet the entire market demand. Both MFS and a wireless carrier might be efficient entrants in specific segments of the market, but neither could efficiently serve the entire market with their existing networks or technology.

Figure 1 illustrates the problem. Figure 1 shows the average costs of a monopolist that builds a network to serve the entire market demand, and the average costs of several competitors that serve specific segments of the market -- such as MFS or a wireless carrier. For its market segment, an individual new entrant may have average costs that are far lower than the monopoly provider. However, to serve the entire market an individual competitor's average costs may be greater than the monopolist's average costs. However, the entire market demand can be served at lower average costs by several competitors each sized to serve individual market segments rather than a single monopoly provider sized to serve the entire market.

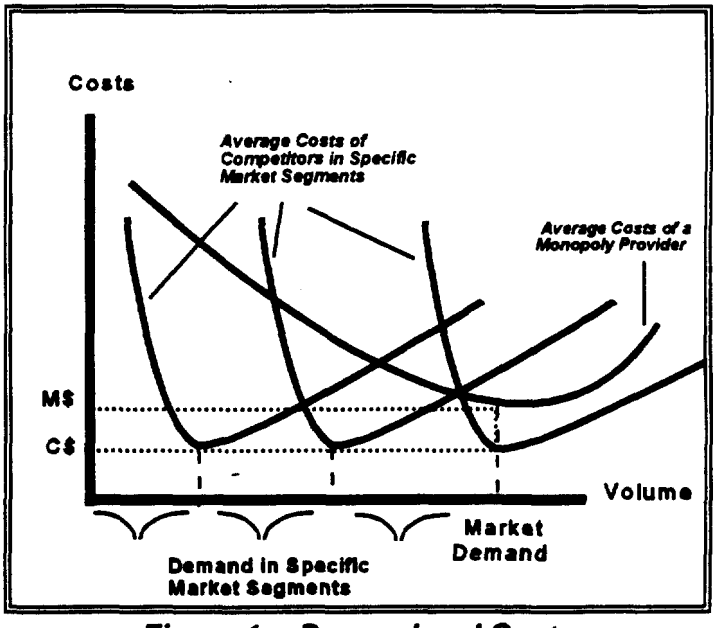

Figure 1 -- Demand and Costs

As shown in Figure 1, an efficiently configured competitor serving a particular segment of total market demand achieves minimum costs in that particular market segment at a demand level that results in average costs of C$. An efficiently configured monopolist that builds a network to serve all segments of the market achieves its minimum average costs at M$, which are higher than C$. In a competitive environment, costs would equilibrate at average costs of C$, not M$. Thus, an economically efficient market structure would result in a competitive market that is a collection of competitors, each with average costs of C$ and

each serving a segment of the market, and not a single monopolist with average costs of M$. To capture this dynamic, *a proxy cost model should develop cost estimates that reflect the minimum costs of a collection of least-cost networks rather than the least cost point of a single network sized to meet the entire market demand.*[5/]

It is important to emphasize that *cost proxy models should always produce cost estimates that are lower than or equal to the monopolist's costs*, but not higher than a monopolist's costs.[6/] Figure 1 illustrates a market where a new entrant's average costs are lower than a monopoly (incumbent) provider at low levels of demand. Certainly, an industry may be a "natural monopoly" where the average costs of a monopoly provider are lower than the average costs of a single provider *at every level of demand or in every geographic area*. However, in such cases, competition would be impossible, so it would make little sense to

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5/ Today, the telecommunications industry is composed of a collection of firms that each serve segments of the market. Bell Operating Companies serve particular segments of the market, rural independent telephone companies serve segments of the market, wireless carriers serve segments of the market, etc. While firms may have a monopoly in their specific segments of the market, a single monopolist does not serve the entire U.S. telecommunications market.

6/ The possibility that the costs of deploying new facilities may be higher than embedded costs was raised in a letter to the Commission signed by five of the Department of Justice's former chief economists (Bruce Owen, Lawrence White, Frederick Warren-Boulton, Robert Willig, Janusz Ordover) (Dec. 3, 1996). There are many reasons why the incumbent carrier's embedded costs might differ from the forward-looking costs produced by a cost proxy model. An incumbent carrier's facilities may have been deployed prior to development of a business park or suburb, and a new entrant would face substantially higher costs to deploy its network in a developed area. Likewise, local authorities may impose franchise fees or landlords impose building access fees on new entrants that are not imposed on incumbent carriers. For long-lived plant, such as local loop facilities, many of the costs of deployment were incurred at a time when unit input costs (*e.g.*, labor rates, price of cable) were substantially lower. On the other hand, technological advances may reduce the unit cost of many facilities. For example, advances in computer technology have reduced unit switching costs.

develop a cost proxy model to estimate "competitive" costs that are higher than monopoly costs. In competitive markets, competitive entry ordinarily occurs only when new entrants are more efficient than the incumbent.

As they are presently constructed, the cost proxy models being considered by the Commission estimate the costs of a single, monopoly provider with a network sized to meet the entire market demand for a wire center. For example, the deployment of feeder and distribution facilities in the cost proxy models assume a plant size sufficient to serve the entire population of all the census blocks associated with a particular wire center. While the models develop a network composed of different cost-minimizing technologies reflecting various physical characteristics (*e.g.*, they deploy fiber or copper at specified levels of demand and loop lengths), they do not develop estimates of the costs of efficient competitors that each serve a segment of the market. In a sense, interpreting the cost proxy models being considered by the Commission is like analyzing a model of the US economy that assumes that a single firm produces all goods and services.

As a practical matter, however, it may be difficult (if not impossible) to develop *a priori* estimates of the costs of multiple competitors that each serve a segment of the market.[7] This failure, however, is not fatal. The cost proxy models that are based on a single service provider should be interpreted to provide a cost ceiling estimate. That is, the costs that would prevail in a competitive environment can be no higher than the cost estimates produced by a monopoly cost proxy model. This difficult task may best be overcome by using prices to

[7] For example, one would have to cross-tabulate the technologies a competitor might use (*e.g.*, wireless, landline, copper, fiber) with all the potential market segments a firm might enter (*e.g.*, downtown areas, business parks, suburban areas, etc.).

bound cost estimates (as described below) and relying on state regulation of incumbent carriers until effective competition develops.

2. *Cost Proxy Models Should Develop Cost Estimates that Reflect the Cost Differences between Geographic Market Segments*

Cost proxy models should develop cost estimates that reflect differences between various geographic market segments. In its *Interconnection Order*, the Commission ordered that the rates for unbundled network components be geographically deaveraged into at least three geographic zones based on cost differences that might exist between various geographic areas.[8] In developing its interim unbundled loop proxy prices, the Commission did so in recognition that the costs of providing unbundled loops in Nevada, for example, were different than the costs of providing such facilities in New York.

Figure 1, above, illustrates how costs might be geographically deaveraged in a competitive market. C$ could represent the average costs of serving a specific geographic segment of the market rather than the entire market. Thus, the competitive equilibrium in a competitive market might be a collection of C$ for several geographic market segments. In a competitive market, new entrants may choose to serve some markets and not others. However, the determination of geographically-developed competitive costs should not be confused with the geographically averaged price that a monopoly incumbent provider might need to charge in a competitive environment to cover its total costs. *In a fully competitive market*,[9] incumbents should be both allowed and encouraged to deaverage prices to match

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[8] *Interconnection Order* at ¶¶ 764-766.

[9] If the market is not fully competitive, allowing the incumbent provider unlimited pricing (continued...)

the prices of new entrants in low cost markets and to set more economically realistic prices in high-cost areas. This would result in market segmentation with prices that reflect both the costs of multiple entrants and geographic deaveraging. Geographic deaveraging would incent incumbents to become more efficient (by matching the prices and costs of competitors) and bring competition to high-cost areas -- areas that generally are unattractive today because the geographically averaged prices are artificially held below the economically relevant costs to serve high-cost segments of the market.[10/]

The cost proxy models reflect varying degrees of geographic deaveraging. Figure 2 (attached) compares the results of the Benchmark Cost Model (BCM2) and Hatfield 2.2.2 models with the loop costs reported by NECA. Specifically, it shows the statewide average cost per loop per month plotted against each state's average density (loops per square mile). For statewide data, BCM2 results (using the default BCM2 assumptions) were systematically higher than the embedded loop costs reported by NECA. For Bell Operating Company data, the Hatfield model results (using the default Hatfield assumptions) were systematically lower than the corresponding NECA loop costs. For all data sets, as density increases, costs per

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9/ (...continued)
flexibility may give it the ability to restrict the development of competition by targeting the market segments where its competitors are concentrated and subsidizing targeted price reductions with price increases in less competitive market segments.

10/ In its universal service comments, MFS suggests that the relevant geographic areas be defined using zip codes.

loop decline. Thus, regardless of the data set, the models unambiguously display significant geographic cost differences.[11]

A power curve was fit to the data to estimate the precise relationship between loop costs and density.[12] Table 1 shows the relationship between density and loop costs for the various data sets.

Table 1 -- Loop Costs and Density

MODEL	PERCENTAGE DECREASE IN LOOP COSTS ASSOCIATED WITH A 10% INCREASE IN DENSITY (T-STATISTIC) [R^2]
BCM 2	1.53% (8.0) unweighted R^2 =.67; weighted R^2 = .99
Hatfield 2.2.2	1.94% (9.1) unweighted R^2 = .82; weighted R^2 = .99
NECA -- Statewide	1.13% (2.8) unweighted R^2 = .28; weighted R^2 = .99
NECA -- BOCs Only	1.4% (unweighted regression) (not significant) Unweighted R^2 = .33

11/ MFS has submitted a petition for preemption and a declaratory ruling that loop rates must reflect geographic cost differences. In the Matter of MFS Communications, Inc. Petition for Preemption and Declaratory Ruling Regarding Geographical Deaveraging, CCB/CPD 97-1.

12/ A power curve was used because the functional form fit the data better than other functional forms (*e.g.*, linear equations) and because interpretation of the coefficients was more direct (*i.e.*, the coefficients produced by a power curve provide direct estimates of the elasticity of a particular variable). Because there are substantial size differences between states (*e.g.*, California has substantially more lines than New Hampshire), weighted least squares was used to estimate the regressions with the number of lines used as the weights. Data from the BCM2 and Hatfield 2.2.2 models were used because the later versions of the models were unavailable to MFS for analysis at the time it prepared these comments.

Thus, irrespective of whether one examines data for all incumbent carriers (*i.e.*, NECA embedded cost data, data for an efficiently configured monopoly provider (BCM2 or Hatfield), or just data for the Bell Operating Companies, there are substantial geographic cost differences.

B. Economic Cost Proxy Models Should Reflect the Incremental Costs of Forward-Looking Design Standards

The Staff observes that cost proxy models "should, at a minimum, be able to estimate the full stand-alone costs of the minimum set of network elements capable of delivering traditional voice telecommunications service and narrowband data services, at currently acceptable quality levels."[13] MFS respectfully disagrees. As described below, a cost proxy model should reflect network standards higher than traditional voice telecommunications and such models should reflect incremental costs rather than stand-alone costs. It is important to note that while cost proxies should reflect higher network standards, cost proxy estimates should be developed independent of the costs of any individual carrier, and thus, would not include any costs associated with upgrading an existing network to conform with forward-looking network design standards.

1. Cost Proxy Models Should Reflect the Incremental Costs of a Forward-Looking Network Design

Cost proxy models should provide estimates of the incremental costs of a forward-looking network design, and not just the costs associated with ordinary voice and narrow-band data services. Throughout the Commission's universal service proceeding, MFS has urged

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[13] *Staff Cost Report* at ¶10. [emphasis added]

the Commission to establish a network design standard that promotes access to advanced telecommunications and information services in all regions of the Nation -- a universal service policy principle that is specifically listed in §254(b),[14] and a policy goal featured prominently throughout the Telecommunications Act.[15] To promote access to advanced services as required by §254(b)(2), MFS suggested [16] that the Commission adopt the network modernization standards mandated by Congress for rural telephone companies in the Rural Electrification Loan Restructuring Act of 1993 (RELRA).[17] The RELRA requires state or territorial public utility commissions or borrowers to develop network modernization plans as a prerequisite for otherwise eligible carriers to receive federally subsidized loans for telecommunications utilities.[18] Application of the statutory network modernization standard is

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[14] 47 U.S.C. §254(b)(2). "Access to advanced telecommunications and information services should be provided in all regions of the Nation."

[15] 47 U.S.C. §§ 254(b)(2) (access to advanced services), (b)(3) (rural access to advanced services), (b)(6) (access to advanced services for schools, health care providers and libraries), (h)(2) (advanced services for schools, health care providers and libraries), and, 706 (regulators shall encourage the deployment of advanced telecommunications capabilities).

[16] MFS's recommendation is described more completely in its universal service (CC Docket 96-45) Comments at pp. 3-12 (December 19, 1996), its Reply Comments at pp. 3-6 (January 12, 1997), its initial Reply Comments at pp. 12-18 (filed May 7, 1996), the comments it filed in response to two subsequent requests for information filed with the Joint Board and the Commission on August 2, 1996 (pp. 11-28) and August 9, 1996 (pp. 3-5), and in a written *ex parte* filed with the Commission and members of the Joint Board on October 17, 1996.

[17] 107 Stat. 1356, codified in 7 U.S.C. § 935 (1994).

[18] The Act specifically requires that
"a telecommunications modernization plan must, at a minimum, meet the following objectives:

(continued...)

clearly feasible since the Rural Utilities Service (RUS) has promulgated rules implementing the above statute[19] and implementation plans from the majority of states and territories (many with substantial rural, high-cost and/or low-income populations) have been filed with and approved by the RUS.[20] If Congress set these minimum standards for rural telephone companies as a prerequisite for receipt of federal subsidies, they should also be the minimum design standard for all local telecommunications providers as a prerequisite for federal universal service subsidies, absent a showing of technical infeasiblity.[21] MFS is not suggesting that high-capacity services or deployment of broadband networks be subsidized

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18/ (...continued)
- (I) The plan must provide for the elimination of party service.
- (ii) The plan must provide for the availability of telecommunications services for improved business, educational, and medical services.
- (iii) The plan must encourage and improve computer networks and information highways for subscribers in rural areas.
- (iv) The plan must provide for --
  - (I) subscribers in rural areas to be able to receive through telephone lines --
    - (aa) conference calling;
    - (bb) video images; and,
    - (cc) data at a rate of at least 1,000,000 bits of information per second; and,
  - (II) the proper routing of information to subscribers."

7 U.S.C. §935(d)(3)(B). [emphasis added]

19/ 7 C.F.R. §1751.106 *et seq.*

20/ MFS's Attachment 1, filed with its universal service Comments (December 19, 1996), shows the status of plans filed with the RUS.

21/ For example, a wireless carrier might not be able to develop a network capable of 1Mbs transmission speeds simply because it cannot obtain sufficient spectrum due to limited spectrum and regulations governing allocation of spectrum. In such instances, where a carrier cannot conform with the requirements due to factors beyond its control, the minimum network standards should be waived.

by universal service funds; it is merely suggesting that cost proxies reflect and networks be capable of at least the same transmission speeds that Congress requires of rural telephone borrowers. By making such capabilities a prerequisite for receipt of universal service funds, the Commission will encourage the deployment of and access to advanced telecommunications and information services as required by §254(b)(2).

Likewise, in its *Interconnection Order*, the Commission required that incumbent carriers make available loops capable of supporting advanced services.

> Our definition of loops will in some instances require the incumbent LEC to take affirmative steps to condition existing loop facilities to enable requesting carriers to provide services not currently provided over such facilities. For example, if a competitor seeks to provide a digital loop functionality, such as ADSL, and the loop is not currently conditioned to carry digital signals, but it is technically feasible to condition the facility, the incumbent LEC must condition the loop to permit the transmission of digital signals. Thus, we reject BellSouth's position that requesting carriers "take the LEC networks as they find them" with respect to unbundled network elements. As discussed above, some modification of incumbent LEC facilities, such as loop conditioning, is encompassed within the duty imposed by section 251(c)(3). The requesting carrier would, however, bear the cost of compensating the incumbent LEC for such conditioning.[22]

Thus, the Commission's *Interconnection Order* expressly rejects the notion that interconnectors must "take LEC networks as they find them" or that loops merely be capable of supporting voice-grade telecommunications.

A cost proxy model ought to reflect a network design standard capable of satisfying the Congressional prerequisite for rural carriers, the forward-looking design that the Commission mandated for unbundled loops, and whatever design standards the Commission might require to advance the explicit statutory requirements for access to advanced telecommunications

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[22] *Interconnection Order* at ¶ 382. [emphasis added]

services. As MFS showed recently with its high-speed Internet access demonstration at the Commission's Bandwidth Forum,[23] ordinary copper loops less than 18,000 feet long that are free from load coils and bridge taps are capable of supporting advanced, high-speed services.[24] Thus, specifying a forward-looking network design in cost proxy models need not result in costs that are substantially different than the costs of a network capable of delivering only voice-grade telecommunications.

The required design standard has a direct impact on the technologies selected to model loops. For example, if the model incorporates only the technologies necessary to provide voice grade switched services, the proper mix might be copper loops with loading coils at the proper points. MFS believes an all copper design would, in fact, produce the lowest total loop plant cost. [25] And, as MFS demonstrated at the Commission's Broadband Forum, with appropriate additional electronics on both ends of the loop, copper loops can be used to provide digital transmission speeds up to 1.544 Mbs.

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[23] Bandwidth Forum held on January 23, 1997.

[24] A loop design should not permit "loaded" loops because the signal attenuation characteristics of such loops prevent access to advanced, high-speed services even including 28.8 kbs modems or modem facsimile machines.

[25] But, this design does not permit unrestricted deployment of technologies as basic as modem facsimile machines or 28.8 kbs data modems to subscribers served by copper loops longer than 18,000 feet. The Hatfield model apparently produces loops with unconstrained lengths of unloaded copper. Unloaded copper loops will not even provide useful voice grade services. At the Commission's costing workshop, Dr. Mercer volunteered that the soon to be released Hatfield model would design longer loops with heavier gauge copper and load coils. That still does not provide loops capable of basic data transmission. The BCM apparently limits the maximum copper loop length to 18,000 feet. However, a properly designed 18,000 foot loop (without load coils or bridge taps) is capable of supporting facsimiles and modems.