

Converging on a Cost Proxy Model

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1 | AN ASSESSMENT OF THE PROGRESS IN DEVELOPING A COST PROXY MODEL

1.1 Background

Last April, the National Cable Television Association (NCTA) submitted a comprehensive analysis of the original Benchmark Cost Model (BCM) in the FCC's universal service proceeding.¹ The BCM had been submitted to the FCC in September, 1995 by MCI Communications, Inc. (MCI), NYNEX Corporation (NYNEX), Sprint/United Management Co. (Sprint), and US West, Inc. (US West), the so-called "Joint Sponsors." The report, prepared on behalf of the NCTA, concluded that the BCM,² in its original form, overstated by a significant amount the costs associated with the universal and ubiquitous deployment by local exchange carriers of primary residential access lines. The report also concluded, however, that the design of the original BCM was sufficiently flexible to accommodate necessary corrections to certain logical and factual assumptions and data.³

Since then, there have been several significant developments regarding the evolution of cost proxy models. First, on July 3, 1996, as anticipated, a new version of the BCM — styled as "BCM2" — was submitted for the FCC's consideration.⁴ Two of the original Joint Sponsors are no longer participating in the BCM development effort, leaving US West

1. *The Cost of Universal Service, A Critical Assessment of the Benchmark Cost Model*, Baldwin, Susan M. and Lee L. Selwyn, April 1996 (hereinafter "April report").

2. Throughout this report, when we refer to the BCM or to the "original" BCM, we are referring to the BCM that was submitted to the FCC on September 12, 1995. MCI Communications Inc., NYNEX Corporation, Sprint/United Management Co., and US West, Inc., *Benchmark Costing Model: A Joint Submission*, Copyright 1995, CC Docket No. 80-286 (Dec. 1, 1995)("Joint Submission").

3. In addition, in May, ETI prepared a companion report, *The BCM Debate, A Further Discussion*, Baldwin, Susan M., Helen Golding, and Lee L. Selwyn, May 1996.

4. Joint Submission by Sprint Corporation, U S West, Inc., CC Docket No. 96-45, July 3, 1996 ("BCM2 Submission").

and Sprint as the sole sponsors of BCM2.⁵ The Joint Sponsors of the original BCM, in addition to US West and Sprint, included MCI and NYNEX. MCI, together with AT&T, is now sponsoring the so-called Hatfield model and, NYNEX is apparently not a sponsor of any particular cost proxy model. Hatfield 2.2, Release 1 (the "Hatfield Model") was filed with the FCC on July 5, 1996.⁶ On May 22, 1996, Pacific Telesis filed a detailed description of a third proxy model, an overview of Pacific's Cost Proxy Model (CPM) and a user manual for the CPM.⁷ Also, cost proxy models are being investigated by various state public utility commissions. As we discussed in our April report, the California Public Utilities Commission is presently investigating universal service issues, and, in that context, is evaluating the Hatfield Model and Pacific Bell's Cost Proxy Model.⁸

Most recently at the national level, interested parties submitted comments to the FCC (responding to a series of detailed questions posed by the Commission) on August 2, 1996, that address issues which are also germane to the questions under consideration in this request for further comment. In the separate request for comment, to which this report responds, the FCC has indicated that BCM2 and the newest HM "will be carefully considered by the Federal-State Joint Board as it formulates its recommendations concerning the provision of Universal Service."⁹ The FCC also indicated that interested parties may comment on any or all of the three models.

The universal service debate has progressed to encompass not only the theory of cost proxy models but also the practical aspects of implementating a cost proxy model. Delineating the differences among the models — both with respect to the underlying logic and algorithms and with respect to the assumed inputs — is a critical step in resolving the ongoing debate about these models. There is substantial support for a usable, reliable model to inform universal service funding decisions. On the other hand, it is also evident

5. Hereinafter, "Sponsors" refers to Sprint and US West, the sponsors of BCM2 and "Joint Sponsors" refers to MCI, NYNEX, Sprint and US West, the sponsors of the original BCM.

6. A newer version of the Hatfield model is expected to be filed with the FCC shortly. Remarks of Robert Mercer addressing the NARUC Subcommittee on Telecommunications, Los Angeles, July 1996. It is our understanding that the newer version will be substantially changed. Accordingly, our evaluation of the Hatfield model in the context of this report is general in nature. At a later date, we may conduct a more in-depth analysis of the Hatfield model in order (1) to assist regulators in assessing the relative strengths and weaknesses of the Hatfield model and (2) to support a cross-comparison of the three models that have been submitted to the FCC.

7. Ex parte filing, May 22, 1996 letter from Gina Harrison of Pacific Telesis to William F. Caton, Acting Secretary, FCC.

8. California PUC, R.95-01-020/I 95-01-021, the *Universal Service Proceeding*. An Administrative Law Judge Proposed Decision was released on August 6, 1996.

9. Public Notice, "Common Carrier Bureau Seeks Further Comment on Cost Models in Universal Service Notice of Proposed Rulemaking," CC Docket 96-45, DA 96-1094, released July 10, 1996.

that no model will ever be perfect and thus the regulator needs to set time frames for deciding how to resolve key controversial attributes of any given model. In this report, we hope to continue to contribute to the debate that is occurring at the national and state levels, by identifying the relative strengths and weaknesses of the various models being proposed for use in universal service policy making deliberations.

1.2 Objectives of this report

The purposes of this report are to:

- Assist the Joint Board in its development of recommendations, due to be submitted to the FCC by early November, 1996.
- Evaluate the degree to which the BCM2 has addressed the flaws that we identified with respect to the original BCM and that were discussed in our two earlier reports.¹⁰ Where feasible, we will provide comparative analyses of the CPM and BCM with regard to specific attributes of cost proxy models.
- Analyze the impacts of the various changes in BCM2 on the average cost of basic local exchange service.
- Evaluate the degree to which BCM2 is an “open” model.
- Where feasible, analyze the effect of incorporating corrections to the BCM2 on the average cost results and the universal service funding requirement.
- Provide a preliminary comparison of the ways in which the three models differ in (1) their logic and algorithms (e.g., grid structure versus CBG structure); (2) the inputs assumed (e.g., switch costs, fill factors, etc.); and (3) the results produced. This comparison ultimately should assist with an assessment of the magnitude of the differences among the results of the three models, if an identical set of assumptions about input values were used.¹¹

10. In addition to our April report, we also prepared a report in May that was submitted with the NCTA's reply comments in the universal service proceeding. See *The BCM Debate, A Further Discussion*, Baldwin, Susan M., Lee L. Selwyn, and Helen E. Golding, May 1996.

11. Based upon our participation in a cost proxy panel, held by the Telecommunications Subcommittee, during the summer meeting of NARUC, July 1996, we believe that there is interest in cross-comparisons of the three models, and where possible, runs of the various models holding constant as many assumptions as possible (e.g., regarding switch costs, cost factors, etc.) in order to determine the extent to which the fundamental design and logic
(continued...)

- Identify the specific issues and questions about which we recommend the Joint Board and the FCC seek information from the industry in order to make fully informed decisions about the design and implementation of a forward-looking cost model.

This third report prepared by ETI on behalf of the NCTA cross-references certain discussions in ETI's two previous reports that continue to be germane to the questions posed by the FCC in this notice, e.g., regarding the desirable attributes of a useful cost proxy model¹² and the relationship of the cost results of the BCM with the existing implicit and explicit sources of universal service support.¹³ Therefore, for more complete discussions of certain issues of policy and methodology, we recommend that the reader refer back to these two earlier reports.

1.3 Methodology

In our April report, we conducted an in-depth analysis of the BCM by focussing primarily upon data for the state of Washington, the results of which we then extrapolated to the national level. The use of a single state for our previous analysis was necessitated by the processing time required to run the original BCM.

The BCM2 is macro driven and is far easier to use than the BCM. After making adjustments to the user inputs for a state or group of states, a user simply highlights the desired states and processes the run. There is no need for intermittent manipulation of the model by the user as was the case with the BCM. We therefore originally believed that we could readily run the BCM2 for the entire nation. However, until the Sponsors release the Visual Basic version of the BCM2 it is impractical to run the entire nation because results for the individual states must be aggregated manually. Furthermore because 20 of the 50 states require more than a single data input file, close analysis of an entire state's results requires that the user combine the output from multiple files into a single worksheet. Again, the need to aggregate state results in this manner would greatly inhibit close examination of multiple runs at the national level.

11. (...continued)

of the three models yield different results. After the newest version of the Hatfield Model has been made public, and depending upon the feasibility of running the CPM for other states, this may be an effort that we undertake in the future.

12. **see chapter **.

13. See Chapter 7 of our April report.

Therefore, until such time as there is a version of BCM2 that feasibly permits a national analysis, we are continuing to conduct our in-depth examination on the Washington State data set. The relative "openness" of a model also affects the methodology for assessing its robustness. Chapter 2 discuss this attribute of the BCM2.

An evaluation of any cost model requires first that the appropriate attributes of a proxy model be identified and defined. Chapter 2 of our April report discusses this topic in detail. BCM2 computes the *unseparated* cost of basic local exchange service (as did BCM1). A critical question for regulators is how to apply the *results* of the new model (or any other cost proxy model) to specific universal service funding decisions. Chapter 7 of our April report discusses this important issue.

This report focusses on the BCM2 in order to discuss and describe the desirable attributes of a reliable cost proxy model.¹⁴ In selected instances, we will provide comparative analyses of the HM's and CPM's approach to similar questions of logic or inputs. Throughout the report, we have attempted to provide practical advice for regulators to assist them in making final decisions about the appropriate design of and data inputs for a forward-looking cost proxy model.

1.4 Organization of the Report

This report is organized as follows:

- Chapter 1 assesses progress in resolving the debate over the design and implementation of a cost proxy model to be used in universal service funding decisions; sets forth the objectives of this report; and describes the general methodology used in our analysis.
- Chapter 2 evaluates the "openness" of the BCM2.
- Chapter 3 analyzes the new cost factors in the BCM2, which are used for translating investments into monthly costs and for reflecting non-plant-related line-sensitive expenses.
- Chapter 4 evaluates the new switching algorithms and costs that are incorporated into the BCM2.
- Chapter 5 examines the significant changes that have been made to the model's algorithms and input assumptions for outside plant.

14. In certain instances, where necessary, we discuss and rely on the results of the original BCM.

An Assessment of the Progress in Developing A Cost Proxy Model

- Chapter 6 applies the theory that we discussed in our April report regarding the economies of scale and scope inherent in ILECs' networks.
- Chapter 7 summarizes our major recommendations.

2 | AN EVALUATION OF THE “OPENNESS” OF THE BCM2

2.1 If the BCM is to be adopted as a universal service policymaking tool as its Sponsors urge, the Commission must first require that the Sponsors forego any “proprietary” claims in the Model and afford all interested parties and regulators the ability to examine and modify it without any “license” restrictions

If the Benchmark Cost Model — or any proxy model — is to serve as an effective and useful policymaking tool, it is critical that it possess each and all of the following attributes:

- It must permit a full range of policy options to be examined in a neutral and unbiased manner.
- It must support a full range of cost assignment/attribution methodologies, without interposing any significant restrictions on the examination of different costing theories and approaches.
- It must provide the capability of undertaking sensitivity analyses with respect to alternative engineering and network architecture principles and assumptions.
- It must not introduce any biases or otherwise prejudice contested and controversial issues.
- It must be an “open document” whose structure, logic and underlying data can be examined, modified, and expanded by any interested party without being impeded by any artificially-imposed “proprietary” claims or interests of the model’s developers.

Unfortunately, the BCM2 — while providing certain improvements to certain of the mechanical algorithms and engineering/costing assumptions that were inadequately addressed in the original model — falls short in all of these critical attributes.

An Evaluation of the "Openness" of the BCM2

The Sponsors have failed to submit an "open" model that could serve as a public policymaking tool

According to the Joint Sponsors, the BCM was offered in order to provide regulators and policymakers with a tool that would permit them to, among other things:

- (1) Identify areas likely to require explicit high-cost assistance.
- (2) Provide a benchmark cost range "assuming efficient engineering and design criteria and deployment of current state-of-the-art loop and switching technology, using the current national local exchange network topology."

The Joint Sponsors of the original BCM characterized the BCM as a *public* model and made a point of making the model widely available. In their Joint Submission of December 1, 1995, they stated:

*The BCM is intended to provide the Commission, Joint Board, and other interested parties with information that can be used to evaluate the multiple proposals for the use of proxy methods set forth in the NPRM, including assessing the application of the proxy methodology to large companies only. ... By making the model publicly available, the Joint Sponsors hope that the Commission, Joint Board and other interested parties will be able to obtain facts, data, and policy recommendations which will assist in the timely resolution of the important issues relating to universal service.*¹⁵

In the letter to the FCC accompanying the submission of the revised model, presumably in the same spirit, the BCM2 Sponsors state that they "have made every effort to inform the public on the workings of the BCM, and to gain input which can help to improve the model and its usefulness in the targeting of explicit high cost support funds."¹⁶

If the BCM is to serve as a catalyst for a broad consensus, however, its status must be like that of any draft document that will be reviewed and potentially modified by multiple interested parties. In a negotiation in which one party takes the lead in drafting such a document, the drafting party will likely introduce its own "spin" on contested or controversial issues. However, the participation of other (often opposing) parties in the process helps to assure that such biases are eliminated in any final consensus document. The BCM or any costing model that is to achieve broad acceptance among a diverse set of parties and interests demands the same treatment. In our April report as well as in the

15. December 1 Joint Submission at I-1 - I-2, footnotes omitted, emphasis added.

16. BCM2 Submission at 2.

An Evaluation of the "Openness" of the BCM2

present document, we have identified and documented a number of serious biases and shortcomings in the BCM (and now in BCM2) that *must be addressed and corrected* if this particular proxy model is to serve the Commission's (and the Sponsors') objectives in providing a universal service costing benchmark. Unfortunately, while the Sponsors' have addressed certain of the shortcomings that we and others had identified, they also locked down the BCM to a point where its use is strictly controlled and confined within a narrow range of options that the Sponsors' apparently find acceptable. The Commission, however, must find this tactic *unacceptable* and must reject it as an end-run attempt by the Sponsors around its policymaking and rulemaking process. As an input to an open, public regulatory proceeding, the BCM and any incarnation thereof deserves no more "proprietary status" than any other comment or submission made by any party to any rulemaking proceeding.

In order to access BCM2, the user must on each separate occasion when loading the model into the computer "accept" specific "license" terms imposed by the Sponsors; failure to "accept" the license terms causes the computer to exit the model and deny access to the user. The "license terms" that are to be accepted are as follows:

Sprint/United Management Company and US West, Inc. grant to all registered parties the right to use the Benchmark Cost Model 2 (BCM2) and its output results. Rights are granted only to run and use the final output results of the BCM2. No right is granted to any party to claim that any intermediate calculations or any intermediate data from the BCM2 are output values or results of the BCM2. No right is granted to license or sell the BCM2, or any portion thereof, or to reverse engineer or decompile the BCM2, or any portion thereof, or to use any component or subcomponent of the BCM2 software as a component of any other model. The BCM2 contains "trade secrets" and is proprietary to Sprint/United Management Company and US West, Inc. The BCM2 is provided "as is" without warranty of any kind whether written, oral, statutory, expressed or implied, including without limitation for a particular purpose. Sprint/United Management Company and US West, Inc. and their suppliers make no representations and assume no liability of any kind, including without limitation, for either the quality or performance of the BCM2. Sprint/United Management Company and US West, Inc. and their suppliers shall not be responsible for any damages, whether direct, indirect, incidental, or consequential, arising in any manner from the Registering Parties use of the BCM2. In no event shall Sprint/United Management Company and US West, Inc. have any monetary liability to users of the BCM2. Operating systems or other programs not supplied or licensed hereunder may be required to operate the BCM2.

An Evaluation of the "Openness" of the BCM2

The terrain data included in the BCM2 is the property of Stop Watch Maps, Inc. It is provided exclusively for use in the BCM2. All other uses are prohibited except by explicit agreement with Stop Watch Maps, Inc.¹⁷

The Commission would clearly never allow a party submitting comments in any of its proceedings to constrain the scope of replies to those comments in such a manner, yet the tactic of the BCM Sponsors amounts to precisely that. The Sponsors cannot be permitted to use the cloak of a self-serving claim of a "proprietary property right" as a device for limiting access by other parties to their submissions *in this proceeding*.

2.2 The design of the BCM continues to thwart the efforts of interested parties to evaluate the logic and algorithms of the BCM2

One of the flaws in the original BCM was that it prevented interested users *and regulators* from examining certain algorithms and logic in the model's design, such as the distance at which the theoretical network would deploy fiber rather than copper in the feeder plant. The Sponsors have made some changes in the BCM2 that represent an improvement in terms of the model's ease of operation and the extent to which key variables and benchmarks are now user-adjustable inputs. For example, running the BCM2 for the state of Washington requires approximately 20 minutes of computer processing time, while the original BCM required two hours minutes of computer processing. However, the Sponsors have repeated the practice of "locking" the "Main Logic" spreadsheet and have thereby frustrated and in some cases prevented altogether the performance of certain analyses.

The original BCM was comprised of three separate modules, each of which consisted of a separate spreadsheet file with multiple worksheets. The "Main Logic," "Shared Allocation" and "Costing" Sheets of the BCM's "Loop Module" were password protected and thereby worked to frustrate and prevent parties in the conduct of certain sensitivity analyses of the model's most important functions (i.e., the development of the actual network and the allocation of costs among CBGs). As we indicated in our April report,¹⁸ we were able to overcome the password protection of the BCM to perform, for example, such analyses as testing the effect of alternative "crossover points" for the selection of copper vs. fiber optic feeder cable, accounting for the penetration rate of local residential service, and examination of the funding requirement at the wire center as opposed to the

17. The BCM2 License Agreement.

18. April report at 112.

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CBG level. However, these analyses required extra time and resources that would not have been necessary had the Sponsors incorporated them into the workings of the model.

In an *ex parte* filing of January 25, 1996, the Joint Sponsors identified potential changes in the BCM that had been expressed by interested parties and classified them among three categories: (1) those changes that were "desirable but difficult," (2) those changes that were still open for consideration, and (3) those changes that would not be accommodated. The Joint Sponsors classified the potential change that would enable a user to calculate the average cost at the wire center level in the third category. In a later *ex parte* filing of February 21, 1996, the Joint Sponsors reiterated that they would not facilitate the examination of costs at the wire center level although "an interested user of the BCM could perform an aggregation of all CBGs in a wire center to obtain an approximation of cost at the wire center level."¹⁹ The task of performing an examination of costs and support requirement at the wire center level for the entire nation would require considerable time and effort.

In BCM2, rather than facilitate the wire center analysis and the other analyses described above, the Sponsors have replaced the "modular" format of the BCM by aggregating all of the network development and costing functions into a single "Main Logic" worksheet which they have again decided to lock. It is indeed unfortunate that the Sponsors have sought to channel and control analysis of the BCM2 within the narrow range that they find acceptable, for in doing so they have diminished its value as a policymaking tool.²⁰ By confining use of the BCM2 in this manner, the Sponsors make a transparent and entirely self-serving attempt to foreclose other parties and the Commission from consideration of policy options that the Sponsors oppose.

The FCC should explicitly reject the Sponsors' attempt not only to force the Commission to exclude from consideration — and thereby to prejudge — certain critical public policy options, but worse, to do an end run around other parties' ability to inform the public policy debate on universal service funding. In its request for comments due August 2, 1996, the FCC explicitly sought comment on the appropriate geographic area to use.²¹ Albeit somewhat time-consuming, it was feasible using the original BCM for parties to assess the impact of evaluating universal service funding requirement at the wire center level rather than the CBG level or variations thereof, such as that proposed in

19. *Ex Parte* filing of February 21, 1996.

20. While the copper/fiber crossover point in the BCM2 is now a user specified input, the Joint Sponsors have limited the selection of crossover points to a range of 9,000 - 18,000 feet.

21. See Question 58, "What are the advantages and disadvantages of using a wire center instead of a Census Block Group as the appropriate geographic area in projecting costs?"

Dr. Lee Selwyn's June 19, 1996 letter to the Joint Board.²² A significant, undesirable, and inexcusable result of the revisions to the original BCM is that the Sponsors of the BCM2 have sought to prevent other parties' ability to examine one of the specific and controversial public policy issues about which the FCC has sought comment.

2.3 A cost proxy model should rely on public, readily available information

In its request for comments on specific questions, the FCC sought comment on several matters relating to whether a proxy model should be subject to proprietary restrictions.²³ If a cost proxy model - or any model — is to be employed by regulators to support a public policy decision — and particularly one that may involve the transfer of billions of dollars each year from consumers and competitors to incumbent local exchange carriers — the credibility of such an action *requires* that all aspects of the model upon which regulators rely be in the public record without any proprietary claims or restrictions. It is only in this way that the policymaking process can be subject to open, complete, comprehensive, and rigorous examination by all interested parties. Whatever "economic value" such a model might have to its developers as "intellectual property" pales when compared with the enormity of those same Sponsors' claims as to their alleged entitlement to universal service support. As an economic matter, it would make no sense for US West, for example, to risk the loss of universal service funding merely to "protect" the BCM's proprietary status; therefore, one must assume that the Company's attempt to impose such "protection" measures is intended to foreclose examination of the basis for its universal service support claim, rather than to maintain the negligible (in the context of aggregate universal service funding support) value of the model itself.

There are two possible exceptions to the public nature of the cost proxy model itself that are reasonable and that could be permitted.

22. ETI conducted precisely this type of analysis for our May report and to support our presentation to the Federal-State Joint Board on Universal Service (Joint Board). Presentation by Dr. Lee L. Selwyn, June 5, 1996, Washington, D.C. to the Joint Board. Letter from Dr. Lee L. Selwyn to the Joint Board, dated June 19, 1996.

23. Question 45 asked: "Is it appropriate for a proxy model adopted by the Commission in this proceeding to be subject to proprietary restrictions, or must such a model be a public document?" Question 46 asked: "Should a proxy model be adopted if it is based on proprietary data that may not be available for public review?" Question 47 asked "If it is determined that proprietary data should not be employed in the proxy model, are there adequate data publicly available on current book costs to develop a proxy model? If so, identify the source(s) of such data." Question 48 asked "Should the materiality and potential importance of proprietary information be considered in evaluating the various models?" Public Notice, DA 96-1078. *Common Carrier Bureau Seeks Further Notice on Specific Questions in Universal Service Notice of Proposed Rulemaking*, CC Docket 96-45, released July 3, 1996.

An Evaluation of the "Openness" of the BCM2

- First, there may be certain underlying databases owned by third parties upon which the model may rely. In such cases, publicly available proprietary databases may be utilized, provided that the cost of acquiring access to such material is reasonable. For example, the Hatfield Model relies upon the Local Exchange Routing Guide (LERG), which must be purchased from Bellcore. The price of the LERG is \$700 for a single copy delivered on a CD ROM, although a subscription to the LERG is more costly.²⁴ By contrast, Pacific Bell's Cost Proxy Model (CPM) relies upon a proprietary geographic database that appears to be available from Indetec Corporation.²⁵ The cost of acquiring this database for all 50 states and the District of Columbia has not been disclosed, so it is not known at this time whether such cost will exceed the bounds of reasonableness (see discussion below).
- Second, the model may rely upon certain proprietary cost data the public disclosure of which could compromise the economic interests of the equipment vendors (and possibly affect the prices that are offered to ILECs for their capital inputs). The BCM2 gets around this problem by substituting approximations, such as assuming a 20% discount off the list prices of switches. As we note below in Chapter 4, the use of such approximations likely results in an overstatement of the equipment costs and hence in an overstatement of the universal service funding requirement. ILECs should be required to provide *accurate* equipment cost information for use in the model. However, in order to properly protect the rights of vendors, such information may be furnished pursuant to an appropriate protective agreement or order that does not limit its use for purposes of the proceeding but that does operate to prevent general public disclosure. This cost data exception should not, however, be applied so broadly as to permit ILECs to assert a similar proprietary claim for the costs upon which they rely as a basis for their claim of entitlement to universal service support. By its nature, the baseline primary access line service for which such support is being sought is distinctly *not* a competitive service; hence, there can be no basis for any claim that public disclosure would compromise the ILECs' competitive position with respect to such services. Any application of proprietary status for such data will necessarily limit the ability of interested parties to analyze and comment on the model's results (even though they would still, in principle, be provided access to such data pursuant to a protective order). As such, the conveyance of any right to assert proprietary status for underlying cost data should be applied sparingly and only upon a compelling

24. Bellcore is, of course, not a true "third party" database developer, in that Bellcore is owned by the seven largest ILECs who stand most to gain from a universal service funding mechanism. To the extent that a model submitted by one or more RBOCs may rely upon Bellcore databases, access to such databases should not be priced in excess of a reasonable copying charge.

25. Letter from Pacific Telesis to William F. Caton, Acting Secretary, FCC, dated July 3, 1996.

evidence that disclosure would materially impact the ILECs' or the equipment vendors' economic interests in such data.

2.4 Except for such proprietary third party databases and proprietary cost data, the model should in all other respects be public and accessible to complete scrutiny by affected and interested parties

As is discussed throughout this report, the FCC should direct incumbent LECs to provide documented, detailed up-to-date cost data on items such as equipment costs so that the FCC can make fully informed decisions as to the appropriate input values to select when the FCC runs a cost proxy model in order to compute the level and geographic distribution of high cost funds. Ultimately, regulators, not local exchange carriers, will need to run and refine any cost proxy model that is adopted for universal service funding requirements, and therefore it is essential that regulators be provided with the best available data on the forward-looking costs of key model components such as switches and digital loop carrier equipment. Proprietary claims made by LECs about critical data should be questioned and investigated by the FCC; where such claims are determined to be legitimate, disclosure should still be required, but subject to an appropriate protective order.

2.5 A preliminary analysis of the degree of openness and ease of use of the CPM and HM

The CPM

In certain limited respects, the CPM is at least as open as the BCM2 and the HM. All of the data tables in the CPM software package are accessible and can be modified by the user; those model algorithms and assumptions that are actually contained in the CPM are generally transparent; and the supporting documentation developed by INDETEC is generally sufficient for those areas that it covers.²⁶ That having been said, the disadvantage of the CPM is that there are numerous, critical inputs and assumptions that are not explicitly found in the CPM software itself, but instead flow into the CPM's results via the "unitized" cost estimates and related network parameters that are fed into the CPM's data tables. This drawback stems from the basic design of the CPM, which is significantly different from the approach used by the BCM/BCM2 and the HM. In contrast to those models, the CPM is not a self-contained model that is capable of being run after selecting a

26. There are significant omissions, however. For example, the public CPM documentation that we have reviewed does not provide sufficient explanation of the manner in which census data is mapped ("apportioned") to grid cells. See, Pacific Telesis ex parte filing, June 3, 1996 at slides labeled "CPM: Customer Engine: the Grid."

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limited number of user-specified inputs. There are three major areas in which the CPM relies heavily upon external data sources, models, and assumptions, namely in the development of loop investments, switching investments, and annual expense factors.

Loop investments. Unlike the other models, the CPM's loop modelling process does not follow a bottoms-up engineering/planning approach that builds up a simulated network from underlying components as required to meet the total specified demand level. Instead, the CPM's overall approach to costing outside plant is to (1) analyze the ILEC's existing, embedded local distribution network into a series of tables of unitized costs and network parameters, and (2) reconstitute the network by applying those values to individual customer loops. Whereas the BCM/BCM2 and HM expend considerable resources to explicitly size and cost out the loop facilities that would be required to serve the specified demand level, the CPM estimates the total outside plant investment costs for the network by simply summing together the individual loop investments generated using its unitized data tables.

The CPM's design does not actually avoid the challenges of loop facilities sizing that are directly undertaken in the BCM/BCM2 and HM; instead, it *externalizes* that process, so that it occurs during the development of the pre-determined unit cost data and network parameters that are stored in the CPM's data tables. This problem pervades the CPM, as can be seen by considering the wide array of data inputs that must be specified in the CPM's data tables. For example, the CPM requires as *inputs* cost data at the following level of disaggregation: Installed cost per foot per month for aerial cable in an urban wire center within high-density zone, placed in bedrock.²⁷ Similarly, the CPM requires as inputs specific values for each of the following parameters (as well as many more): Average cable sizes for feeder and distribution; the mix of SAI vs. cross-connects by density zone; the percentages of copper feeder that is underground, buried, and aerial; the ratio of route miles to airline miles; and the ratio of feeder to distribution lengths.²⁸ Virtually all of these parameters can be estimated only by drawing upon numerous external data sources, calculations, and models. In the current version of the CPM, many of the data table inputs have been drawn specifically from Pacific Bell company-proprietary databases and therefore strongly reflect the particular characteristics of Pacific Bell's embedded network.

Switching investments. In addition, the CPM does not independently develop costs for switching investments. Instead, the CPM relies upon Bellcore's Switching Cost Information

27. Pacific Telesis *ex parte* filing, May 22, 1996, Cost Proxy Model: Universal Service Edition — User Manual, at 3-4.

28. *Id.* at Appendix B (Data Dictionary) and Appendix D (SAS Table Layouts).

An Evaluation of the "Openness" of the BCM2

Switching investments. In addition, the CPM does not independently develop costs for switching investments. Instead, the CPM relies upon Bellcore's Switching Cost Information System (SCIS),²⁹ another highly complex and highly proprietary model that Bellcore has consistently declined to make publicly available.³⁰ The public documentation provided on the CPM makes few references to switching assumptions and costs, in contrast to the copious (albeit incomplete) documentation provided for the loop investment portions of the CPM. Some of the outstanding questions regarding how the default switching inputs were derived are which SCIS modeling option was employed (e.g. Average Mode, Marginal Mode — Capacity Cost Option, or Marginal Mode — Excess Capacity Option); how "getting started" (i.e., "fixed") investment costs and other volume-insensitive investments were treated; assumptions made regarding cost of money, peak-to-average busy hour ratios and traffic loads; and how "...[s]witching cost calculations were modified to more closely relate the data to that filed as usage costs in the [California] OANAD proceeding."³¹ While SCIS is certainly more sophisticated than the switching cost modelling undertaken in the BCM/BCM2 and the HM, it is entirely foreclosed from public examination and verification. Moreover, even if the CPM developers answer these (and other) questions regarding the default switching values, regulators that elect to use the CPM will still have to consider how well these California-specific values fit their jurisdictions, or alternatively, how more relevant values could be generated.

Operating expenses. The third area in which the CPM is not self-contained is the development of operating expenses. In fact, the California version of CPM does not develop Pacific Bell's operating expenses at all, but instead obtains these costs from Pacific Bell's OANAD Cost Studies, which contain thousands of pages of highly disaggregated expense data and calculations, virtually all of which are considered proprietary and not publically reviewable, which are based upon outputs from Pacific Bell's internal accounting system. For other LECs, the CPM estimates operating expenses by applying ratios derived from ARMIS data to those Pacific Bell-specific expense levels. Consequently, as is the case with switching investments in order to adopt the CPM outside of California, a regulator would need to accept Pacific Bell's expense calculations "on faith," or pursue development of an alternative approach to estimating operating expenses that did not rely on Pacific Bell's data.

29. Pacific Telesis *ex parte*, June 3, 1996, CPM: California Universal Service Subsidy at 1-2.

30. See for example, the record in CC Docket 91-92 ("the ONA Tariff Investigation").

31. *Id.* at 2.

It is not evident that customer location data for the other 49 states can be readily purchased and modified to be compatible with the CPM

One of the concerns that has been raised regarding the adoption of the CPM for use in a federal proceeding is the model's reliance upon other databases. In a letter to the FCC, Pacific Telesis stated:

Our model contains customer location data that has been commercially obtained from a third party vendor. The diskette contains that customer location data for a sample of California. Inputs of customer location data for other states would need to be arranged by the recipient. One such vendor is Stopwatch Map in St. Louis, Missouri.³²

Pacific Telesis neglected, however, to inform the FCC as to the costs of purchasing data for the entire country or as to the compatibility of the customer location data that would be commercially purchased with the CPM.³³ Pacific Telesis has failed to provide information that would enable the FCC to assess the feasibility of using the CPM for the entire country.³⁴ Furthermore, in addition to purchasing customer location data for the entire country, users must also purchase a SAS software package which, according to Pacific Telesis, is available for between \$1000 and \$2500 for a one-user license. At some point, even if a model were otherwise "truly" open (which the CPM is not), if the cost of running the model becomes prohibitive, the model becomes effectively closed to public scrutiny.

Therefore, we conclude that, at this point, it is entirely ambiguous as to how public policy makers would "arrange" for the inputs of customer location data for other states and as to the feasibility of such an undertaking. If there are certain desirable features of the CPM that can be replicated feasibly in a different, open model, such an effort could be

32. Letter dated July 3, 1996 from Alan F. Ciamporcerro, Vice President, Pacific Telesis Group - Washington to William F. Caton, Acting Secretary, FCC, at 2 ("July 3 Letter from Ciamporcerro").

33. We called the vendor mentioned by Pacific Telesis, and, to date, have been unable to obtain relevant information.

34. In order to gauge the feasibility of using the CPM as a national model, we contacted the vendor identified in Pacific Telesis' letter to inquire about the availability and cost of data for states other than California. Telephone conversation on August 6, 1996, with Stopwatch Map, St. Louis, Missouri. The individual responding to our question was unable to provide information, and directed us to an individual at INDETEC International, Inc. (INDETEC), one of Pacific's consultants in the development of the CPM. This individual indicated that information for the rest of the country was not yet available, but would be available in September at a "minimal" cost. When questioned as to what the "minimal" cost would be, the individual indicated that a decision had not yet been made as to the price. Conversation with INDETEC International, Inc., August 6, 1996. Based upon our research, we simply cannot evaluate who the supplier of the data will be, and furthermore whether the data will be reliable, affordable and compatible.

made. However, for the various reasons described above, we strongly caution regulators against the use of the CPM for public policy making purposes.

The HM

The HM is an open model in principle, in the sense that most of the input data, assumptions, and algorithms are accessible in the model and are subject to public review and evaluation. The chief shortcoming of the HM at this time is that there is little detailed documentation of the core algorithms used in the model, particularly those that calculate switching investments and expense factors. In the absence of such documentation, the complex cell formulas used in these areas are difficult to verify or evaluate. While this problem is not unique to the HM — some of the BCM2's new loop investment algorithms are also difficult to penetrate — it does curtail the practical "openness" of the model.

The HM is also the most complex of the three models to operate. Version 2.2, Release 1 now includes an "automated version," which eliminates a significant number of the steps required to run the model. Nevertheless, HM users still need to take over thirty steps to obtain results for even one state, including relatively low-level spreadsheet tasks such as copying and pasting data ranges, which are not required by the BCM2 or CPM.³⁵ These multiple steps, plus lack of automatic error-checking in some circumstances (e.g., the Line Converter module can produce negative values for access line counts)³⁶ also appears to create more potential for data-related or user-introduced errors than exists in the other models. The HM developers have made efforts to address these problems, such as a compilation of "Troubleshooting Tips" for users to respond to errors that can occur in each of the four main logic modules.³⁷ We hope that the next version of the HM will continue to improve the model's performance in this area.

35. *Instruction Manual: Benchmark Cost Model and Hatfield Model, Automated Version (with Troubleshooting Tips)*, at 4-6.

36. *Id.* at 7.

37. *Id.* at 7-11.

3 | AN ASSESSMENT OF THE BCM2 COST FACTORS

3.1 The BCM2 revises the way in which investment and expenses are translated into monthly costs, but the BCM2 Sponsors have failed entirely to support their excessive cost factors

What the original BCM did

The original BCM computed a monthly per-line cost of basic residential service by multiplying the total investment per line (which the model yielded) by a factor which was intended to reflect operating expenses (including depreciation) and an after-tax return on investment. The original BCM provided two sets of results based upon two very different cost factors:³⁸

- (1) A factor of 31.6765% reflecting historical accounting data and total expense levels of Tier 1 LECs based upon 1994 ARMIS Form 43-01; and
- (2) A factor of 22.97% reflecting a *forward-looking* estimate of expenses and overheads using the MCI/Hatfield methodology.³⁹

The selection of a cost factor clearly has a material impact on the aggregate estimate of the costs of providing universal service:

- For the national results the original model yielded an average monthly cost of \$23.04 if the embedded cost factor were used and yielded an average monthly cost

38. See Chapter 4 of ETI's April report for a more detailed discussion.

39. MCI Communications Inc., NYNEX Corporation, Sprint/United Management Co., and US West, Inc., *Benchmark Costing Model: A Joint Submission*, Copyright 1995, CC Docket No. 80-286 (Dec. 1, 1995) ("Joint Submission") at II-1. Data for Alaska were then unavailable. The Joint Submission, filed December 1, 1995, did not include an updated version of the model. Therefore the model that has been submitted to the FCC and that has been made publicly available was the one current as of September 12, 1995, and current when ETI completed its April report.

An Assessment of the BCM2 Cost Factors

of \$16.71 if the forward-looking cost factor were used.⁴⁰ Also, assuming a price threshold of \$30, if the embedded cost factor were used, the BCM computed a national USF requirement of approximately \$4.9-billion, whereas when the forward-looking cost factor was applied, the BCM computed a national USF requirement of approximately \$2.2-billion.⁴¹

Despite the clear significance of this variable, the model documentation for the original BCM failed to provide details of the calculation of the two different cost factors, and thus provided no basis for regulators to make an assessment as to the appropriate cost factor to incorporate into a model being used for public policy purposes.

What the BCM2 does

As the original BCM did, BCM2 derives total investment costs for the basic local exchange service being modelled. In contrast with the original BCM, which applied a single cost factor to the investment, BCM2 uses four factors to translate plant investment and expenses into a monthly cost.⁴² The BCM2 default values for the three investment-related factors are as follows:

Cable and Wire Investment	0.23276
Circuit Equipment Investment ⁴³	0.24241
Switching Equipment Investment	0.25703

BCM2 also assigns 75% of an assumed total amount of \$133.39 per line to reflect those expenses that (1) vary according to the number of lines served and (2) support local service. There is no justification for or explanation of the default allocation of 75% of the expenses to basic local services, nor is there more than minimal justification for the assumed total amount of non-plant-related expenses. The BCM2 Sponsors indicate that the cost per line reflects customer operations (marketing and services), corporate operations and "other depreciation/amortization" and also indicate that the cost is developed based upon

40. *Id.*, at II-2.

41. *Id.*, at IV-28.

42. *Benchmark Cost Model 2 Methodology*, undated document distributed at BCM-2 Workshops held during the summer NARUC meetings, 1996, Los Angeles (hereinafter "*Benchmark Cost Model 2 Methodology*") at 18. This documentation was not filed with the submission of the BCM2 to the FCC on July 3, 1996, but rather first became publicly available at the workshops held by the Sponsors July 19 through July 23, 1996.

43. The circuit equipment includes the digital carrier loop equipment.

1995 ARMIS data.⁴⁴ The three investment factors, the cost per line, and the allocation factor are all user-adjustable.

BCM2 fails to provide any supporting documentation that would enable a regulator to independently assess the reasonableness of the elements reflected in these four critically important factors. Until such time as the Sponsors provide comprehensive, account-specific information relating to the items that are being incorporated into these factors, and step-by-step derivations of the cost factors themselves, regulators should reject the proposed cost factors.

The three investment-related cost factors are unsupported

The basis of the three investment factors in BCM2 is the 1995 ARMIS data that the Sponsors used to derive “the historical ratio of certain investment related expenses to the gross investment for the plant category.” The categories include a return on investment of 11.25%; federal income taxes, state taxes, and local taxes; plant-specific expenses; plant non-specific expenses; and depreciation/amortization. The Sponsors used national 1995 ARMIS data to develop historical booked expenses and thus, according to the Sponsors, the factors reflect the historical relationship between maintenance expenses and investment and the regulatory-approved depreciation lives.⁴⁵

Disaggregating the investment into distinct plant categories in order to apply category-specific cost factors is not unreasonable, but regulators should reject the unexamined use of historical relationships in order to compute forward-looking costs.

Return on Investment: As was stated in ETI’s April report,⁴⁶ instead of reflecting the LECs’ authorized return of 11.25%, the return on investment should instead be computed using 10.3125% to reflect (1) a jurisdictional weighting of 25% of the FCC’s authorized return of 11.25%⁴⁷ and a 75% jurisdictional weighting of recent state PUC decisions,

44. *Benchmark Cost Model 2 Methodology*, at 19.

45. *Id.* at 18.

46. April report at 69.

47. In the Matter of Represcribing the Authorized Rate of Return for Interstate Services of Local Exchange Carriers, CC Docket No. 89-624. *Order*, 5 FCC Rcd 7507 (1990).

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which have resulted from comprehensive investigations of LEC capital structures, cost of debt, and cost of equity.⁴⁸

Plant Specific Expenses: The Sponsors have failed to provide any information as to the plant-specific expenses that are reflected.

Plant Non-specific Expenses: Similarly, the Sponsors have failed to provide any documentation as to the derivation of this component of the three investment factors.

Depreciation/Amortization: As is shown in Table 4.1 of our April report, depreciation expenses account for approximately one-quarter of ILECs' total operating expenses, and thus should be viewed most critically by regulators. The Sponsors indicate that they have used depreciation rates that have been approved by regulators.⁴⁹ The fact that specific depreciation rates have been approved by regulators does not in and of itself make the depreciation rates appropriate for use in a cost proxy model for primary line basic residential service. Therefore, in setting depreciation rates for the relevant plant accounts, regulators should consider specifically the rates that are appropriate for the universal service cost proxy model. As recently expressed by the California PUC Administrative Law Judge (ALJ) in that state's USF proceeding:

It is important to keep in mind that the purpose of this proceeding is to model the cost of providing universal service. It is not designed to model the cost of a state of the art network for every conceivable telecommunications service.⁵⁰

This issue is discussed below in more depth in the context of the CPM.

48. The ETI figure relies on the 10% return authorized by the California Public Utilities Commission. California PUC, Consolidated A.92-05-002, A.92-05-004, I.87-11-033 and A.87-05-049, I.85-03-078 and A.85-01-034, *Applications of GTE California Incorporated (U 1002 C) and Pacific Bell (U 1001 C) for Review of the Operations of the Incentive-based Regulatory Framework Adopted in Decision 89-10-031, and Related Matters*, Decision 94-06-011, June 8, 1994, at 52. Also, the Vermont Public Service Board authorized an effective rate of return of 8.5%. Vermont PSB, Dockets No. 5700/5702, *Investigation of Proposed Vermont Price Regulation Plan and Proposed Interim Incentive Regulation Plan of New England Telephone and Telegraph Company and Petition of Department of Public Service for an Investigation of New England Telephone and Telegraph Company Rates*, Order, October 5, 1994, at 82. The Massachusetts Department of Public Utilities authorized an effective rate of return of 9.63%. Massachusetts D.P.U. 94-50, *Petition of New England Telephone Company d/b/a NYNEX for an Alternative Regulatory Plan for the Company's Massachusetts Intrastate Telecommunications Services*, May 12, 1995, at 507.

49. Benchmark Cost Model 2 Methodology at 18.

50. CPUC R.95-01-020/I.95-01-021, Proposed Decision of ALJ Wong, August 5, 1996, at 127.

The non-plant-related expenses are excessive

As was discussed in ETI's original report,⁵¹ there are some historical expenses that would be reflected in ARMIS data that have absolutely no bearing on the provision of single-line basic residential service. Expenses such as marketing (which the Sponsors acknowledge as present in the assumed value of \$133.39) have no relationship to the provision of primary residential local exchange service, and certainly not in the context of potentially subsidized universal service. In Appendix 3A, we continue the analysis that we began in our April report regarding selected accounts that are described in a detailed cost of service study that was prepared by NYNEX and submitted to the Massachusetts Department of Public Utilities.⁵² The purpose of our illustrative analysis is to demonstrate that one should not simply take aggregate historical expenses at face value in order to compute forward-looking expense factors in a cost proxy model.

The Sponsors should be directed to fully document any proposed inclusion of non-plant-related expenses and to provide comprehensive account-specific back-up for the individual numbers assumed. The data should also be disaggregated by customer class, and, where applicable, disaggregated between those activities that support the *primary* residential local exchange line and *additional* residential local exchange lines.⁵³ The provision of such information would enable regulators to assess independently the reasonableness of the inclusion of the various categories of expenses. For example, as is shown in Appendix 3A, an examination of the Massachusetts COSS showed that 84% of the expenses associated with Account 6611 (Product Management) were related to market management and planning for *business* customers. If a cost proxy model includes business lines, it may be legitimate to include *some* expenses associated with serving business customers, but these must be limited to only those items relating specifically to basic local exchange service. Moreover, if business costs are included, they must be identified and expressly assigned to business services, not spread across all (business and residential) access lines. When modelling a stand-alone primary line residential network, all business-related expenses should be excluded. Therefore, if a disproportionate percentage of the expenses associated with a line are caused by *non-residential* expenses, the expenses should be scaled back accordingly.⁵⁴

51. See Chapter 4 and Appendix 4A.

52. Massachusetts Cost of Service Study (COSS), NYNEX, 12 Months Ended November 30, 1992.

53. For example, marketing and sales costs are disproportionately driven by additional residential access lines and by non-basic (vertical) service features, none of which have any relevance in the context of the cost of basic universal service.

54. In the BCM2, primary residential lines account for 56% of the total lines. This is simply the 91,989,955 households divided by the 164,686,297 total lines. July 3 letter from the Sponsors to the FCC, at 7.

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The depreciation lives advanced in the California CPM are, on a weighted average basis, only 12.2 years,⁶² which is substantially shorter than Pacific Bell's prescribed lives and those assumed in either the BCM2 or the HM. Use of the proposed depreciation lives would increase the California USF requirement by more than \$200-million relative to the level estimated using currently prescribed lives.⁶³

As justification for its shortened depreciation lives, Pacific Bell argued that "[a]ny proxy cost model intended to sustain universal service in the face of competitive entry must reflect economic lives consistent with fully competitive markets."⁶⁴ We strongly disagree with this view. Universal service funding should reflect only the costs of providing the defined basic universal service, i.e. a primary residential access line to each household, and should not become a vehicle for recovery of the costs of modernizing networks in order to furnish the entire range of discretionary and competitive services that LECs may wish to offer. The ALJ in the CPUC's universal service proceeding has recognized this fundamental point:

One would expect a more rapid turnover of the facilities used to provide advanced telecommunications services. However, the facilities used to provide basic service throughout the state are less likely to be replaced as quickly. As Selwyn points out, one of the reasons why Pacific replaces analog central office switches with digital switches is to support various discretionary services that can generate additional revenues. (Ex. 10, p. 11.) Pacific witness Scholl concedes that new switches provide advantages, such as advanced capability, over existing technology. (Ex. 85, p. 16.)⁶⁵

While the ALJ consequently rejected Pacific's use of shortened depreciation lives in the CPM,⁶⁶ adoption of currently-prescribed lives does not necessarily go far enough to exclude the costs of non-basic services. As explained in ETI's April report (pages 67-69), the plant required for basic telephone service should have *longer* lives, e.g. 20 years on average, and *lower* depreciation expense, e.g. 5% of total plant in service (TPIS), than the prescribed values reflected in LECs' ARMIS data, which may already reflect the impact of

62. CPUC R.95-01-020/I.95-01-021, Testimony of R.L. Scholl (Pacific), April 17, 1996 (provided in June 7 ex parte filing to the FCC), at 15.

63. CPUC R.95-01-020/I.95-01-021, Testimony of Lee L. Selwyn (AT&T/MCI), April 17, 1996 at 88.

64. *Id.* at 15.

65. CPUC R.95-01-020/I.95-01-021, Proposed Decision of ALJ Wong, August 5, 1996, at 127.

66. *Id.* at 128.