distribution plant actually is constructed, and (2) the capping of distribution cable lengths in the model both tend to understate costs, the square lot design substantially overstates distribution costs. The combined effect of these inaccuracies differs wire center-by-wire center. Generally, however, the resulting distribution cable lengths are similar for the HAI Model and BCPM, while the BCPM substantially overstates the amount of feeder and the amount of DLC/SAI equipment. Clearly the sum of these wrongs do not make a right.

B. The BCPM Switching, Transport, and Signaling Costs are not Forward-Looking

The BCPM switching, transport, and signaling modules are all based on the embedded network configurations. Because these embedded configurations were built incrementally to serve demand as it has evolved over time, they are unlikely to be efficient. In addition, new technology has outdated much of the old technology and can now serve the same purpose more efficiently (*i.e.*, at lower initial and ongoing maintenance costs). For example, a number of small stand-alone switches can be replaced with more efficient remote switches. To calculate efficient forward-looking costs, models must permit the placement of facilities that minimize costs incurred to serve current demand.

The BCPM uses both the current LERG-indicated status of switches by wire center, and their configuration as hosts, remotes or stand-alones. The states have not provided, nor as far as MCI is aware have the BCPM proponents ever provided, data that would permit the user to determine whether the remotes modeled by the

BCPM include the full range of remotes currently available, or whether only older, smaller remotes are modeled. Line limitations for all switches match only those associated with large 5ESS and DMS switches, and no check is performed to determine whether an engineered remote could exceed a remote's lines capacity.

In short, with respect to switch configuration, the BCPM appears unable to operate outside of the LERG's current specification of switches, ensuring that its switching costs can reflect only embedded network configurations, and that they cannot be forward-looking.

In addition, because the BCPM does not provide for the placement and costing of stand-alone switches smaller in size than the 5ESS or DMS-100, it calculates extremely large per line costs for small wire centers that in the LERG may be served by a small switch, such as a DMS-10. Because the BCPM uses embedded switch configurations, it does not model efficient, forward-looking switching cost.

1. BCPM Switching Costs are Based on a Closed, Proprietary Process

The BCPM relies on either Bellcore's SCIS model or U S WEST's SCM model to determine its switching costs.[14] Although the BCPM allows a user to

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[14] The BCPM proponents use the term "Audited ILEC Switching Module" in referring to the SCIS or SCM input process to BCPM. The audit alluded to by the "A" in ALSM was performed in 1993 and is now stale. In BellSouth's cost filing in Florida Docket Nos. 960833-TP/960846-TP/960916-TP, Section 3 Description of Models and Price Calculators, BellSouth indicated that "In fact, technology, economic theory and other advancements are occurring at such a rapid pace that, approximately 35 to 40% of the system code must be revised on an annual basis." Thus, very little of the "audited" 1993 code

bypass this step and to enter directly switching prices, the BCPM submitted by the states still relies upon the proprietary algorithms and inputs to these proprietary models to functionally categorize switching investment data into "buckets."[15]

The FCC's FNPRM on universal service requires that all submitted cost models be open, and subject to public scrutiny. Use of proprietary Bellcore or incumbent LEC (ILEC) models to determine switching costs is inconsistent with this requirement, rendering the BCPM modeling process inappropriate for developing the costs of universal service.

The SCIS and SCM material used in the BCPM switching module are highly complex and extremely sensitive to the ILEC-designated inputs, which are unknown and undocumented. The functional categorization of outputs is dependent on the inputs entered by the BCPM sponsors into these models, yet none of this data has

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likely remains in SCIS.

15 During the review of the SCIS and SCM models in the ONA proceeding in 1993, it was determined that the models required separate examinations because of differences in their methodology. In particular, the differences between SCIS's and SCM's initial partitioning of switching equipment into functional categories is highlighted by BCPM in the discussion regarding Excess CCS being included in Usage or Port. (*See*, BCPM Switch Model Inputs documentation on Reserve CCS Inv. Per Line, Sections 1.28-1.31). Given that the two proffered input models disagree in how a switch should be partitioned, it is unclear how a single set of functional categories can be created in BCPM without violating methodologies inherent in one or both input models. Thus, it appears quite possible that even if the total price of a switch were agreed upon, the functional categorization buckets could be radically different. Because neither the SCIS nor SCM models and their underlying methodologies are publicly documented, it is impossible to determine which input model is more correct.

been made available.[16] In at least one state, a Bellcore SCIS expert testified[17] that there are 50 SCIS/MO setup inputs, 22 setup inputs per technology, and an additional 200 user-specified office parameters for each host office.[18] Unless each of these inputs is identified, and the workpapers and assumptions underlying its development are available for discussion and evaluation during the input phase, the BCPM's functional categorization is effectively a "black box."

To MCI's knowledge, the BCPM proponents never have included the SCIS or SCM models in their individual state filings, nor have they documented the development of the inputs used to run these models. Therefore, it cannot be determined if the BCPM switching cost development in a given state reflects a least-cost, most-efficient approach. There are numerous SCIS inputs that require decisions regarding the type of technology and efficient engineering practices that cannot be discerned from any of the documentation or models provided (for example, there is no reference to the amount of TR303-compliant integrated digital

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16 Indeed, the only data inputs identified by BCPM are those mentioned in passing in the Model Inputs Section of BCPM's Model Methodology. The BCPM sponsors indicate that the values used for BCPM inputs correspond to inputs used in SCIS, but their actual values were rounded because they allegedly are proprietary. No other data is documented, proprietary or not.

17 Direct Testimony of David Garfield on behalf of BellSouth Telecommunications, Inc., April 30, 1997 before the Georgia Public Service Commission, Docket No. 7061-U, page 17.

18 Some of these inputs are ISDN-related and would not be required here. Eliminating the ISDN inputs still leaves a large number of SCIS/MO inputs for each wire center.

loop carrier that has been used as inputs to these proprietary models).[19]

2. The BCPM Employs a Default Procedure for Developing Switching Costs Which Leads to a Significant Overstatement of These Costs

Many of the BCPM-based models submitted for FCC review use the default "BCPM method" to develop switching costs. MCI believes that these may be significantly overstated. In Minnesota, U S WEST filed the BCPM with SCM inputs for 139 of its 709 switches (approximately 20%). Overall, running the BCPM switching module for Minnesota using the "BCPM method" in Minnesota generated switching costs that were 88 percent *higher* than the switching costs generated using U S WEST's switch-specific SCM inputs. Thus, using the "BCPM method" may result in a network design that is not least cost, in violation of criteria 1.

3. The BCPM Fails to Calculate Signaling Costs

Review of the signaling network calculations contained within the BCPM indicates that no explicit modeling of signaling costs is performed at this time, which conflicts with the second of the FCC's criteria for cost proxy models. Instead, the user must employ an input table that is based on results produced by the "Signaling Cost Proxy Module" for *parts* of U S WEST's operating region.[20] To MCI's knowledge, this Signaling Cost Proxy Module is not integrated into the BCPM.

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19 In addition, the BCPM switching module does not appear to be linked to its loop module. For example, the amounts of TR303 DLC computed in the BCPM loop module do not appear to the used in its switching module.

20 BCPM Model Methodology at 76.

III. THE STATES HAVE NOT SELECTED FORWARD-LOOKING INPUTS IN EVERY CASE

In many cases, the inputs selected by the states do not meet the Commission's criteria. Before examining individual inputs, there are two overarching issues that bear on a number of the input assumptions relied upon by various states. First, many states have relied upon what they refer to as "forward-looking" cost inputs that are nothing more than historical ILEC costs indexed to current dollars. Second, these inputs have been developed in a "black box," preventing outside parties from examining and understanding the universe of data examined, sampling techniques employed, and the reliability of the sample results.[21]

A. Embedded Costs Are Inappropriate for Use in This Proceeding

Although it is clear that the FCC has concluded that costs used for the purpose of establishing the size of the Universal Service fund must be the forward-looking costs of providing basic local exchange service, several states – particularly states that have proposed use of the BCPM – continue to recommend embedded costs to this Commission, even though they use the term "forward-looking" to characterize these costs. For example, the filing by South Carolina states:

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[21] This is especially the case with Puerto Rico's submission, which is simply a three page list of changes to the BCPM default input values, with no discussion of the basis on which the revised input values were selected. These inputs result in a support level for Puerto Rico of almost $191 million, even though the default values for support in both BCPM and the HAI Model were less than $6 million. The Commission should reject any state submitted model and inputs that results in such a large change in support without providing substantial support for the changes made in the input values.

"Whenever possible, BellSouth South Carolina-specific cost inputs which reflect the forward-looking cost of providing service in BellSouth territory in South Carolina were used. These input values include BellSouth specific costs for cable, structures, switches and other network components of universal service. Due to the economies of scope that are realized by BellSouth, these inputs are representative of any efficient carrier operating in South Carolina."

* * *

"The forward-looking structure sharing percentages are based on BellSouth experience in South Carolina."

* * *

"BellSouth material inputs are based on actual cable prices paid by BellSouth and adjusted for inflation/deflation to reflect forward-looking costs. Costs for engineering, installation, splicing, etc., are derived from BellSouth in-plant factors."

* * *

"Switch Fill Factor – Based on South Carolina-specific BellSouth switch fill rates."

These quotations from the South Carolina filing reveal profound misunderstandings about the term "forward-looking." Although South Carolina obviously recognizes that forward-looking costs must reflect "current," *i.e.*, 1998 dollars, its filing repeatedly *assumes* that existing BellSouth practices and characteristics are efficient, without citing evidence or record support that this is so. Thus, for example, it relies upon BellSouth's existing structure sharing percentages, without having considered the extent to which structure sharing would increase in a forward-looking environment. Similarly, it *assumes* that BellSouth's embedded costs for items such as cable, terminals, drops, and NIDs (adjusted for inflation) are

efficient, without knowing the extent to which they reflect the economies of scale that would be available with large material purchases.[22] Most egregiously, perhaps, it assumes that BellSouth's embedded "in-plant factors" somehow reflect efficient, forward-looking costs for items such as engineering, installation, and splicing.

In short, forward-looking costs are *not* simply historical costs expressed in today's dollars. Instead, they must reflect a more fundamental examination of whether the underlying technology, scale of installation, and implicit assumptions are consistent with a forward-looking environment. States that have failed to conduct these sorts of examinations – or otherwise failed to adjust unit prices and other costing assumptions – have not conducted forward-looking cost studies consistent with the FCC requirements. None of the states that filed BCPM have documented that they have performed these forward-looking analyses. In fact, it is just such a failure to perform forward-looking cost studies that can lead to the absurd result that, as the South Carolina Public Service Commission recently ruled, the forward-looking cost of a local loop is more than $6 above the current average retail rate.

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22 BellSouth testified in numerous states that its unit prices for material were based upon the *average* price paid historically by BellSouth, adjusted for inflation. While acknowledging that there were a range of values that were averaged, BellSouth refused to provide the underlying detail or to provide other information that would be required to determine the extent to which the various data points reflected economies of scale appropriate for a forward-looking cost study. Obviously, forward-looking costs should reflect a "best in class" approach to establishing unit prices, not a simplistic average of historical experience that fails to ask or demand an answer to why some historical unit prices are lower than others.

B. ILEC Studies of Historical Costs Are Not Open and Verifiable

State reliance on ILEC studies of historical cost experience is problematic for a second reason – in virtually every state, this reliance is based upon "black box" studies that were not open to either the state PUC staffs nor to MCI and other non-ILEC parties. As a result, the conclusions reached by the ILECs – and presented in summary fashion – were not verifiable by either the state or the other parties.

This inability to verify the ILECs' studies is a significant flaw for two reasons. First, for input choices to be consistent with the Commission's requirement that the technology used be forward-looking and the most efficient, it is critical that the assumptions implicit in the ILEC calculations be clearly understood and evaluated in light of these requirements. For example, merely adopting an ILEC's existing sharing percentages without (1) understanding how they were calculated, (2) the extent to which the ILEC sought opportunities for sharing historically, or (3) whether recent trends indicate an increasing incidence of sharing is an abrogation of the states' responsibility to ensure that these studies comply with the FCC's principles.

Second, to determine whether average unit prices for material paid by an ILEC historically are relevant for forward-looking cost studies, it is important to:

> determine how the average price compares to the range of prices paid by the ILEC from which the average is drawn, and to understand how any calculated average was weighted;[23]

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[23] If ILECs had provided this information, MCI might have been able to (1) show that the HAI Model inputs are well within the range of ILEC inputs, or

compare the range of prices paid by the ILEC for each material component to prices paid by *other* ILECs and, where different, to ask why; and

understand the circumstances under which the prices were paid historically.[24]

By failing to require the ILECs to produce the necessary data, the various states that have relied upon the historical ILEC experience have made it impossible to ensure that the resulting historical experiences are appropriate for Total Element Long Run Incremental Cost/Total Service Long Run Incremental Cost (TELRIC/TSLRIC) calculations. Merely *assuming* that the ILEC is efficient (or that, because of its large size, its recent purchases must reflect an appropriate scale of purchases) falls far short of the states' obligation in this proceeding.[25]

C. Specific Input Values Have Not Been Appropriately Set

In this section, we address certain specific inputs that can have a significant

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(2) show that the standard deviation around the ILEC "average" is so large that the input employed in the ILEC study is not statistically different from the the HAI Model input.

24 For example, do the pole installation costs reflect too high a proportion of small scale installations (*e.g.*, replacement of poles knocked down in traffic accidents) to represent the costs that would be incurred to install poles, *en masse*, in a forward-looking world.

25 This same criticism applies to the default inputs in the BCPM, which certain states adopted after ILECs reviewed them and found them "consistent" with their own experience. To MCI's knowledge, the ILEC survey that allegedly forms the basis for these default inputs has never been provided to a state PUC or outside party. As a result, there is no way to determine how the average survey response that is reputedly used as the BCPM default input relates to the range of survey responses that were received – preventing MCI (or any other party) from examining why some ILECs pay higher costs for the same material or activity than others, or making an independent judgement about the reliability of the BCPM default input.

effect on the level of costs calculated for universal service support. These items include structure sharing, structure mix, cable sizing factors, network operations expenses, and overhead expenses.

1. Structure Sharing

The states' proposals reflect two alternative approaches to the issue of structure sharing, *i.e.*, the percentage of structure that should be assigned to basic local exchange service. In one case, states such as Minnesota and Louisiana have assumed that on a forward-looking basis, a significant proportion of structure costs would be paid for by other entities (*e.g.* cable companies, electric utility companies). On the other hand, states such as South Carolina and North Carolina assume that structure sharing will be minimal, based upon the ILECs' historical experience.

It is unreasonable to assume little or no structure sharing on a forward-looking basis. Even in today's climate, there is considerable sharing of aerial structure, with electric utility companies often using as much as 50 percent of a pole and telecommunications and cable providers occupying the rest of the pole. Underground structure is commonly shared, particularly in urban areas and in developments that have been built in the past fifteen years. Although it is arguably less common, even buried structure can be effectively shared.

In a March 25, 1997 letter to the FCC, Sprint (one of the developers of the BCPM) conceded that the amount of structure sharing reflected in the BCPM default values was inappropriately low. Based upon its own "independent evaluation," in the context of universal service proceedings, Sprint concluded that it would be

appropriate to assume that only half of the cost of aerial structure and two-thirds of the cost of buried and underground structure should be assigned to basic local exchange services.

In MCI's view, these amounts should constitute the *maximum* amount of structure included in any of the cost studies in this proceeding. As the FCC is aware, the HAI Model default inputs assume that considerably more sharing would be possible in the long-run in a forward-looking environment, and assign somewhat lower percentages of structure costs to basic local exchange service. MCI's view is informed by the experiences that can be observed in other "network" industries that have made a transition from competitive to regulated environments. In such industries, one sees explosive growth in efforts to share rights-of-way and other structure costs as competitive pressures increase, and it is appropriate to extrapolate this experience to the basic local exchange business.

2. Structure Mix

Rather than focusing on the specific structure mix percentages adopted by the various states, it is most useful to address this issue by examining various approaches to the issue. Consistent with the long-run, forward-looking approach to costing advocated by the Commission, structure sharing percentages should not necessarily be based on the embedded ILEC experience. The current mix of aerial, underground and buried plant undoubtedly reflects economic and policy trade-offs that are no longer relevant. This is because the relative costs of various structure choices is not what it was historically, or because the environment in which

structure would be installed – in a forward-looking context – is not the environment that existed at the time structure was *actually* installed.

Both the HAI Model and the BCPM require that users input the relevant structure mix. Only the HAI Model, however, permits the user to *compare* relative life cycle costs for aerial, buried and underground structure and to adjust the starting structure mix to reflect a more efficient structure mix.[26] Thus, the HAI Model approach is far more consistent with a long-run, forward-looking costing approach than *either* adopting model defaults or using the ILECs' historical structure mix.

3. Cable Sizing Factors

Both models employ cable sizing factors (sometimes referred to as "fill" factors) to reflect the fact that it is desirable to construct networks with some amount of spare capacity – above the capacity required to handle existing demand – in order to reflect administrative needs, eventual damage to wire pairs, and "breakage."[27] In addition, cable sizing factors (particularly in the distribution portion of the network), can be used to provide spare capacity in anticipation of growth. ILECs argue that this is appropriate because it is less expensive to install *all* copper pairs required for ultimate demand in a distribution area at once, rather than to

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26 The extent to which the HAI Model is permitted to adjust structure mix to reflect lower life cycle costs is user-adjustable.

27 The term "breakage" refers to the fact that copper cables are commonly available only in a limited number of standard sizes. When the required number of copper pairs is between two standard cable sizes, it is necessary to install the next largest standard cable size, effectively creating spare capacity in that portion of the network.

periodically incur the expense of having to "reinforce" these areas as demand increases.[28]

The ILECs' historical experience is not the relevant guideline for establishing the appropriate cable sizing factor. The embedded incidence of spare plant in an existing ILEC network can reflect "gold-plating" (or other forms of inefficiency) or the fact that forecasts of growth made long ago have turned out to be inaccurate.[29] Embedded calculations of "fill" factors are further complicated by the ILECs' practice of abandoning plant in place, but continuing to carry it as "available" as long as even a single pair in the cable is in use.

The appropriate approach is to determine what an efficient entrant would require in planned spare capacity, recognizing that the availability of a limited

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28 MCI does not dispute that it may be less costly to install, up front, sufficient distribution facilities to meet ultimate demand in a distribution area, and that doing so would lower the overall present value of providing service to all customers in the distribution area. The more complex question, however, is how these costs should be recovered from present and future customers. The approach advocated by the ILECs forces *existing* customers to defray the costs of *all* loops installed until future customers materialize. As a result, *existing* customers pay more than it would cost to construct a distribution network for their exclusive use, and future customers effectively avoid paying some portion of the carrying costs that is incurred to provide them service. Furthermore, if the ILECs' forecast of future customer demand fails to materialize, the ILECs are nevertheless made whole because existing customers will continue to pay the full cost of all loops originally installed. Thus, under their approach, ILECs have no incentive to accurately forecast demand and are not penalized if their forecasts overstate eventual demand – a fact that is difficult to reconcile with the cost of capital, which implicitly assumes that the ILECs should be compensated for assuming a certain level of business risk.

29 In the latter case, of course, there would be no need to install, on a forward-looking basis, the same amount of spare plant.

number of standard cable sizes will automatically provide a significant element of spare capacity in many circumstances. This is the approach reflected in the HAI Model default values, and is the approach the Commission should require any state-sponsored model to follow.

4. Network Operations Expenses

As the Commission is aware, the HAI Model calculates network operations expenses on a per line basis (instead of using an expense-to-investment ratio), but adjusts the embedded amount downward by 50 percent, to make it forward-looking. Although many states have adopted some adjustment, the ILECs argue that no adjustment is appropriate – claiming that if the HAI Model sponsors are unable to specifically quantify the dollar savings that result from technological advances, no reduction from embedded levels should be reflected.

Obviously, use of the ILECs' embedded network operations expense per line – with no adjustment – is inconsistent with a forward-looking approach, and ignores the fact that across all ILECs, network operations expenses per line have been declining in real terms for several years. The appropriateness of the HAI Model adjustment of 50 percent is established by reference to the BCPM default value for network operations expenses, which is well below historical levels and generally comparable to the amount per line reflected in the HAI Model.

5. Overhead Expenses

There are two related issues that the FCC must focus on in this area. First, the HAI Model uses a percentage "mark-up" to account for general and

administrative expenses not otherwise accounted for in the model. In contrast, the BCPM proponents – and the states that have adopted the BCPM – utilize a fixed cost per line as a mechanism for recovering such costs.

Second, the HAI Model approach rejects embedded costs in favor of an analysis that focused on the relationship between "overhead costs" and direct expenses in more competitive industries, such as long-distance telecommunications and the automobile manufacturing and airline industries. What MCI and AT&T observed in these studies was that as industries become more competitive, the relationship between overhead expenses and direct expenses appears to decline. Thus, while the average ILEC relationship was approximately 13.6 percent, the comparable ratio for AT&T was 10.4 percent, and approximately 6 percent for the automobile and airline industries.

As is the case with all of the BCPM default inputs, the BCPM proponents have never produced the data underlying their development of the BCPM default values for overhead expenses per line used in the model. Similarly, MCI is unaware of any work papers supporting company-specific calculations of overhead expenses per line in the states of Montana, Nebraska, North Carolina or South Carolina, which all propose use of the BCPM model in this proceeding. As an initial matter, therefore, these inputs fail the FCC's requirement that they be open and verifiable.

More fundamentally, by assuming that overhead expenses per line will be unchanged, the BCPM proponents implicitly assume that embedded overhead

expenses will continue into the indefinite future. It is inappropriate to ignore the experience of lower overhead rates in other, more competitive industries in calculating long-run, forward-looking costs – yet this is precisely the approach advocated by the BCPM proponents, and the states that have adopted the BCPM for this proceeding.

IV. THE STRUCTURE OF AMERITECH'S COST MODEL IS NOT FORWARD-LOOKING IN ALL RESPECTS

Illinois and Michigan have submitted company-specific Universal Service Fund (USF) models for their states. For the territories served by Ameritech, these USF models are a modified version of the TELRIC models used by these states to set prices for UNEs and interconnection for Ameritech. As discussed infra, these state-specific USF models are not forward-looking in every respect.

In their USF cost model submissions, Illinois and Michigan have not fully described the models, their functions, and their input values. MCI's comments are based in part on information available on the public record in the relevant state proceedings. Based on that analysis, there are several modifications that must be made to these models to bring them into compliance with the Commission's criteria:

1. Ameritech's Facilities Analysis Model (AFAM) for distribution facilities requires modification. Specifically, Ameritech's default placement of the SAI on the distribution area's boundary is not always optimal. To minimize investments in costly copper based distribution facilities, the SAI should be moved *into* the distribution area *toward* the distribution area's centroid for

longer loops served by fiber feeder facilities. This would result in significant cost savings for longer loops that tend to be the subject of universal service concerns;

2. Ameritech should eliminate from AFAM the decision tables that use the *age* of living units and *historic* engineering design to select relatively expensive aerial cables over cheaper buried cables. Instead, Ameritech should program AFAM to select technologies based on *forward-looking*, *least cost criteria*; and,

3. In Michigan, Ameritech inappropriately uses "closure factors" to align the USF costs with those of Docket U-11280. The closure factors are evidence that Ameritech's models *overstate* the true forward-looking economic costs (as determined in MPSC Docket U-11280, the Michigan Commission's TELRIC proceeding for Ameritech). Instead of using closure factors, Ameritech should be required to modify its models. These modifications would eliminate much of the need for closure factors and produce costs consistent with those of MPSC Docket U-11280.

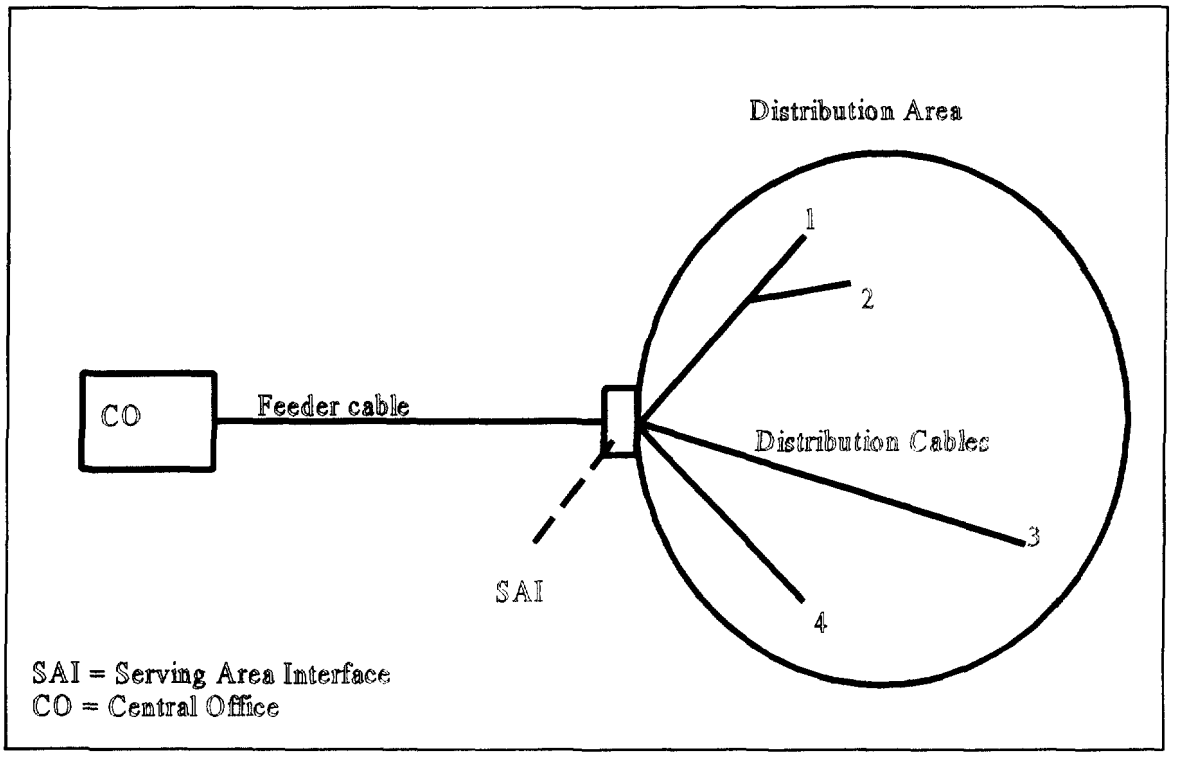
A. Ameritech's Loop Cost Model Fails to Minimize the Costs of Distribution Facilities

The AFAM is used to determine both feeder and distribution costs. For the purposes of the state universal service proceedings, however, Ameritech altered AFAM from its original form as used to determine the costs for unbundled loops in the Illinois Commerce Commission's TELRIC proceeding, ICC Docket 96-0486/96-

0569. The modified AFAM calculates loop investments based on hypothetical distribution facilities rather than on a sample of *existing* loop distribution facilities and a nearly complete inventory of feeder facilities, as was done in its original TELRIC model.

In the modified version of AFAM, Ameritech starts with the identification of all customer addresses in a distribution area. These addresses are then geo-coded and used to identify a boundary for the distribution area. Next, the modified version of AFAM places the feeder/distribution interface at the point on the polygon that is closest to the central office (CO). Investments in distribution facilities are then determined by constructing hypothetical distribution facilities between the feeder/distribution interface and the geo-coded customer addresses.

The construction of the hypothetical distribution facilities is illustrated below in Figure 1. In this figure, facilities are constructed for customers, whose addresses are known and geo-coded. The hypothetical distribution cables are then constructed to connect the customer addresses (locations) with the SAI, which is always placed *on the distribution area boundary* at a point nearest to the CO.



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The problem with Ameritech's modification of AFAM is that the model minimizes only the length of the feeder facilities; the default placement of the SAI on the distribution area boundary fails to minimize the more costly portion of the loop: *the distribution facilities*.

There is no optimization routine in AFAM that determines whether placing the SAI *on the boundary* is in fact optimal from a cost perspective. The Commission should recognize, however, that placing the SAI on the distribution area boundary, as AFAM does, will not always be optimal from a cost perspective. Specifically, this default placement ignores the critically important trade-off between the relatively lower costs for feeder facilities and higher costs for distribution facilities. This

trade-off is particularly important, of course, in the case of fiber based feeder facilities used to serve longer loops, which are the loops most likely to require universal service support.

As noted, it is most important to minimize the necessary investments in distribution facilities and maximize the use of feeder facilities. As all telephone engineers and cost analysts know, distribution facilities are the most costly portion of the loop. Thus, in order to minimize distribution costs, loop facilities, when possible, should be aggregated onto less costly feeder facilities.

Generally, the optimal placement of the SAI for longer loops is *not* on the boundary of the distribution area, but *inside* the distribution area. Exactly how far inside the distribution area the SAI should be placed depends on the specifics of the distribution area, such as the customer locations, etc. Therefore, the optimal point for the SAI can only be found by doing some sensitivity runs with AFAM in which the coordinates of the SAI are moved toward the centroid of the distribution area.[30]

Obviously, placing the SAI inside the distribution area will almost always accomplish important cost savings for two reasons:

1) It will substitute cheap feeder facilities for expensive distribution facilities.
2) It will permit additional deployment of fiber facilities because longer feeder

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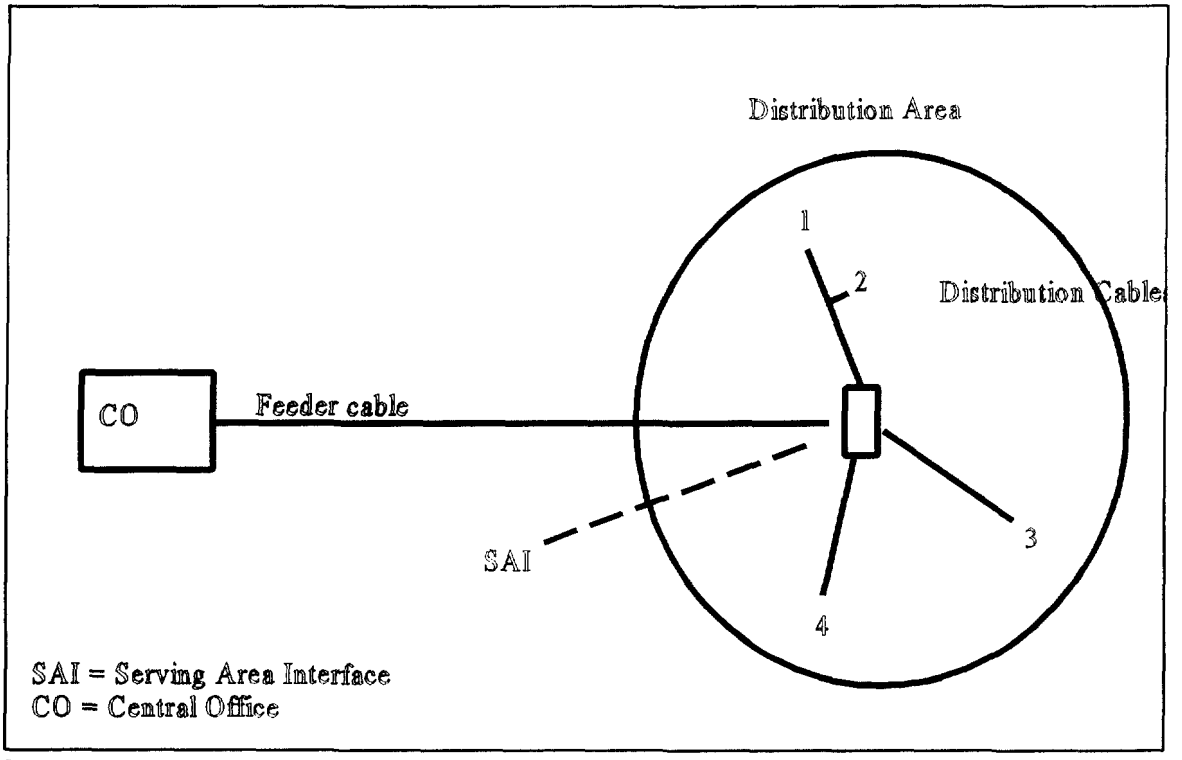
[30] Such sensitivity runs were performed in Wisconsin, and found substantial cost savings from placing the SAI inside the distribution area for fiber-based loops.

routes make the deployment of fiber economical.

The advantages of placing the SAI inside the distribution area are illustrated in Figure 2 below. In Figure 2 the customer locations are the same as in Figure 1 (above). The difference is that the SAI is now placed inside the distribution area. As a result, far fewer distribution facilities need to be deployed. Of course, extending the SAI into the distribution area requires more feeder facilities. However, as discussed supra, feeder facilities can be extended at only a fraction of the costs of distribution facilities. On balance, therefore, placing the SAI inside the distribution area will result in cost savings.



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The Commission should also note that Figure 2 understates the extent to which cost

savings are achieved by moving the SAI inside the distribution area. The lengths of the distribution facilities indicated in Figure 1 and 2 disguise that distribution facilities are multiplied by a route to air ratio of to reflect that the air distance between the SAI and the geo-coded customer locations cannot be realized in the real world. In general, the cost savings of moving the SAI into the distribution area for longer loops -- *those that are most likely to generate universal service concerns* -- are substantial.

B. Ameritech's Technology Mix in AFAM is not Forward-Looking

Ameritech's loop cost model uses three types of outside plant technologies: underground, buried and aerial. The age of the dwelling units determines whether or not the unit is served by means of aerial cables, with older dwellings being served by relatively more aerial cable. For smaller cable sizes, the per foot total installed costs (TIC) for aerial cable in the Ameritech model are *significantly greater* than those for buried cables.

In view of these cost comparisons and Ameritech's own documentation that less of the newly constructed distribution facilities use aerial technologies, AFAM's decision criteria are not consistent with least cost, forward-looking network design principles. Furthermore, the cost inefficiency of using aerial technologies in AFAM is compounded, because when aerial cables are used, drop facilities are also aerial, which increases the costs of the drop. The investment for aerial cable in the AFAM is higher than for buried cables. The impact of this large difference in costs becomes more important for longer and more expensive loops -- the very loops that

are most likely to require USF support. These drop costs, however, would be substantially reduced in the AFAM if buried cables were used.

In sum, AFAM is inappropriately biased toward the use of aerial technologies, which are relatively expensive. As a result, loop costs are overstated. This is particularly true for longer loops in rural areas that are most likely to generate universal service concerns.

C. Ameritech's Use of Closure Factors Demonstrates that Ameritech's Models Inflate Costs and are Inconsistent with the Results of Docket U-11280

The cost model submitted for Michigan, uses "closure factors" to bring the inflated cost estimates in line with the UNE cost results from Docket U-11280. Ameritech calculates closure factors for each of the rate bands; the factors are then multiplied by the cost to ensure that the average loop costs for each rate band does not exceed the average loop costs as calculated in MPSC Docket U-11280.

Of course, if Ameritech's cost models accurately reflected the Commission's Order in Docket U-11280 and used appropriate methodologies for aggregating costs on a per wire center basis, then there would be *no* need for "closure factors." The use of these factors only serves to quantify the extent to which Ameritech's cost models inflate the true forward-looking economic cost of loops. In short, the closure factors reveal in a most concise fashion that Ameritech's models are flawed and require downward adjustments.

Since the models will be used for years to come, it is of utmost importance that the USF models are accurate. Thus, it would be inappropriate for the

Commission to approve state models for Ameritech that are so fundamentally flawed as to produce cost results that are well above the true cost.

V. SEVERAL OF THE INPUTS USED IN THE AMERITECH MODEL ARE NOT FORWARD-LOOKING

The state-specific USF models, as filed for Illinois and Michigan, use several inputs that are not forward-looking. Specifically, the model assumes no structure sharing, uses dated switch vendor contracts, and unreasonably short depreciation lives. In addition, the Illinois model relies on a study of shared and common costs that has not been available for effective review by interested parties, in violation of the Commission's criterion 8.

A. Inputs for Structure Sharing, Switch Prices, and Depreciation Lives are not Appropriately Set

Ameritech's loop cost model assumes that there is no sharing of poles and conduit facilities. This is inappropriate and inconsistent with forward looking, least-cost principles. Because Ameritech is estimating the costs of constructing and maintaining conduit space and pole facilities for a forward-looking network, the Company should recognize in its cost studies that in a forward-looking network, conduit space and pole facilities can and will be *shared* by other entities. As such, the costs for these facilities should be allocated to the other entities using the conduit and poles. Assigning 100 percent of the structure costs to telephony is simply not reasonable.

Similarly, Ameritech's reliance on 1991 contracts to determine switching costs is unreasonable. The Commission's third criterion explicitly requires that