

competitively neutral estimate of the cost of providing supported services.”¹ Effective competitive entry objectives of CC 96-325 rely on the employment of forward-looking, long-term incremental costs with key assumptions including the cost of money, economic life, plant replacement cost and cable/wire fill factors. Docket 96-325 states, “We noted, however, that there was a lack of general agreement on the specifics of methodology for deriving prices based on LRIC or total service long-run incremental cost (TSLRIC).” The analysis of the models relevant to compliance with TELRIC/TSLRIC methodology is flawed without consensus of what the methodology is. By what measure, then, will costs be considered technology neutral? An agreeable foundation is essential to develop a cost proxy model that produces competitively neutral results.

The Hatfield documentation states that pricing for many central office elements is from publicly available studies on component pricing. However, *what* publicly available data is not disclosed; publicly available doesn't necessarily mean competitively neutral. Switch investment estimates are from "typical per-line prices paid by BOCs, GTE and other independents.”² “Loop cable pricing information is based on Hatfield's best estimate as default values for cable investment per foot and cable fill factors obtained from discussions with subject matter experts.”³ Tandem switching investments are based on AT&T assumptions contained in an AT&T report on interexchange capacity expansion costs. Wire center investments consider internal assumptions for room sizes required to house a switch. These assumptions do not consider the vast differences between building requirements for a Bell Operating Company and an Independent Telco. Hatfield and BCM base digital loop carrier investment primarily on SLC 2000 (a Lucent Technology Product) or AFC (Advanced Fiber Communications) also not representative of the small

¹ CC Docket No. 96-45 Released November 8, 1996 at Paragraph 276.

² Model Description, Hatfield Model, Version 2.2, Release 2, page 24

³ Model Description, Hatfield Model, Version 2.2, Release 2, page 17

client community. Expense inputs are averaged from ARMIS reports which a large portion of the independent community does not participate in. The result is inappropriate weight factors which are based on large company conditions.

The Benchmark II (BCM) does not specify where the investment inputs are from. Structure and placement costs are stated to be "based on a national average of available contractor prices for that activity."⁴ Switch investments are stated as "calculated using generic digital switch investments for five sizes of switches."⁵ These statements do not clarify whether the resulting inputs reflect investment numbers representative of small telephony providers who may average less than 1,000 lines overall. Until one understands the basis of an input, one cannot change it. The BCM also utilizes ARMIS data to develop expenses. "Using national 1995 ARMIS data the historical booked expenses were developed."⁶

The Cost Proxy Model (CPM), Version 1.0 states that pricing inputs reflect proprietary PacBell inputs which are not disclosed. The pricing inputs, therefore, could not be evaluated from a small company perspective--a violation of the criteria that all underlying data, formulae and computations be available to interested parties. The CPM model also utilizes national 1995 ARMIS data to represent expenses.

The evidence is clear that current pricing assumptions *cannot* be assumed to be applicable to a small telephone Company. Nor can it be assumed that pricing assumptions are *not* based on any individual company's costs without specific evaluation of the supporting data that underlies the assumptions. Going forward without such evaluation may detrimentally impact a small telephony provider's ability to continue operations in the future.

⁴Benchmark Cost Model 2 Methodology, page 16-17

⁵Benchmark Cost Model 2 Methodology, page 17

⁶Benchmark Cost Model 2, Methodology, page 18

The Recommendation also states that, "Technology assumed in the model should be the least-cost, most efficient and reasonable technology for providing the supported services..."⁷ Considering the telephone company's position, the least-cost, most efficient technology may not be appropriate for industry players that must select a more expensive technology solution due to provisioning, maintenance or technical constraints of their current network. From the perspective of the supplier, however, least-cost may imply pricing bounded by an upper and lower limit. Thus, manufacturer's who may have formerly successfully entered the telecommunications industry with a market strategy other than price, (e.g. on the basis of technology or quality) may now be blocked from entry because they aren't strategically positioned to compete on price. If the entry of a manufacturer, who could have otherwise successfully competed in the telecommunications industry, is blocked, then isn't the spirit of the Modification of Final Judgment also, in part, dishonored? The parameters of "least-cost" technology solution must be evaluated on the basis that it supports the ability to maintain and provision the network, that it supports a clearly defined set of services and that it supports open competition via pricing levels that allow a majority of suppliers to participate.

Paragraph 277(7) states, "all underlying data, formulae, computations, and software associated with the model should be available to all interested parties for review and comment."⁸ All three of the models fail to meet this criteria to one degree or another. The CPM model fails because all the underlying data is considered proprietary although its developers have been the most cooperative in terms of communicating information about the algorithms and results. Where the BCM model was perhaps the most user friendly in terms of running and evaluating data, the basis for many of the models input assumptions are unclear. The Hatfield model was the most difficult to run or evaluate. This model is

⁷ CC Docket No. 96-45 Released November 8, 1996 at Paragraph 277 (1).

⁸ CC Docket 96-45 Paragraph 277, page 147-148

not designed to run data for small companies, period. Paragraph 277(8) further states, “...the model should include the capability to examine and modify the critical assumptions and engineering principles.”⁹ None of the models meet this criteria to date. Many of the engineering principles are hard coded and require significant modifications to change limiting the types of sensitivity analysis that can be performed by a small organization.

B. Appropriateness of Engineering Decisions

The appropriateness of engineering decisions is critical to the viability of the results produced by any model when applied in a small company arena. Data runs completed to date exhibit widely varying results from one model to another. These variations are attributable to differing engineering decisions and/or inputs.

1. Inconsistent estimates of loop investment result from variations in pricing assumptions and type of cable placed. In the case of the BCM model, underground and buried cable are treated similarly and there is no provision for poles or manholes. Obviously, different cost characteristics are attributable to underground cable which is placed in conduit and buried cable which is armored and trenched into the ground. Although the models do consider terrain variables, none of the models consider topical engineering decisions made to directionally drill or place cable around a land obstruction. Other areas of concern within the loop investment include representation of air miles versus actual route miles, whether sufficient distribution cables are placed for the modeled demand, or whether a sufficient number of serving area interfaces were placed.

2. The actual mapping of wire centers to census blocks or census block groups may result in outside plant designs which assign a customer serving area to the closest switch. In reality, this is not

⁹ CC Docket 96-45 in Paragraph 277, pages 147-148.

always the case. The significance is that the model may not calculate proper cable sizes or distances. Further, unrealistic uniform density distributions are assumed in each model and the density distribution categories may not be adequate to evaluate small telephony providers. More information is required on the mapping methodology and data used by each of the model developers.

3. All three models address ownership of the plant differently. Hatfield assumes 100% joint ownership, CPM assumes 25% solely owned and 75% joint owned for densities of 0 to 500. It is not clear the BCM addresses this issue at all.

4. Results indicate that models deploy a much greater percentage of digital loop carrier than found in an actual network, overstating digital loop carrier costs. This is due to a shortened copper/fiber crossover point of 9,000 to 12,000 kft. In addition to specifying the crossover point, the model should also address deployment of bridge tap, loading and gauge of wire. For instance, if the maximum loop length is 12 kft, 19-, 22- and 24-gauge cable facilities should be used. If the loop length is 9 kft, 26-gauge cable should be used. All loops in a customer serving area should have non-loaded cable with a maximum bridged tap of 2.5kft.

5. Networks are not built on a wholesale basis, they are built incrementally over time. The BCM, CPM and Hatfield all assume a “desert start” approach. This does not consider the capital investments of a network over time. For instance, given a current population density and anticipated growth, a 200 pair cable may have been placed. Later demand may require that an additional 200 pair cable be placed. Placing a 400 pair cable at the onset of construction results in excessive first costs and extremely low utilization rates. Conversely, placing a small capacity transport system at 85% capacity doesn’t allow for maintenance or growth potential. Undersizing a network element is a very costly way to meet demand. The desert start approach does not consider current network configurations, the

varying migration strategies required to move towards a forward-looking network, the impact of new technologies which are not known, or the financial capability of a telephony provider to engineer, furnish and install the forward-looking technology. There must be some consideration of model results which may incite the unnecessary abandonment or early retirement of good technologies that are not considered forward-looking. The evolutionary aspect of the network is simply not captured adequately by these models.

6. Network elements are incorporated into each model differently. CPM and Hatfield clearly identify the cost of poles, where the BCM does not. The Hatfield incorporates cost for SS7 signaling elements, where the BCM and the CPM do not. Switch and transport parameters differ widely. The Hatfield goes to greater length to address interoffice facility requirements, where the BCM adds an overall 3%. The CPM doesn't really address interoffice facilities at all. Common cards, circuit costs, labor and installation are applied differently, further restricting the ability to analyze the differences without the underlying data or input from the developer.

7. The number of residence lines, business lines and special service lines vary between models. An agreement is necessary as to how these numbers will be determined.

8. It is not clear how common systems (power, mainframe, channel banks, test gear, spares and operational support systems) are treated between models.

9. The treatment of switching requires a great deal of attention. BCM uses the current central office locations reported by Bellcore's LERG database. The Hatfield assumes the placement of one switch per wire center, which understates costs, "... the model will equip the wire center with a single switch if the number of switched access lines served by the wire center is no greater than

80,000...”¹⁰ Interestingly, their documentation also states that average switch line sizes deployed are considerably different. “... average BOC (11,200) and independent (2,671) switch line sizes derived from data published in the FCC’s *Statistics of Communications Common Carriers*. Switch investments in the BCM are calculated using generic digital switch investments for five switch sizes. Developers of the CPM model developed a switch investment curve based on proprietary customer data. The Hatfield uses per-line average prices which include remotes, hosts and stand alone offices, although per line prices between stand-alone and remote systems vary greatly. Hatfield disregards the placement of remote switches which is not representative of large or small telephony networks. The placement of remote switches avoids major hardware and software costs for the provider. If the switch type (hosts, remotes, stand-alone and tandem switches) is not modeled correctly, the differentiation in cost for the various switch types will not be captured and costs will likely be overstated. The Hatfield assumes a TR-303 interface which impacts the complexion of the network and its cost. Many companies, however, are not yet deploying TR-303 interfaces.

10. The models do not identify the portion of expense attributable to providing diversity and survivability within a Bell Operating Network, an element of design which is not as pervasive in a small company environment.

11. The size of the study area should be evaluated by wire center, by density zone, by census bureau group or census bureau, etc. to determine the amount of variance that occurs as the study area is increased or decreased. The point is to be able to evaluate the resulting network design adequately enough to isolate high cost from low cost areas so that the subsidy can be provided to the proper provider, where geographically necessary, to maintain universal service.

¹⁰ Model Description, the Hatfield Model, Version 2.2. Release 2, page 23.

12. Paragraph 277(5) states, “the model should estimate the cost of providing service for all business and households within a geographic region”¹¹ Yet the proposed recommendation indicates that vacation homes and second lines should be eliminated from consideration. Network designs must include that 100 pair cable to the lake for lifeline service even though the residents are only there one-half of the year. Network designs **MUST** take into consideration multiple lines per business or residential location or demand will not be met in a timely fashion. The models must exhibit rational deployment decisions that occur day to day.

14. Switching and interoffice traffic considerations, a significant portion of the timing and sizing of network elements, is not included in either the BCM or the CPM models.

15. Consideration for the three major support networks synchronization, signaling and power should be depicted similarly between models. Signaling is currently only considered in the Hatfield model.

16. The BCM addresses wireless technologies by capping the loop investment per line. Wireless is not addressed by either the Hatfield or CPM, nor is any other loop technology.

17. All of the models assume plant and capacity efficiencies of a single network provider. However, as competition enters, efficiencies may be lost as plant capacity is shared, duplicated or stranded. The models must recognize that density and geography will influence the number of providers, possibly deteriorating plant and capacity efficiencies. If this is not recognized, efficiencies demonstrated in the models, may never be realized resulting in support which is not sufficient.

¹¹ CC docket No. 96-45, Released November 8, 1996 at Paragraph 277(5)

C. Relevance of Model Inputs

Model inputs represent the other half of the equation which signify how accurately the model represents reality. A cursory review of the inputs between the BCM, the Hatfield and the CPM models, where possible, indicate a significant degree in variation.

1. The Hatfield per-line switch prices are an average of remote, host and stand-alone end offices. Experience evidences that the per line price of a remote is significantly different from that of a host or stand-alone switch. The fixed portion of the switch is represented at \$250,000 to \$1,500,000 in the BCM and \$600,000 for the CPM model. It is unclear what software is included. In addition to operational (generic) and application (feature) software fees, recurring right-to-use fees are increasingly used.

2. Business lines are reported as ten lines per location for the BCM and four lines per location for the Hatfield.

3. The drop investment per line reported in the BCM is determined on a cost/foot, the CPM varies the drop cost on the basis of density and the Hatfield reports \$40/line.

4. Placement of the serving area interface is based on density in one model and cable size in another.

5. Cost elements are shifted from one category to another depending on which model you are considering.

6. The treatment of expense parameters also warrant significant discussion. As previously stated, all three models rely on the use of ARMIS data which is primarily populated by the major telephony providers. ARMIS is not applicable for small service providers, it represents historical data

and may include expenses for technologies that may not be deployed in a forward-looking network design.

7. Considerable discussion is also required for the treatment of depreciation factors, especially for a small telephony provider.

8. Manufacturer discounts are utilized in the Benchmark but not in the Hatfield. There are two components to evaluating the manufacturer discounts, first the discount itself and second, the base material price.

9. There are a considerable number of factors which are applied throughout each model for different purposes. The appropriateness and basis for each of these factors demands additional review.

Further discussion during the workshops should evaluate the reasonableness of input assumptions along with the underlying data that supports them and align the parties to a set of inputs or multiple set of inputs given specified criteria.

D. Impact of Model Results

The Joint Board recommendation requires that the models exhibit forward-looking costs. An apples to apples comparison of the results supported by proxy models to current embedded based cost studies, we agree, is not accurate and does not explain the errors of the models. However, the impact and application of Part 32, Part 36 and Part 69 rules in the cost proxy models should be known. An understanding of these differences will foster an understanding of the potential differences between the support levels a company may be entitled to via actual cost study methods versus support levels determined via cost proxy models.