elect to use technical standards that are not developed or adopted by voluntary consensus standards bodies if the head of the agency or department transmits to the Office of Management and Budget an explanation of the reasons for using such standards.

This proposed rule does not mandate the use of any technical standards; accordingly, the NTTAA does not apply to this rule.

G. Applicability of Executive Order 13045

This proposed rule is not subject to E.O. 13045, entitled ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997), because it is not an economically significant regulatory action as defined in E.O. 12866 and because it does not involve decisions on environmental health risks or safety risks that may disproportionately affect children.

H. Executive Order 13084: Consultation and Coordination With Indian Tribal Governments

Under Executive Order 13084, EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 13084 requires EPA to provide to the Office of Management and Budget, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected officials and other representatives of Indian tribal governments ''to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities.''

Today's rule does not significantly or uniquely affect the communities of Indian tribal governments, because this regulation applies directly to facilities that use these substances and not to governmental entities. Accordingly, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

List of Subjects in 40 CFR Part 82

Administrative practice and procedure, Air pollution control, Chemicals, Chlorofluorocarbons, Exports, Hydrochlorofluorocarbons, Imports, Interstate commerce.

Dated: June 4, 1999.

Carol M. Browner,

Administrator.

For the reasons set out in the preamble title 40, chapter I of the Code of Federal Regulations, is proposed to be amended to read as follows:

PART 82—PROTECTION OF STRATOSPHERIC OZONE

1. The authority citation for Part 82 continues to read as follows:

Authority: 42 U.S.C. 7414, 7601, 7671–7671q.

Subpart C—[Amended]

2. Section 82.66 is amened by removing paragraphs (d)(2)(ii), (iii), (iv),(ix), and (xi); by redesignating (d)(2)(v) through (d)(2)(viii) as (d)(2)(ii) through (d)(2)(v); by redesignating (d)(2)(x) as (d)(2)(vi); by revising paragraph (c); and by adding paragraph (e) to read as follows:

§ 82.66 Nonessential Class I Products and Exceptions.

* * * * *

(c) Any plastic foam product which is manufactured with or contains a class I substance.

* * * * *

(e) Any air-conditioning or refrigeration appliance which contains a class I substance used as a refrigerant.

[FR Doc. 99–15014 Filed 6–11–99; 8:45 am]

BILLING CODE 6560–50–P

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Parts 36, 54, and 69

[CC Docket Nos. 96–45 and 97–160; FCC 99–120]

Federal-State Joint Board on Universal Service; Forward-Looking Mechanism for High Cost Support for Non-Rural LECs

AGENCY: Federal Communications Commission.

ACTION: Notice of proposed rulemaking.

SUMMARY: This document concerning the Federal-State Joint Board on Universal Service proposes input values for the forward-looking mechanisms cost model for determining support for non-rural high-cost carriers. Comments are sought to supplement the record so that the Commission can select final input values.

DATES: Comments are due on or before July 2, 1999 and reply comments are due on or before July 16, 1999.

Written comments by the public on the modified information collections are due on or before July 2, 1999 and reply comments are due on or before July 16, 1999. Written comments must be submitted by the Office of Management and Budget (OMB) on the modified information collections on or before August 13, 1999.

ADDRESSES: Parties who choose to file by paper must file an original and four copies of each filing. All filings must be sent to the Commission's Secretary, Magalie Roman Salas, Office of the Secretary, Federal Communications Commission, 445 Twelfth Street, S.W., TW–A325, Washington, D.C. 20554. In addition to filing comments with the Secretary, a copy of any comments on the information collections contained herein should be submitted to Judy Boley, Federal Communications Commission, Room 1–C804, 445 Twelfth Street, S.W., Washington, DC 20554, or via the Internet to jboley@fcc.gov, and to Timothy Fain, OMB Desk Officer, 10236 NEOB, 725__17th Street, N.W., Washington, DC 20503 or via the Internet to fain__t@al.eop.gov.

FOR FURTHER INFORMATION CONTACT: Richard Smith, Attorney, Common Carrier Bureau, Accounting Policy Division, (202) 418–7400. For additional information concerning the information collections contained in this Further Notice of Proposed Rulemaking contact Judy Boley at 202–418–0214, or via the Internet at jboley@fcc.gov.

SUPPLEMENTARY INFORMATION: This is a summary of the Commission's document released on May 28, 1999. The full text of this document is available for public inspection during regular business hours in the FCC Reference Center, Room CY–A257, 445 Twelfth Street, S.W., Washington, D.C. 20554.

Initial Paperwork Reduction Act Analysis

1. This Further Notice of Proposed Rulemaking contains a modified information collection. The Commission, as part of its continuing effort to reduce paperwork burdens, invites the general public and the Office of Management and Budget (OMB) to comment on the information collections contained in this Further Notice of Proposed Rulemaking, as required by

the Paperwork Reduction Act of 1995, Public Law 104–13. Public and agency comments are due at the same time as other comments on this Further Notice of Proposed Rulemaking; OMB notification of action is due August 13, 1999. Comments should address: (a) whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimates; (c) ways to enhance the quality, utility, and clarity of the information collected; and (d) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other form of information technology.

OMB Approval Number: 3060–0793.

Title: Procedures for States Regarding Lifeline Consents. Adoption of Intrastate Discount Matrix, and Designation of Eligible Telecommunications Carriers.

Form No.: N/A.

Type of Review: Revision of a currently approved collection.

Respondents: Business or other for profit.

	Number of respondents	Estimate time per response (hours)	Total annual burden (hours)
Self-Certification as a rural company for companies serving less than 100,000 access lines	5	1	5
Self-Certification as a rural company for companies serving more than 100,000 access lines	20	1	20

Total Annual Burden: 25 hours.

Estimated costs per respondent: $0.

Needs and Uses: All the requirements contained herein are necessary to implement the congressional mandate for universal service. These reporting requirements are necessary to verify that particular carriers and other respondents are eligible to receive universal service support. In this document the Commission is proposing to change the way in which LECs file rural certification letters. The Commission proposes that once it has clarified the meaning of ''local exchange operating entity'' and ''communities of more than 50,000'' in section 153(37), it should require carriers with more than 100,000 access lines that seek rural status to file certifications for the period beginning January 1, 2000, consistent with the Commission's interpretation of the ''rural telephone company'' definition.

I. Introduction

2. In the Telecommunications Act of 1996 (1996 Act), Congress directed this Commission and the states to take the steps necessary to establish support mechanisms to ensure the delivery of affordable telecommunications service to all Americans. In response to this directive, the Commission has taken action to put in place a universal service support system that will be sustainable in an increasingly competitive marketplace. *In the Universal Service Order,* 62 FR 32862 (June 17, 1997), the Commission adopted a plan for universal service support for rural, insular, and high cost areas to replace longstanding federal subsidies to incumbent local telephone companies with explicit, competitively neutral federal universal service support mechanisms. The Commission adopted the recommendation of the Federal-State Joint Board on Universal Service (Joint Board) that an eligible carrier's level of universal service support should be based upon the forward-looking economic cost of constructing and operating the network facilities and functions used to provide the services supported by the federal universal service support mechanisms.

3. Our plan to adopt a mechanism to estimate forward-looking cost has proceeded in two stages. On October 28, 1998, with the release of the *Platform Order,* 63 FR 63993 (November 18, 1998), the Commission completed the first stage of this proceeding: the selection of the model platform. The platform encompasses the aspects of the model that are essentially fixed, primarily the assumptions about the design of the network and network engineering. In this document, we move toward completion of the second stage of this proceeding, by proposing input values for the model, such as the cost of cables, switches, and other network components, in addition to various capital cost parameters. For the most important inputs, we provide a description of the methodology we have used to arrive at the proposed values. In addition, we seek to supplement the record regarding certain inputs to the model.

4. The forward-looking cost of providing supported services estimated by the model will be used to determine high cost support for non-rural carriers beginning January 1, 2000. The Commission is adopting a companion Order and Further Notice that establishes the framework for determining federal high cost support levels and seeks comment on the details of that mechanism.

II. Estimating Forward-Looking Economic Cost

A. Designing a Forward-Looking Wireline Local Telephone Network

5. To understand the assumptions made in the mechanism, it is necessary to understand the layout of the current wireline local telephone network. In general, a telephone network must allow any customer to connect to any other customer. In order to accomplish this, a telephone network must connect customer premises to a switching facility, ensure that adequate capacity exists in that switching facility to process all customers' calls that are expected to be made at peak periods, and then interconnect that switching facility with other switching facilities to route calls to their destinations. A *wire center* is the location of a switching facility. The wire center boundaries define the area in which all customers are connected to a given wire center. The *Universal Service Order* required the models to use existing incumbent LEC wire center locations in estimating forward-looking cost.

6. Within the boundaries of each wire center, the wires and other equipment that connect the central office to the customers' premises are known as *outside plant.* Outside plant can consist of either copper cable or a combination of optical fiber and copper cable, as well as associated electronic equipment. Copper cable generally carries an analog signal that is compatible with most customers' telephone equipment, but thicker, more expensive cables or loading coils must be used to carry signals over greater distances. Optical fiber cable carries a digital signal that is incompatible with most customers' telephone equipment, but the quality of a signal carried on optical fiber cable is superior at greater distances when compared to a signal carried on copper

wire. Generally, when a neighborhood is located too far from the wire center to be served with copper cables alone, an optical fiber cable will be deployed to a point within the neighborhood, where a piece of equipment will be placed that converts the digital light signal carried on optical fiber cable to an analog, electrical signal that is compatible with customers' telephones. This equipment is known as a digital loop carrier remote terminal, or DLC. From the DLC, copper cables of varying gauge extend to all of the customer premises in the neighborhood. Where the neighborhood is close enough to the wire center to serve entirely on copper cables, a copper trunk connects the wire center to a central point in the serving area, called the serving area interface (SAI), and copper cables will then connect the SAI to the customers in the serving area. The portion of the loop plant that connects the central office with the SAI or DLC is known as the *feeder plant,* and the portion that runs from the DLC or SAI throughout the neighborhood is known as the *distribution plant.*

7. The model's estimate of the cost of serving the customers located within a given wire center's boundaries includes the calculation of switch size, the lengths, gauge, and number of copper and fiber cables, and the number of DLCs required. These factors depend, in turn, on how many customers the wire center serves, where the customers are located within the wire center boundaries, and how they are distributed within neighborhoods. Particularly in rural areas, some customers may not be located in neighborhoods at all but, instead, may be scattered throughout outlying areas. In general, the model divides the area served by the wire center into smaller areas known as *serving areas.* For serving areas sufficiently close to the wire center, copper feeder cable extends from the wire center to a SAI where it is cross-connected to copper distribution cables. If the feeder is fiber, it extends to a DLC terminal in the serving area, which converts optical digital signals to analog signals. Individual circuits from the DLC are cross-connected to copper distribution cables at the adjacent SAI.

8. The model assumes that wire centers are interconnected with one another using optical fiber networks known as Synchronous Optical Network (SONET) rings. The infrastructure to interconnect the wire centers is known as the *interoffice* network, and the carriage of traffic among wire centers is known as *transport.* In cases where a number of wire centers with relatively few people within their boundaries are located in close proximity to one another, it may be more economical to use the processor capacity of a single switch to supervise the calls of the customers in the boundaries of all the wire centers. In that case, a full-capacity switch (known as a *host*) is placed in one of the wire centers and less expensive, more limited-capacity switches (known as *remotes*) are placed in the other wire centers. The remotes are then connected to the host with interoffice facilities. Switches that are located in wire centers with enough customers within their boundaries to merit their own full-capacity switches and that do not serve as hosts to any other wire centers are called stand-alone switches.

9. There are also a number of expenses and general support facilities (GSF) costs associated with the design of a forward-looking wireline telephone network. GSF costs include the investment related to vehicles, land, buildings, and general purpose computers. Expenses include: plant specific expenses, such as maintenance of facilities and equipment expenses; plant non-specific expenses, such as engineering, network operations, and power expenses; customer service expenses, such as marketing, billing, and directory listing expenses; and corporate operations expenses, such as administration, human resources, legal, and accounting expenses.

B. Synthesis Model

10. The ''synthesis'' model adopted in the *Platform Order* allows the user to estimate the cost of building a telephone network to serve subscribers in their actual geographic locations, to the extent these locations are known. To the extent that the actual geographic locations of customers are not available, the Commission determined that the synthesis model should assume that customers are located near roads.

11. Once the customer locations have been determined, the model employs a clustering algorithm to group customers into serving areas in an efficient manner that takes into consideration relevant engineering guidelines. After identifying efficient serving areas, the model designs outside plant to the customer locations. In doing so, the model employs a number of cost minimization principles designed to determine the most cost-effective technology to be used under a variety of circumstances, such as varying terrain and density.

12. The Commission concluded that the federal universal service mechanism should incorporate, with certain modifications, the HAI 5.0a switching and interoffice facilities module to estimate the cost of switching and interoffice transport. The Commission noted that it would consider adopting the LERG at the inputs stage of this proceeding to determine the deployment of host and remote switches. In addition, the Commission adopted the HAI platform module for calculating expenses and capital costs, such as depreciation.

13. The Commission noted that technical improvements to the cost model will continue, both before implementation of the model for non-rural carriers and on an ongoing basis, as necessary. The Commission therefore delegated to the Bureau the authority to make changes or direct that changes be made to the model platform as necessary and appropriate to ensure that the platform of the federal mechanism operates as described in the *Platform Order.* As contemplated in the *Platform Order,* Commission staff and interested parties have continued to review the model platform to ensure that it operates as intended. As a result, some refinements have been made to the model platform adopted in the *Platform Order.*

C. Selecting Forward-Looking Input Values

14. In the *Universal Service Order,* the Commission adopted ten criteria to be used in determining the forward-looking economic cost of providing universal service in high cost areas. These criteria provide specific guidance for our selection of input values for use in the synthesis model. Rather than reflecting existing incumbent LEC facilities, the technology assumed in the model ''must be the least-cost, most-efficient, and reasonable technology for providing the supported services that is currently being deployed.'' As noted, existing LEC plant does not necessarily, or even likely, reflect forward-looking technology or design choices. Similarly, the input values we tentatively select in this Notice are not intended to replicate any particular company's embedded or book costs. Criterion three directs that ''costs must not be the embedded cost of the facilities, functions, or elements.'' Rather, the model ''must be based upon an examination of the current cost of purchasing facilities and equipment.''

15. As discussed, we generally have proposed using nationwide, rather than company-specific input values in the federal mechanism. In many cases, the only data for various inputs on the record in this proceeding are embedded cost, company-specific data. We have used various techniques to convert these data to forward-looking values. For example, we propose modifying the

switching data to adjust for the effects of inflation and the cost changes unique to the purchase and installation of digital switches. We propose nationwide averages, rather than company-specific values, to mitigate the rewards to less efficient companies.

16. Although the BCPM sponsors have provided nationwide default values, they and other LECs generally advocate company-specific input values. For purposes of determining federal universal service support amounts, we believe that nationwide default values generally are more appropriate than company-specific values. Under the new mechanism, support is based on the estimated costs that an efficient carrier would incur to provide the supported services, rather than on the specific carrier's book costs. There may be some categories of inputs, however, where company-specific or state specific input values might be appropriate for use in the federal mechanism. We seek comment on specific alternatives to nationwide values for certain input values, as discussed. We make no finding with respect to whether nationwide values would be appropriate for purposes other than determining federal universal service support.

III. Determining Customer Locations

A. Issues for Comment

1. Geocode Data

17. While we affirm our conclusion in the *Platform Order* that geocode data should be used to locate customers in the federal mechanism, we tentatively conclude that at this time we cannot adopt any particular source of geocode data because interested parties have not had adequate access or time to review such data. We tentatively conclude that a road surrogate algorithm will be used to locate customers in the federal mechanism until a source of geocode data is selected by the Commission. We reiterate our expectation, however, that we will identify and select a source of accurate and verifiable geocode data in the future for use in the federal mechanism.

18. In the *Platform Order,* we concluded that a model is most likely to select the least-cost, most-efficient outside plant design if it uses the most accurate data for locating customers within wire centers, and that the most accurate data for locating customers within wire centers are precise latitude and longitude coordinates for those customers' locations. We noted that commenters generally support the use of accurate geocode data in the federal mechanism where available. We further noted that the only geocode data in the record were those prepared for HAI by PNR Associates (PNR), but that ''our conclusion that the model should use geocode data to the extent that they are available is not a determination of the accuracy or reliability of any particular source of the data.'' Although commenters support the use of accurate geocode data, several commenters question whether the PNR geocode data are adequately available for review by interested parties.

19. In the *Universal Service Order,* the Commission required that the ''model and all underlying data, formulae, computations, and software associated with the model must be available to all interested parties for review and comment.'' In an effort to comply with this requirement, the Commission has made significant efforts to encourage parties to submit geocode data on the record in this proceeding. PNR took initial steps to comply with this requirement in December 1998 by making available the ''BIN'' files derived from the geocoded points to interested parties pursuant to the *Protective Order,* 63 FR 42753 (August 11, 1998). In addition, PNR has continued to provide access to the underlying geocode data at its facility in Pennsylvania. Several commenters, in petitions for reconsideration of the *Platform Order,* have argued that the availability of the BIN data alone is not sufficient to comply with the requirements of criterion eight, particularly in light of the expense and conditions imposed by PNR in obtaining access to the geocode point data.

20. We tentatively conclude that interested parties have not had an adequate opportunity to review and comment on the accuracy of the PNR geocode data. We note that a nationwide customer location database will, by necessity, be voluminous, relying on a variety of underlying data sources. In order to comply with criterion eight, all underlying data must be reasonably available to interested parties for review. In light of the concerns expressed by several commenters relating to the conditions and expense in obtaining data from PNR, we find that no source of geocode data has been made adequately available for review. We anticipate that a source of accurate and verifiable geocode data can be selected for use in the federal mechanism in the future and we encourage parties to make continued efforts to ensure that all underlying geocode data are available for review. For example, we note that PNR has contacted its data vendors for the purpose of making additional underlying data more freely available to parties in this proceeding. As noted in the *Platform Order,* we recognize that more comprehensive geocode data are likely to be available in the future and encourage parties to continue development of a data source that complies with the criteria outlined in the *Universal Service Order* for use in the federal mechanism. We therefore seek further comment on a source of geocode customer locations that will comply with the Commission's criteria for use in the federal mechanism. In addition, we seek comment on the availability for review of the PNR geocode data, including any further measures necessary to ensure that the PNR geocode data are sufficiently available for review by the public.

2. Road Surrogate Customer Locations

21. We tentatively conclude that the road surrogating algorithm proposed by PNR should be used to develop road surrogate customer locations for the federal universal service mechanism. In the *Platform Order,* we concluded that, in the absence of actual geocode customer location data, BCPM's rationale of associating road networks and customer locations provides the most reasonable approach for determining customer locations. As anticipated in the *Platform Order,* once a source of geocode data has been selected, the road surrogate customer locations will be used only in the absence of geocode customer location data.

22. As noted in the *Platform Order,* ''associating customers with the distribution of roads is more likely to correlate to actual customer locations than uniformly distributing customers throughout the Census Block, as HCPM proposes, or uniformly distributing customers along the Census Block boundary, as HAI proposes.'' We therefore concluded in the *Platform Order* that the selection of a precise algorithm for placing road surrogates should be conducted in the inputs stage of this proceeding.

23. Currently, there are two road surrogating algorithms on the record in this proceeding—those proposed by PNR and Stopwatch Maps. On March 2, 1998, the HAI proponents provided a description of the road surrogate methodology developed by PNR for locating customers. On January 27, 1999, PNR made available for review by the Commission and interested parties, pursuant to the terms of the *Protective Order,* the road surrogate point data for all states except Alaska, Iowa, Virginia, Puerto Rico and eighty-four wire centers in various other states. On February 22, 1999, PNR filed a more detailed

description of its road surrogate algorithm.

24. In general, the PNR road surrogate algorithm utilizes the Census Bureau's Topologically Integrated Geographic Encoding and Referencing (TIGER) files, which contain all the road segments in the United States. For each Census Block, PNR determines how many customers and which roads are located within the Census Block. For each Census Block, PNR also develops a list of road segments. The total distance of the road segments within the Census Block is then computed. Roads that are located entirely within the interior of the Census Block are given twice the weight as roads on the boundary. This is because customers are assumed to live on both sides of a road within the interior of the Census Block. In addition, the PNR algorithm excludes certain road segments along which customers are not likely to reside. For example, PNR excludes highway access ramps, alleys, and ferry crossings. The total number of surrogate points is then divided by the computed road distance to determine the spacing between surrogate points. Based on that distance, the surrogate customer locations are uniformly distributed along the road segments.

25. Stopwatch Maps has compiled road surrogate customer location files for six states suitable for use in the federal mechanism. We tentatively conclude, however, that until a more comprehensive data set is made available, the Stopwatch data set will not comply with the *Universal Service Order's* criterion that the underlying data are available for review by the public. In addition, we note that the availability of only six states is of limited utility in a nationwide model.

26. We tentatively conclude that the PNR road surrogate algorithm is a reasonable method for locating customers in the absence of actual geocode data. We note that PNR's methodology of excluding certain road segments is consistent with the Commission's conclusion in the *Platform Order* that certain types of roads and road segments should be excluded because they are unlikely to be associated with customer locations. In addition, we note that PNR's reliance on the Census Bureau's TIGER files ensures a degree of reliability and availability for review of much of the data underlying PNR's road surrogate algorithm, in compliance with criterion eight of the *Universal Service Order.* We note that the HAI proponents contend that use of a surrogate algorithm may overstate the amount of plant necessary to provide supported services. We seek comment on the validity of this contention. We also note that PNR has indicated that it intends to finalize a number of improvements to the road surrogate algorithm and data. For example, PNR states that the new release will incorporate any new input requirements relating to an authoritative wire center list, housing units versus households, and treatment of phone penetration rates. In addition, the new release will include data for all fifty states, Washington, D.C., and Puerto Rico. We seek comment on our tentative conclusion to adopt the PNR road surrogate algorithm to determine customer locations, and to adopt the PNR road surrogate data set for use in the model beginning on January 1, 2000. We also seek comment on any changes that should be made to the PNR methodology to improve the accuracy of the customer locations it generates.

3. Methodology for Estimating the Number of Customer Locations

27. In addition to selecting a source of customer data, we also must select a methodology for estimating the number of customer locations within the geographic region that will be used in developing the customer location data. We also must determine how demand for service at each location should be estimated and how locations should be allocated to each wire center.

28. In the *Universal Service Order*, the Commission concluded that a ''model must estimate the cost of providing service for all businesses and households within a geographic region.'' In the *Inputs Public Notice*, 63 FR 28339 (May 22, 1998), the Bureau sought comment on the appropriate method for defining ''households,'' or residential locations, for the purpose of calculating the forward-looking cost of providing supported services. Model proponents and interested parties have proposed alternative methods to comply with this requirement.

29. The HAI sponsors propose that we use the methodology devised by PNR, which is based upon the number of households in each Census Block, while the BCPM sponsors propose that we use a methodology based upon the number of housing units in each Census Block. A household is an occupied residence, while housing units include all residences, whether occupied or not.

30. Specifically, the HAI sponsors advocate the use of the PNR National Access Line Model to estimate the number of customer locations within Census Blocks and wire centers. The PNR National Access Line Model uses a variety of information sources, including: survey information, the LERG, Business Location Research (BLR) wire center boundaries, Dun & Bradstreet's business database, Metromail's residential database, Claritas' demographic database, and U.S. Census estimates. PNR's model uses these sources to estimate the number of residential and business locations, and the number of access lines demanded at each location. The model makes these estimations for each Census Block, and for each wire center in the United States.

31. At the conclusion of PNR's process for estimating the number of customer locations: (1) PNR's estimate of residential locations is greater than or equal to the Census Bureau's estimate of households, by Census Block Group, and its estimate is disaggregated to the Census Block level, (2) PNR's estimate of demand for both residential and business lines in each study area is greater than or equal to the number of access lines in the Automated Reporting and Management Information System (ARMIS) for that study area, and the estimates are available by location at the Block level, and (3) each customer location is associated with a particular wire center.

32. The BCPM sponsors rely on many of the same data sources as those used in PNR's National Access Line Model. For example, BCPM 3.1 uses wire center data obtained from BLR and business line data obtained from PNR. In estimating the number of residential locations, however, the BCPM sponsors use Census data that include household and housing unit counts from the 1990 Census, updated based upon 1995 Census statistics regarding household growth by county. In addition, rather than attempting to estimate demand by location at the Block level, the BCPM model builds two lines to every residential location and at least six lines to every business.

33. The synthesis model currently calculates the average cost per line by dividing the total cost of serving customer locations by the current number of lines. Because the current number of lines is used in this average cost calculation, the HAI sponsors argue that the total cost should be determined by using the current number of customer locations. The HAI sponsors contend that ''the key issue is the consistency of the numerator and denominator'' in the average cost calculation. The HAI sponsors argue that other approaches are inconsistent because they select the highest possible cost numerator and divide by the lowest possible line denominator, and therefore result in larger than necessary support levels. The HAI sponsors argue that, in

order to be consistent, housing units must be used in the determination of total lines if they are used in the determination of total costs. The HAI sponsors contend that ''[i]f used consistently in this manner, building to housing units as GTE proposes is unlikely to make any difference in cost per line.''

34. In contrast, the BCPM sponsors and other commenters contend that the total cost should include the cost of providing service to all possible customer locations, even if some locations currently do not receive service. Furthermore, the BCPM sponsors contend that if total cost is based on a smaller number of locations, support will not be sufficient to enable carriers to meet their carrier-of-last-resort obligations. The BCPM sponsors also argue that basing the estimate of residential locations on households instead of housing units will underestimate the cost of building a network that can provide universal service. The BCPM sponsors, as well as some other commenters, contend that residential locations should be based on the number of housing units—whether occupied or unoccupied. These commenters contend that only this approach reflects the obligation to provide service to any residence that may request it in the future.

35. We tentatively conclude that PNR's process for estimating the number of customer locations should be used for developing the customer location data. We also tentatively conclude that we should use PNR's methodology for estimating the demand for service at each location, and for allocating customer locations to wire centers. We believe that the PNR methodology is a reasonable method for determining the number of customer locations to be served in calculating the cost of providing supported services. To the extent that the PNR methodology includes the cost of providing service to all currently served households, we tentatively conclude that this is consistent with a forward-looking cost model, which is designed to estimate the cost of serving current demand. As noted by the HAI sponsors, adopting housing units as the standard would inflate the cost per line by using the highest possible numerator (all occupied and unoccupied housing units) and dividing by the lowest possible denominator (the number of customers with telephones).

36. In addition, we do not believe that including the cost of providing service to all housing units will promote universal service to unserved customers or areas. We note that there is no guarantee that carriers would use any support derived from the cost of serving all housing units to provide service to these customers. Many states permit carriers to charge substantial line extension or construction fees for connecting customers in remote areas to their network. If that fee is unaffordable to a particular customer, raising the carrier's support level by including the costs of serving that customer in the model's calculations would have no effect on whether the customer actually receives service. In fact, as long as the customer remains unserved, the carriers would receive a windfall. We recognize that serving unserved customers in such circumstances is an important universal service goal. As discussed in the companion Order and Further Notice adopted on May 28, 1999, we will initiate a separate proceeding in July 1999 to investigate the issue of unserved areas.

37. If we were to calculate the costs of a network that would serve all potential customers, it would not be consistent to calculate the cost per line by using current demand. In other words, it would not be consistent to estimate the cost per line by dividing the total cost of serving all potential customers by the number of lines currently served. We note, however, that the level and source of future demand is uncertain. Future demand might include not only demand from currently unoccupied housing units, but also demand from new housing units, or potential increases in demand from currently subscribing households. We also recognize that population or demographic changes may cause future demand levels in some areas to decline. Given the uncertainty of future demand, we are concerned that including such costs may not reflect forward-looking costs and may perpetuate the system of implicit support.

38. We recognize, however, that additional comment would be helpful with regard to certain issues. For example, if a currently vacant unit will again receive service in the near future, one might argue that it should be included in the calculation of total cost. It is also possible that housing stock is subject to a type of churn that could inflate the number of households used in determining total cost without affecting the total number of lines. That is, a certain percentage of housing units may be repeatedly vacated and then reoccupied, with the specific households involved constantly changing. At any given time, a certain number of housing units might be unoccupied as a result. Under the Census definition, such units are not considered households and therefore may not be included in the number of residential locations estimated by PNR. We seek comment on whether the costs associated with providing service to these housing units should be included in the total cost by identifying an additional number of unoccupied units. The PNR methodology may provide an estimate of the number of residential locations that is greater than the number that currently receive telephone service, however. Therefore PNR's methodology may already account for at least some portion of housing units subject to this type of churn. We seek comment on this issue.

39. We also note that locations outside of existing wire centers will not be included under the PNR methodology. Therefore the accuracy of the wire center boundaries is of importance in estimating the number of customer locations. PNR currently uses BLR wire center information to estimate wire center boundaries. As noted, the BCPM model also uses BLR wire center boundaries, as does Stopwatch Maps in its road surrogate customer location files. PNR has indicated its intent to evaluate alternative sources of wire center boundaries to be used in the customer location data. We therefore seek comment on the accuracy of the BLR wire center boundaries and any possible alternatives to establish more accurate wire center boundaries.

IV. Outside Plant Input Values

A. Copper and Fiber Cable

1. Issues for Comment

40. We now examine the inputs needed to determine outside plant cable costs in the synthesis model. The synthesis model uses several tables to calculate cable costs, based on the cost per foot of cable, which may vary by cable size (*i.e.*, gauge and pair size) and the type of plant (*i.e.*, underground, buried, or aerial). There are four separate tables for copper distribution and feeder cable of two different gauges, and one table for fiber cable. The engineering assumptions and optimizing routines in the model, in conjunction with the input values in the tables, determine which type of cable is used.

41. After the synthesis model has grouped customer locations in clusters, it determines, based on cost minimization and engineering considerations, the appropriate technology type for the cluster and the correct size of cables in the distribution network. Every customer location is connected to the closest SAI by copper cable. The copper cable used in the

local loop typically is either 24-or 26-gauge copper. Twenty-four gauge copper is thicker and therefore is expected to be more expensive than 26-gauge copper. Twenty-four gauge copper also can carry signals greater distances without degradation than 26-gauge copper and, therefore, is used in longer loops. In the synthesis model, if the maximum distance from the customer to the SAI is less than or equal to the copper gauge crossover point, then 26-gauge cable is used. Feeder cable is either copper or fiber. Fiber is used for loops that exceed 18,000 feet, the maximum copper loop length permitted in the model, as determined in the *Platform Order.* When fiber is more cost effective, the model will use it to replace copper for loops that are shorter than 18,000 feet.

a. Engineering Assumptions and Optimizing Routines. 42. Before we consider our proposed input values for cable costs, we discuss certain input values related to the engineering assumptions and optimizing routines in the synthesis model that affect outside plant costs. Specifically, we must determine: (1) whether optimization in the synthesis model should be turned on or off; (2) whether the model should use T–1 technology; and (3) whether the model should use rectilinear or airline distances and the value of the corresponding ''road factor.''

i. Optimization. 43. In the synthesis model, the user has the option of optimizing distribution plant routing via a minimum cost spanning tree algorithm discussed in the model documentation. The algorithm functions by first calculating distribution routing using an engineering ''rule of thumb'' and then comparing the cost with the spanning tree result, choosing the routing that minimizes annualized cost. The user also has the option of not using the distribution optimization feature, thereby saving a significant amount of computation time, but reporting network costs that may be significantly higher than with the optimization. In addition, the user has the option of using the distribution optimization feature only in the lowest density zones.

44. We tentatively conclude that the synthesis model should be run with the optimization turned on when the model is used to calculate the forward looking cost of providing the services supported by the federal mechanism. We point out that the optimization approach represents what a network planning engineer would attempt to accomplish in developing a forward-looking network. This approach also complies with criterion one's requirement that the model must assume the least-cost, most efficient, and reasonable technology for providing the supported service that is currently being deployed. We note, however, that the optimization can substantially increase the model's run time. Preliminary staff analysis of comparison runs with full optimization versus runs with no optimization indicate that, for clusters with line density greater than 500, the rule of thumb algorithm results in the same or lower cost for nearly all clusters. We seek comment on whether an acceptable compromise to full optimization would be to set the optimization factor at ''−p500,'' as described in the model documentation. With this setting the model will optimize distribution plant whenever the density of a cluster is less than or equal to 500 lines per square mile. For purposes of further analysis of the proposed input values, we also anticipate that parties may wish to run the model without optimization turned on to save computing time. After staff has completed its analysis of comparison runs, we intend to make available a spreadsheet showing the estimated percentage change, for each non-rural study area, between running the model with the distribution optimization disabled and running the model with the distribution optimization enabled.

ii. T–1 Technology. 45. A user of the synthesis model also has the option of using T–1 technology as an alternative to copper feeder or fiber feeder in certain circumstances. T–1 is a technology that allows digital signals to be transmitted on two pairs of copper wires at 1.544 Megabits per second (Mbps). If the T–1 option is enabled, the optimizing routines in the model will choose the least cost feeder technology among three options: analog copper, T–1 on copper, and fiber. For serving clusters with loop distances below the maximum copper loop length, the model could choose among all three options; between 18,000 feet and the fiber crossover point, which earlier versions of HCPM set at 24,000 feet, the model could choose between fiber and T–1; and above the fiber crossover point, the model would always use fiber. In the HAI model, T–1 technology is used to serve very small outlier clusters in locations where the copper distribution cable would exceed 18,000 feet. The BCPM sponsors and other LECs contend that T–1 is not a forward looking technology and, therefore should not be used in the synthesis model. The HAI sponsors contend that current advertisements show that T–1 is being used currently.

46. As noted, a number of parties contend that the T–1 on copper technology is not forward looking. Other sources indicate that advanced technologies, like HDSL, potentially can be used on T–1 technology to transmit information at T–1 or higher rates. We seek comment on this issue. We also seek comment on the extent to which HDSL technology presently is being used on T–1.

47. The only input values for T–1 costs on the record in this proceeding are the HAI default values. Because the synthesis model and the HAI model use T–1 differently, we tentatively find that the HAI default values would not be appropriate for use in the synthesis model. In light of the fact that T–1 may not be a forward looking technology and the lack of appropriate input values, we tentatively conclude that we should not use the T–1 option in the synthesis model. We seek comment on our tentative conclusion. We ask that parties who disagree with our tentative conclusion and recommend that the T–1 function be used in the synthesis model propose input values that will accurately estimate the cost of this technology, including what values are needed for the costs of shielded copper, repeaters, and terminals.

iii. Distance Calculations and Road Factor. 48. We tentatively conclude that the synthesis model should use rectilinear distance, rather than airline distance, in calculating outside plant distances, because this more accurately reflects the routing of telephone plant along roads and other rights of way. In fact, research suggests that, on average, rectilinear distance closely approximates road distances. As a result, we tentatively conclude that the road factor in the model, which reflects the ratio between route distance and road distance, should be set equal to 1. We seek comment on these tentative conclusions.

49. We also note that airline distance could be used in the model, if we were to derive accurate road factors. We seek comment on this alternative. Specifically, we seek comment on whether we should use airline miles with wire center specific road factors. Research has shown that the airline distance metric with an appropriate road factor is more accurate than the rectilinear metric. We seek comment on this alternative approach.

b. Cost of Copper Cable. i. Preliminary Issues. 50. The synthesis model uses tables that show the cost per foot of copper cable, by pair size. In selecting input values for the cost of copper cables, we must first address a number of preliminary issues: the extent to which 24- and 26-gauge copper cable should be used in the synthesis model; whether cable installation costs should

differ between feeder and distribution cable; and whether cable installation costs should vary for underground, buried, and aerial cable.

51. *Use of 24- and 26-Gauge Copper.* The HAI default values assume that all copper cable below 400 pairs in size is 24-gauge and all copper cable of 400 pairs and larger is 26-gauge. The BCPM default values include separate costs for 24- and 26-gauge copper of all sizes. We tentatively reject the HAI sponsors' argument that 26-gauge copper costs should be used for all larger pair sizes of copper cable. We tentatively conclude that the model should use both 24-gauge and 26-gauge copper in all available pair-sizes. Based on a preliminary analysis of the results of the structure and cable cost survey, it appears that a significant amount of 24-gauge copper cable in larger pair sizes currently is being deployed. We seek comment on these tentative conclusions.

52. *Distinguishing Feeder and Distribution Cable Costs.* We reaffirm the Commission's tentative conclusion in the *1997 Further Notice*, 62 FR 424572 (August 7, 1997), that the same input values should be used for copper cable whether it is used in feeder or in distribution plant. Although the BCPM sponsors previously disagreed with this tentative conclusion, they have not provided persuasive data for this position. We seek comment on this tentative conclusion.

53. *Distinguishing Underground, Buried, and Aerial Installation Costs.* The HAI and BCPM sponsors both claim that their proposed values for cable costs include the cost of installation. The BCPM defaults provide separate cost estimates for aerial, buried, and underground cable. The HAI default cable costs do not vary by type of plant and, therefore, appear to assume that installation costs are the same for aerial, underground, and buried cable. For buried copper cable, the HAI defaults include a multiplier to estimate the additional cost of the filling compound used in buried cable to protect the cable from moisture. For underground cable, HAI adds a per foot material cost for the conduit material.

54. We tentatively conclude that we should adopt separate input values for the cost of aerial, underground, and buried cable. Based on our analysis of cable cost data, we have found considerable differences in the per foot cost of cable, depending upon whether the cable was strung on poles, pulled through conduit, or buried. We seek comment on this tentative conclusion.

ii. Cost Per Foot of Copper Cable. 55. We now turn to the cost per foot of 24- and 26-gauge copper cable. Both the HAI and BCPM sponsors provide default input values for copper cable costs that are based upon the opinions of their respective experts, but without data that enable us to substantiate those opinions. In addition, the Commission received cable cost data from a number of LECs, including data received in response to the structure and cable cost survey developed by staff, which staff is continuing to analyze, as noted.

56. At the December 11, 1998 workshop, Commission staff described how they had estimated the preliminary copper cable costs, by pair size and by plant type (i.e., aerial, buried, or underground), that had been posted on the Commission's Web site prior to the workshop. For copper cable, the staff estimated high and low values for the cost of the smallest pair size of 26-gauge copper cable based on an analysis of the HAI default values and the values submitted by states filing cost models in this proceeding. These estimates were adjusted for larger pair sizes of 26-gauge cable and different structure types using estimates in Gabel and Kennedy's analysis of RUS data, which was published by the National Regulatory Research Institute (NRRI Study). The cost of 24-gauge copper cable was estimated by applying a multiplier to the 26-gauge estimates based on the relative weight of the copper in these two gauges.

57. While the HAI sponsors support using the publicly available RUS data in the NRRI Study to estimate cable costs, Sprint questions the reliability and suitability of this data, and urges us instead to use the cable cost data provided by incumbent LECs. As Sprint points out, the RUS data contain information from only the two lowest density zones. Because loops are longer in sparsely populated areas, lower gauge copper often is used.

58. We tentatively conclude that we should use, with certain modifications, the estimates in the NRRI Study for the per foot cost of aerial, underground, and buried 24-gauge copper cable. As described, we also tentatively conclude that we should estimate the cost of 26-gauge copper cable by adjusting our 24-gauge estimates with ratios derived from cost data submitted by several non-rural LECs. We seek comment on these tentative conclusions and proposed values.

59. Although the RUS data were collected from the two lowest density zones, we note that none of the models considered by the Commission has the capability of varying cable costs by density zones. Nor have parties proposed cable cost values that vary by density zone. We also believe that Sprint has mischaracterized the analysis of the RUS data in the NRRI Study. For example, Sprint challenges the validity of the study because some of the observations have zero values for labor or material, while failing to recognize that these values were excluded from Gabel and Kennedy's regression analysis. Similarly, Sprint's complaint that Gabel and Kennedy do not analyze the components of total cable costs, labor and material, separately overlooks that Gabel and Kennedy's regression analysis is designed to explain the variation in total costs.

60. The NRRI Study provides estimates for outside plant structure and cable costs using cost data derived from construction contracts supplied by the RUS for a sample of companies that operate under various soil, weather, and population density conditions. In generating these estimates, Gabel and Kennedy used standard regression techniques to measure the effect of geological and density conditions on cable and structure costs. In general, the econometric formulations that Gable and Kennedy developed to estimate cable costs measure the effect on these costs of cable size and the placement of two or more cables on the same route.

61. We tentatively conclude that one substantive change should be made to Gabel and Kennedy's analysis. Gabel and Kennedy used the ordinary least squares statistical technique to estimate the cost of structure and cables. The ordinary least squares technique fits a straight line to the data by minimizing the sum of squared prediction errors. The ordinary least squares technique is efficacious, however, only for a data set lacking statistical outliers. Such outliers have an undue influence on regression results, since the residual associated with each outlier is squared in calculating the regression. In order to mitigate the influence of such outlier values, statisticians have developed so-called robust regression techniques for estimating regression equations. We tentatively conclude that a robust regression technique should be used for analyzing the RUS data. We seek comment on this tentative conclusion.

62. Specifically, we tentatively conclude that the robust regression technique proposed by Huber should be applied to the RUS data. Essentially, this algorithm uses a standard statistical criterion to determine the most extreme outliers, and excludes them. Thereafter, as suggested by Huber, it iteratively performs a regression, then for each observation calculates an observation weight based on the absolute value of the observation residual. Finally, the

procedure performs a weighted least squares regression using the calculated weights. This process is repeated until the values of the weights effectively stop changing. We have used the robust regression parameter estimates for cable, conduit, and buried structure. The use of robust estimation did not improve the statistical properties of the estimators for pole costs, so we tentatively conclude that the ordinary least squares technique is appropriate for pole costs. We seek comment on these tentative conclusions and analysis.

63. *24-Gauge Aerial Copper Cable.* We tentatively conclude that we should use the regression equation in the NRRI Study, as modified by the Huber methodology described, to estimate the cost of 24-gauge aerial copper cable, with three adjustments.

64. First, we propose to adjust the equation to reflect the superior buying power that non-rural LECs may have in comparison to the LECs represented in the RUS data. We seek comment on whether an adjustment for superior bargaining power is necessary, and, if so, how such an adjustment should be made.

65. Based on data entered into the record in a proceeding before the Maine Public Utilities Commission, Gabel and Kennedy determined that Bell Atlantic's material costs for aerial copper cable are approximately 15.2 percent less than these costs for the RUS companies. We tentatively conclude that this figure represents a reasonable estimate of the difference in the material costs that non-rural LECs pay in comparison to those that the RUS companies pay. To reflect this degree of buying power in the cable cost estimates that we derive for non-rural LECs, we propose to reduce the regression coefficient for the number of copper pairs by 15.2 percent for aerial copper cable. This coefficient measures the incremental or additional cable cost associated with one additional copper pair and therefore largely reflects the material cost of the cable. We seek comment on this proposed adjustment. We also invite parties to suggest alternative methods for capturing the impact of superior buying power.

66. Second, we propose to adjust the equation in the NRRI Study to account for LEC engineering costs, which were not included in the RUS cable data. The BCM2 default values include a loading of five percent for engineering. The HAI sponsors claim that engineering constitutes approximately 15 percent of the cost of installing outside plant cables. This percentage includes both contractor engineering and LEC engineering. The cost of contractor engineering already is reflected in the RUS cable cost data. Based on the record, we tentatively conclude that we should add a loading of 10 percent to the material and labor cost of the cable (net of LEC engineering and splicing costs) to approximate the cost of LEC engineering. We seek comment on this tentative conclusion and invite commenters to justify an alternative loading factor for LEC engineering.

67. Third, we propose to adjust the equation to account for splicing costs, which also were not included in the RUS data. In the NRRI Study, Gabel and Kennedy determined that the ratio of splicing costs to copper cable costs (excluding splicing and LEC engineering costs) is 9.4 percent for RUS companies. We tentatively conclude that we should adopt a loading of 9.4 percent for splicing costs. We seek comment on this tentative conclusion.

68. *24-Gauge Underground Copper Cable.* We tentatively conclude that we should use the regression equation in the NRRI Study, as modified by the Huber methodology described, to estimate the cost of 24-gauge underground copper cable. We also tentatively conclude that we should use the same three adjustments proposed for 24-gauge aerial copper cable, with one exception. We tentatively conclude that we should reduce the regression coefficient for the number of copper pairs by 16.3 percent, to reflect superior buying power, based on the analysis in the NRRI study. We seek comment on the use of this equation and the proposed adjustments.

69. *24-Gauge Buried Copper Cable.* We tentatively conclude that it is necessary to modify the regression equation in the NRRI Study, as modified by the Huber methodology described, to estimate the cost of a 24-gauge buried copper cable, because the equation in the study includes labor and material costs for both buried cable and structure. We seek comment on this tentative conclusion and proposed equation.

70. We propose to make the same three adjustments to this equation as we proposed for 24-gauge aerial and underground cables, with the exception of the adjustment for superior buying power. Because the NRRI Study does not include a recommendation for such an adjustment for buried cable, we tentatively conclude we should use 15.2 percent, which is the lower of the reductions used for aerial and underground cable. We seek comment on the use of these adjustments for 24-gauge buried cable.

71. *26-Gauge Copper Cable.* Because the NRRI Study did not provide estimates for 26-gauge copper cable, we must either use another data source or find a method to derive these estimates from those for 24-gauge. The HAI sponsors support the proposal presented by Commission staff at the workshop to use the relative weight of copper to adjust the 24-gauge copper costs to derive 26-gauge copper costs, although they would make further adjustments to reflect the cost of 26-gauge copper for cable sizes of 400 pairs and larger. The BCPM sponsors challenge the assumption that the cost of copper cable is closely tied to the relative weight of the copper in the cable. Both the HAI sponsors and the BCPM sponsors argue that the cost of splicing is not directly a function of investment, but rather is primarily a function of the number of pairs to be spliced, and the distance between splices. Although they agree that splicing costs should be estimated using the average cost per pair-foot, they disagree over what those costs should be.

72. We tentatively conclude that we should derive cost estimates for 26-gauge cable by adjusting our estimates for 24-gauge cable. We agree with the BCPM sponsors that the cost of copper cable should not be estimated based solely on the relative weight of the cable. Instead, we propose to use the ordinary least squares regression technique to estimate the ratio of the cost of 26-gauge to 24-gauge cable for each plant type (*i.e.*, aerial, underground, buried). We propose to estimate these ratios using data on 26-gauge and 24-gauge cable costs submitted by Aliant and Sprint and the BCPM default values for these costs. While we would prefer to develop these ratios based on data from more than these three sources, we tentatively conclude that these are the best data available on the record for this purpose. We seek comment on these tentative conclusions and proposed analysis, including the regression techniques described. We invite parties to propose alternative methods of deriving cost estimates for 26-gauge cable.

c. Cost of Fiber Cable. 73. In selecting input values for fiber cable costs, we must determine values for the cost per foot of fiber for various strand sizes for aerial, underground, and buried cable. Both the HAI and BCPM sponsors provide default input values for fiber cable costs that are based upon the opinions of their respective experts, without data enabling us to substantiate those opinions. In addition, the Commission received cable cost data from a number of LECs, including data received in response to the structure and cable cost survey, which staff is continuing to analyze, as noted.

74. At the December 11, 1998 workshop, Commission staff described how they had computed the preliminary fiber cable costs, by pair size and by plant type (aerial, buried, or underground) that had been posted on the Commission's Web site prior to the workshop. Using a methodology similar to the one used for copper cable, staff estimated the cost of the smallest size fiber cable based on an analysis of proposed values and used the analysis in the NRRI Study to derive costs for larger sizes.

75. We tentatively conclude that we should use the RUS data and the analysis in the NRRI Study, with certain adjustments, to estimate fiber cable costs. For the reasons discussed for copper cable, we also tentatively conclude that the cost of fiber cable will vary for aerial, underground, and buried plant. We tentatively select the input values for the per foot cost of aerial, underground, and fiber cable in various strand sizes, as shown. We seek comment on these tentative conclusions and proposed values.

76. *Aerial Fiber Cable.* We tentatively conclude that we should use the regression equation in the NRRI Study, as modified by the Huber methodology described, to estimate the cost of aerial fiber cable, with three adjustments similar to those made for copper cable. We seek comment on this tentative conclusion.

77. As noted, we propose three adjustments to the equation used in the NRRI Study to estimate the cost of aerial fiber cable. First, based on the NRRI Study, we propose to reduce by 33.8 percent the regression coefficient for the number of fiber strands, to reflect the superior buying power of non-rural LECs. Second, for the reasons described earlier, we tentatively conclude that we should add a loading of 10 percent to the material and labor cost of the cable (net of LEC engineering and splicing costs) to approximate the cost of LEC engineering. Finally, we tentatively conclude that we should add a loading for splicing costs of 4.7 percent to the material and labor cost of the cable (net of LEC engineering and splicing costs), based on the estimates in the NRRI Study. We seek comment on these tentative conclusions and proposed adjustments.

78. *Underground Fiber Cable.* We tentatively conclude that we should use the regression equation in the NRRI Study, as modified by the Huber methodology described, to estimate the cost of underground fiber cable, with three adjustments similar to those made for aerial fiber cable. We seek comment on this tentative conclusion.

79. As noted, we propose three adjustments to the NRRI equation for the cost of underground fiber cable. First, based on the NRRI Study, we propose to adjust downward by 27.8 percent the regression coefficient for the number of fiber strands, to reflect the superior buying power of non-rural LECs. Second, for the reasons described earlier, we tentatively conclude that we should add a loading of 10 percent to the material and labor cost of the cable (net of LEC engineering and splicing costs) to approximate the cost of LEC engineering. Finally, we tentatively conclude that we should add a loading for splicing costs of 4.7 percent to the material and labor cost of the cable (net of LEC engineering and splicing costs), based on the estimates in the NRRI Study. We seek comment on these tentative conclusions and proposed adjustments.

80. *Buried Fiber Cable.* We tentatively conclude that it is necessary to modify the regression equation in the NRRI Study, as modified by the Huber methodology described, to estimate the cost of a buried fiber cable, because the equation in the study includes labor and material costs for both buried fiber cable and structure. We seek comment on this tentative conclusion and proposed equation.

81. We also propose three adjustments to the proposed equation. First, based on the NRRI Study, we propose to reduce by 27.8 percent the regression coefficient for the number of fiber strands, to reflect the superior bargaining power of non-rural LECs. Second, for the reasons described earlier, we tentatively conclude that we should add a loading of 10 percent to the material and labor cost of the cable (net of LEC engineering and splicing costs) to approximate the cost of LEC engineering. Finally, we tentatively conclude that we should add a loading for splicing costs of 4.7 percent to the material and labor cost of the cable (net of LEC engineering and splicing costs), based on the estimates in the NRRI Study. We seek comment on these tentative conclusions and proposed adjustments.

c. Cable Fill Factors. 82. In determining appropriate cable sizes, network engineers include a certain amount of spare capacity to accommodate administrative functions, such as testing and repair, and some expected amount of growth. The percentage of the total usable capacity of cable that is expected to be used to meet anticipated demand is referred to as the cable fill factor. If cable fill factors are set too high, the cable will have insufficient capacity to accommodate small increases in demand or service outages. In contrast, if cable fill factors are set too low, the network could have considerable excess capacity for many years. While carriers may choose to build excess capacity for a variety of reasons, we must determine the appropriate cable fill factors to use in the federal mechanism. If the fill factors are too low, the resulting excess capacity will increase the model's cost estimates to levels higher than an efficient firm's costs, potentially resulting in excessive universal service support payments.

83. *Variance Among Density Zones.* In general, both the HAI and BCPM sponsors provide default fill factors for copper cable that vary by density zone, and they agree that fill factors should be lower in the lowest density zones. HAI sponsors claim that an outside plant engineer is more interested in providing a sufficient number of spares than in the ratio of working pairs to spares, so the appropriate fill factor will vary with cable size. For example, 75 percent fill in a 2400 pair cable provides 600 spares, whereas a 50 percent fill in a six pair cable provides only three spares. Because smaller cables are used in lower density zones, HAI recommends that lower fill factors be used in the lowest density zones to ensure there will be enough spares available. The BCPM sponsors claim that less dense areas require lower fill ratios because the predominant plant type is buried and it is costly to add additional capacity after installation. We tentatively agree with the HAI and BCPM sponsors that fill factors for copper cable should be lower in the lowest density zones, which is reflected in the fill factors that we propose in this Notice. We seek comment of this tentative finding.

84. *Distribution Fill Factors.* The fill factors proposed by the HAI sponsors for distribution cable are somewhat lower than for copper feeder cable. The BCPM default fill factors for distribution cable, on the other hand, currently are set at 100 percent for all density zones. This difference is related to the differences between certain assumptions that were made in the HAI and BCPM models. The HAI proponents claim that the level of spare capacity provided by their default values is sufficient to meet current demand plus some amount of growth. This is consistent with the HAI model's approach of designing plant to meet current demand, which on average is 1.2 lines per household. BCPM, on the other hand, designs outside plant with the assumption that every residential location has two lines, which is more than current demand. Because

it is costly to add distribution plant at a later point in time, incumbent LECs typically build enough distribution plant to meet not only current demand, but also anticipated future demand. BCPM adopts this convention. Setting the fill factor at 100 percent in BCPM offsets BCPM's assumption that every household has two lines and the resulting estimation of appropriate cable sizes is sufficient to meet current demand, rather than long term growth.

85. In a meeting with Commission staff, Ameritech raised the issue of whether industry practice is the appropriate guideline for determining fill factors to use in estimating the forward-looking economic cost of providing the services supported by the federal mechanism. Ameritech claims that forward-looking fill factors should reflect enough capacity to provide service for new customers for a few years until new facilities are built, and should account for the excess capacity required for maintenance and testing, defective copper pairs, and churn.

86. We tentatively conclude that the fill factors selected for use in the federal mechanism generally should reflect current demand, and not reflect the industry practice of building distribution plant to meet ''ultimate'' demand. The fact that industry may build distribution plant sufficient to meet demand for ten or twenty years does not necessarily suggest that these costs should be supported by universal service support mechanisms. This also appears to reflect the assumptions underlying the HAI and BCPM default fill factors. Because the synthesis model designs outside plant to meet current demand in the same manner as the HAI model, we believe the fill factors should be set at less than 100 percent. We tentatively select the HAI defaults for distribution fill factors and tentatively conclude that they reflect the appropriate fill needed to meet current demand. We seek comment on these tentative conclusions.

87. *Feeder Fill Factors.* In contrast to distribution plant, feeder plant typically is designed to meet only current and short term capacity needs. The BCPM copper feeder default fill factors are slightly higher than HAI's, but both the HAI and BCPM default values appear to reflect current industry practice of sizing feeder cable to meet current, rather than long term, demand. Because both the HAI and BCPM default values assume that copper feeder fill reflects current demand, we tentatively select copper feeder fill factors that are the average of the HAI and BCPM default values. We seek comment on these tentative selections.

88. *Fiber Fill Factors.* Because of differences in technology, fiber fill factors typically are higher than copper feeder fill factors. Standard fiber optic multiplexers operate on four fiber strands: primary optical transmit, primary optical receive, redundant optical transmit, and redundant optical receive. In determining appropriate fiber cable sizes, network engineers take into account this 100 percent redundancy in determining whether excess capacity is needed that would warrant application of a fill factor. Both the HAI and BCPM models use the standard practice of providing 100 percent redundancy for fiber and set the default fiber fill factors at 100 percent. We tentatively conclude that the input value for fiber fill in the federal mechanism should be 100 percent. We seek comment on this tentative conclusion.

B. Structure Costs

1. Issues for Comment

89. The synthesis model uses structure cost tables that identify the per foot cost of structure by type (aerial, buried, or underground), loop segment (distribution or feeder), and terrain conditions (normal, soft rock, or hard rock), for each of the nine density zones. For aerial structure, the cost per foot that is entered in the model is calculated by dividing the total installed cost per telephone pole by the distance between poles. As described, we tentatively conclude that we should use, with certain modifications, the estimates in the NRRI Study for the per foot cost of aerial, underground, and buried structure. In general, these estimates are derived from regression equations that measure the effect on these costs of density, water, soil, and rock conditions.

a. Cost of Aerial Structure. 90. We tentatively conclude that we should use the regression equation for aerial structure in the NRRI Study as a starting point. We propose to use this equation to develop proposed input values for the labor and material cost for a 40-foot, class four telephone pole. We develop separate pole cost estimates for normal bedrock, soft bedrock, and hard bedrock. The regression coefficients estimate the combined cost of material and supplies. The NRRI Study reports that the average material price for a 40-foot, class four pole is $213.94. We note that this estimate is very close to results obtained from the data submitted in response to the *1997 Data Request*. According to the Commission staff's analysis of these data, the unweighted average material cost of a 40-foot, class four pole is $213.97, and the weighted average, by line count, is $228.22. We seek comment on this tentative conclusion and analysis.

91. We tentatively conclude that we should add to these estimates the cost of anchors, guys, and other materials that support the poles, because the RUS data from which this regression equation was derived do not include these costs. In the NRRI Study, Gabel and Kennedy used the RUS data to develop the following cost estimates for anchors, guys and other pole-related items: $32.98 in rural areas, $49.96 in suburban areas, and $60.47 in urban areas. We tentatively conclude that these are reasonable estimates for the cost of anchors, guys, and other pole-related items. We seek comment on these tentative conclusions and proposed values.

92. We also tentatively add an estimate for the cost of LEC engineering, which is not reflected in the data from which Gabel and Kennedy derived cost estimates for poles and anchors, guys, and pole-related materials. For the reasons described for copper and fiber cable, we tentatively conclude that we should add a loading of 10 percent to the material and labor cost (net of LEC engineering) for poles, anchors, guys, and other pole-related items. We seek comment on these tentative conclusions and invite proposals justifying an alternative loading factor for LEC engineering.

93. In order to obtain proposed input values that can be used in the model, we must convert the estimated pole costs into per foot costs for each of the nine density zones. For purposes of this computation, we propose to use for density zones 1 and 2 the per pole cost that we have estimated for rural areas, based on the NRRI Study; for density zones 3 through 7 the per pole cost for suburban areas; and for density zones 8 and 9 the per pole cost for urban areas. We then divide the estimated cost of a pole by the estimated distance between poles. We propose to use the following values for the distance between poles: 250 feet for density zones 1 and 2; 200 feet for zones 3 and 4; 175 feet for zones 5 and 6; and 150 feet for zones 7, 8, and 9. For the most part, these values are consistent with both the HAI and BCPM defaults. We seek comment on these proposals.

b. Cost of Underground Structure. 94. We tentatively conclude that we should adopt a similar methodology to estimate the cost of underground structure, as we proposed for the cost of aerial structure. We tentatively conclude that we should use the equation set forth as a starting point for this estimate. We propose to use this equation to develop proposed

input values for the labor and material cost for underground cable structure. We develop separate cost estimates for underground structure in normal bedrock, soft bedrock, and hard bedrock for density zones 1 and 2. As we did for aerial structure, we tentatively conclude that we should add a loading factor of 10 percent for LEC engineering. We seek comment on these tentative conclusions.

95. We are able to develop directly from the regression equation cost estimates for underground structure only in density zones 1 and 2, because the RUS data is from companies that operate only in those density zones. We tentatively conclude that we should derive cost estimates for density zones 3 through 9 by extrapolating from the estimates for density zone 2. We further tentatively conclude that we should perform such extrapolation based on the growth rate between density zones in the BCPM and HAI default values for underground and buried structure. Although we would prefer to rely on data specific to the density zone, rather than extrapolated, we tentatively conclude that, based on our current analysis, this is the best data currently available for this purpose. We seek comment on these tentative conclusions. We seek comment on this proposed method and invite parties to suggest alternative methods for estimating costs in density zones 3 through 9.

c. Cost of Buried Structure.

96. We tentatively conclude that we should use the modified equation for estimating the cost of 24-gauge buried copper cable and structure to estimate the cost of buried structure. It is necessary to modify this equation because estimates derived from it include labor and material costs for both buried cable and structure. We seek comment on this tentative conclusion.

97. For the reasons described, we tentatively conclude that we should add a loading of 10 percent for LEC engineering to the estimates generated by the modified equation. We seek comment on this tentative conclusion.

98. We are able to develop directly from the regression equation cost estimates for buried structure only in density zones 1 and 2, because the RUS data is from companies that operate only in those density zones. We tentatively conclude that we should derive cost estimates for density zones 3 through 9 by extrapolating from the estimates for density zone 2. We further tentatively conclude that we should perform such extrapolation based on the same method proposed for estimating the cost of underground structure. We seek comment on these tentative conclusions.

d. Plant Mix. 99. As discussed, we have tentatively selected input values for the costs of cable and outside plant structure that differ for aerial, buried, and underground cable and structure. Because these cost differences can be significant, the relative amount of plant type in any given area, *i.e.*, the plant mix, plays a significant part in determining total outside plant investment. The synthesis model provides three separate plant mix tables, for distribution, copper feeder, and fiber feeder, which can accept different percentages for each of the nine density zones. Although we tentatively propose using nationwide input values for plant mix, as we have for other input values, we seek comment on an alternative to nationwide plant mix input values, as discussed.

100. The BCPM sponsors claim that in low densities there generally is a greater percentage of buried plant than underground plant, and conversely, in higher densities there is more underground than buried plant. The BCPM default plant mix values reflect these assumptions. Although the HAI default plant mix values for feeder plant also reflect these assumptions, HAI's assumptions with respect to distribution plant mix are quite different than BCPM's, as discussed. The HAI sponsors suggest that aerial plant is still the most prevalent plant type, but claim that their default plant mix values reflect an increasing trend toward the use of buried cable in new subdivisions. The HAI default values generally assume that there is more aerial plant than the BCPM default values. The BCPM defaults have separate values for plant mix in hard rock terrain, which generally assume there is slightly more aerial and less buried plant than the normal and soft rock terrain defaults.

101. *Distribution Plant.* The BCPM default values for distribution plant assume that there is no underground plant in the lowest density zone and the percentage increases with each density zone to 90 percent underground distribution plant in the highest density zone. In contrast, the HAI default values for distribution plant mix place no underground structure in the six lowest density zones and assume that only 10 percent of the structure in the highest density zone is underground. The BCPM default values assume there is no aerial plant in the highest density zone in normal and soft rock terrain, and 10 percent aerial plant in hard rock terrain. In contrast, the HAI default values assume that there is significantly more aerial cable, 85 percent, in the highest density zone, but notes that this includes riser cable within multi-story buildings and ''block cable'' attached to buildings, rather than to poles.

102. We tentatively select input values for distribution plant mix that more closely reflect the assumptions underlying BCPM's default values than HAI's default values for several reasons. The synthesis model does not design outside plant that contains either riser cable or block cable, so we do not believe it would be appropriate to assume that there is as high a percentage of aerial plant in densely populated areas as the HAI default values assume. Although our proposed plant mix values assume somewhat less underground structure in the lower density zones than the BCPM default values, we disagree with HAI's assumption that there is very little underground distribution plant and none in the six lowest density zones. We tentatively select the distribution plant mix values set forth, and seek comment on our tentative conclusions. We tentatively propose input values, for the lowest to the highest density zones, that range from zero percent to 90 percent for underground plant; 60 to zero percent for buried plant; and 40 to ten percent for aerial plant.

103. *Feeder Plant.* The default plant mix percentages for feeder plant are generally similar in the BCPM and the HAI models. Although the BCPM default values vary between normal or soft rock terrain and hard rock terrain, as noted, and the HAI default values differ between copper and fiber feeder, the plant mix ratios across density zones are similar. For example, both the BCPM default values and the HAI default values assume that there is only five or ten percent of underground feeder plant in the lowest density zone. The HAI defaults assume there is somewhat more aerial feeder cable than the BCPM defaults, except for fiber feeder cable in the four lowest density zones. The BCPM defaults assume there is no aerial feeder plant in the three highest density zones, except in hard rock terrain. Despite these differences, the relative amounts of aerial and buried plant across density zones are generally similar.

104. We tentatively select input values for feeder plant mix, set forth, that generally reflect the assumptions underlying the BCPM and HAI default plant mix percentages, with certain modifications. We tentatively propose input values, for the lowest to the highest density zones, that range from five percent to 95 percent for underground plant; 50 to zero percent for buried plant; and 45 to five percent

for aerial plant. Based on the Commission staff's preliminary review of the structure and cable survey data, the proposed values, unlike the HAI and the BCPM (for normal and soft rock) default values, assume that there is no buried plant in the highest density zone. In contrast to the BCPM defaults, the proposed values assume there is some aerial plant in the three highest density zones. We tentatively find that it is reasonable to assume that there is some aerial feeder plant in all density zones, as HAI does, particularly in light of our assumption that there is no buried feeder in the highest density zone, where aerial placement would be the only alternative to underground plant. Although the HAI sponsors have proposed plant mix values that vary between copper feeder and fiber feeder, they have offered no convincing rationale for doing so. We tentatively conclude that, like the BCPM defaults, our proposed plant mix ratios should not vary between copper feeder and fiber feeder. We seek comment on our tentative conclusions.

105. *Alternatives to Nationwide Plant Mix Values.* In the 1997 Further Notice, the Commission tentatively concluded that plant mix ratios should vary with terrain as well as density zones. Because the synthesis model does not provide separate plant mix tables for different terrain conditions, the proposed nationwide plant mix values do not vary by terrain. One method of varying plant mix by terrain would be to add separate plant mix tables, as there are in BCPM, to the synthesis model. We observe that, while the BCPM model provides separate plant mix tables, the BCPM default values reflect only slightly more aerial and less buried plant in hard rock terrain than in normal and soft rock terrain. Another method of varying plant mix would be to use company specific or state specific input values for plant mix as advocated by the BCPM sponsors and other LECs.

106. We generally have chosen not to use study area specific input values in the federal mechanism, and recognize that historical plant mix ratios may not reflect an efficient carrier's plant type choice today. On the other hand, historical plant mix also may reflect terrain conditions that will not change over time. For example, because it is costly to bury cable in hard rock, a carrier serving a very rocky area would tend to use more aerial than buried plant. The Commission staff's analysis of current ARMIS data reveals a great deal of variability in plant mix ratios among the states. In certain state proceedings, U S West has proposed an algorithm for adjusting plant mix to reflect its actual sheath miles as reported in ARMIS. We seek comment on a modified version of this algorithm as an alternative method of determining plant mix percentages.

107. The proposed algorithm uses ARMIS 43–08 data on buried and aerial sheath distances and trench distances to allocate model determined structure distance between aerial, buried, and underground structures. The first step is to set the underground structure distance equal to the ARMIS trench distance and to allocate that distance among the density zones on the basis of the nationwide plant mix defaults. Then an initial estimate of aerial plant is calculated as the sum of the synthesis model structure distances by density zone multiplied by the nationwide aerial plant mix defaults. A second estimate of aerial plant is calculated by multiplying structure distance less trench miles by the aerial percentage of total ARMIS sheath miles. Then an adjustment ratio is calculated by dividing the second estimate by the initial estimate. This adjustment ratio is then applied to each density zone to adjust the nationwide default so that the final synthesis model plant mix reflects the study area specific plant mix. The buried plant mix percentage is determined as a residual equal to one minus sum of the underground and aerial percentages. We seek comment on this alternative to nationwide plant mix values. We also invite parties to suggest other alternatives to determine plant mix in the synthesis model.

108. We also seek comment on whether we should allow the synthesis model to choose the plant mix on the basis of minimum annual cost. We note that this optimization would be constrained to reflect the embedded underground plant percentage, because underground plant is typically deployed in relatively dense areas for reasons of public safety. Embedded percentages of aerial and buried plant, on the other hand, may reflect zoning ordinances but we note that these ordinances in turn may reflect purely aesthetic concerns rather than public safety. If we were to determine that we should use study area specific plant mix input values, we seek comment on whether the synthesis model should be permitted to use its optimization feature for percentages of aerial and buried plant.

C. Structure Sharing

1. Issues for Comment

109. We tentatively adopt the following structure sharing percentages that represent the percentage of structure costs to be assigned to the LEC. For aerial structure, we tentatively assign 50 percent of structure cost in density zones 1–6 and 35 percent of the costs in density zones 7–9 to the LEC. For underground and buried structure, we tentatively assign 90 percent of the cost in density zones 1–2, 85 percent of the cost in density zone 3, 65 percent of the cost in density zones 4–6, and 55 percent of the cost in density zones 7–9 to the LEC.

110. We believe that the structure sharing percentages that we tentatively adopt reflect a reasonable percentage of the structure costs that should be assigned to the LEC. We note that our tentative conclusions reflect the general consensus among commenters that structure sharing varies by structure type and density. While disagreeing on the extent of sharing, the majority of commenters agree that sharing occurs most frequently with aerial structure and in higher density zones. For example, no commenter attributes more than 50 percent of the cost of aerial structure to the LEC. The sharing values that we tentatively adopt reflect these guidelines. In addition, we note that the Washington Utilities and Transportation Commission has adopted structure sharing values that are similar to those that we tentatively adopt. We also note that the sharing values that we tentatively adopt fall within the range of values proposed by HAI and BCPM.

111. In addition, we agree with the Nebraska Public Service Commission that there are some opportunities for sharing even in the lowest density zones. As noted by the Nebraska Commission, ''[e]ven in these more remote regions of the state, there will be some opportunities for sharing as new homes and businesses are constructed.'' We therefore do not assign 100 percent of the cost of buried or underground structure to the LEC in the lowest density areas, as suggested by the BCPM proponents.

112. We seek comment on the tentative conclusions set forth in this section. In addition, we seek comment on AT&T's contention that the structure sharing percentages should reflect the potential for sharing, rather than the LEC's embedded sharing practice.

D. Serving Area Interfaces

1. Issues for Comment

a. Cost of a 7200 Pair SAI.

113. Our proposed approach takes into account the cost of the following SAI components for a 7200 pair indoor SAI: building entrance splicing and distribution splicing; protectors; tie cables; placement of feeder blocks; placement of cross-connect jumpers/

punch down; and placement of distribution blocks. Of these, we tentatively conclude that protector and splicing costs are the main drivers of SAI costs, and cross-connect costs and feeder block and distribution block installation costs greatly contribute to the difference in Sprint's and the HAI proponents' indoor SAI costs. Based upon the following analysis of the record regarding these costs, we propose a total cost of $21,708 for the 7200 pair indoor SAI. We seek comment on this tentative analysis.

114. *Protector Costs.* The cost of the protector is the single greatest contributor to the difference in Sprint's and HAI's indoor SAI costs. HAI proposes a cost of $2.00 per pair for protector material, and Sprint initially proposed a $6.62 cost per pair for protector material. In its review of Sprint's proposed cost, staff concluded that all of the parts identified in Sprint's proposal may not be necessary for SAI construction. Staff also believed, however, that HAI's proposal was for less than a fully functional SAI, and found HAI's proposed cost to be too low. Having analyzed the *ex parte* submissions, staff proposed a cost of $4.00 per pair for protector material. In its February 4, 1999, *ex parte* submission, Sprint agreed that $4.00 is a reasonable estimate of the cost. We tentatively adopt this proposed value and seek comment.

115. *Splicing and Labor Rates.* HAI and Sprint propose different splicing rates, but do not dispute splice set-up time. The HAI sponsors propose a splicing rate of 300 pairs per hour, while Sprint argues for a splicing rate of 100 pairs per hour. We believe that HAI's proposed rate is a reasonable splicing rate under optimal conditions, and therefore, we tentatively conclude that Sprint's proposed rate is too low. We note that the HAI sponsors have submitted a letter from AMP Corporation, a leading manufacturer of wire connectors, in support of the HAI rate. We recognize, however, that splicing under average conditions does not always offer the same achievable level of productivity as suggested by the HAI sponsors. For example, splicing is not typically accomplished under controlled lighting or on a worktable. Having accounted for such variables, we propose to adjust the splicing rate to 250 pairs per hour. We also propose a $60.00 per hour labor rate for splicing, which is within the range of filings on the record. We seek comment on these proposed values.

116. *Cross-Connect Costs.* The cross-connect is the physical wire in the SAI that connects the feeder and distribution cable. Sprint asserts that the ''jumper'' method generally will be employed to cross-connect in a SAI. In contrast, HAI suggests that the ''punch down'' method is generally used to cross-connect. We tentatively conclude that neither the jumper method nor the punch down method is used exclusively in SAIs. In buildings with high churn rates, such as commercial buildings, carriers may be more likely to use the jumper method. On the other hand, in residential buildings, where changes in service are less likely, carriers may be more likely to use the less expensive punch down method. Based on the record, it appears that both methods are commonly used, and that neither is used substantially more than the other. Therefore, we tentatively conclude that we should assume that each method will be used half the time. We seek comment on this tentative conclusion. In particular, we invite parties to justify a particular allocation between the jumper and punch down methods.

117. *Feeder Block and Distribution Block Installation Rates.* Sprint proposes an installation rate of 60 pairs per hour, while the HAI sponsors propose 400 pairs per hour. Because neither feeder block installation nor distribution block installation is a complicated procedure, we tentatively conclude that Sprint's rate of 60 pairs per hour is too low. We recognize, however, that installation conditions are not always ideal. Like splicing, feeder block and distribution block installations are not typically accomplished under controlled lighting or on a worktable. Having accounted for such variables, we propose a rate of 200 pairs per hour. We seek comment on this proposed value.

b. Cost of Other SAI Sizes. 118. Because we currently do not have similar component-by-component data for other SAI sizes, we propose to determine the costs of the other SAI sizes by extrapolating from the cost of the 7200 pair indoor SAI. We believe that this is a reasonable approach because there is a linear relationship between splicing and protection costs, which are the main drivers of cost, and the number of pairs in the SAI. We look to the HAI data to determine the relationship in cost among the various sizes of SAI. Specifically, we develop a ratio of our proposed cost for a 7200 pair indoor SAI to the cost proposed by HAI. We then propose to apply this ratio, 2.25, to the values submitted by the HAI sponsors for other sizes of indoor and outdoor SAIs. Applying this factor, we tentatively adopt the cost estimates for indoor and outdoor SAIs. We propose to use the HAI, rather than BCPM data, in this manner because BCPM has not submitted estimates for all of the SAI sizes used in the model. We note that using the BCPM data in this way would result in roughly the same estimates. We seek comment on these tentative conclusions and proposed values.

E. Digital Loop Carriers

1. Issues for Comment

119. Both the sponsors of BCPM and HAI have submitted default values for DLC costs. Because these values are based on the opinions of experts without data to enable us to substantiate these opinions, however, we tentatively conclude that we should not rely on these data. We also tentatively conclude that the most reliable data on DLC costs available to the Commission at this time are the contract data submitted to the Commission in response to the *1997 Data Request,* and in *ex parte* submissions following the December 11, 1998 workshop. We seek comment on these tentative conclusions.

120. Following their submission of DLC data to the Commission in response to the *1997 Data Request,* US West, Bell South, and ATU resubmitted their data on the record in this proceeding. At the December 11, 1998 workshop, staff of the Common Carrier Bureau discussed the DLC costs data on the record in this proceeding. In an effort to elicit further discussion of DLC input values, staff presented a template of the components of a typical DLC. The HAI sponsors, GTE, and Aliant submitted data using the template of DLC costs. Staff found the data submitted by the HAI sponsors to be significantly lower than the contract data on the record, and staff concluded that it would be inappropriate to use it, especially as no support was provided in justification. Because the data submitted by the companies are based on actual costs incurred in purchasing DLCs, we tentatively conclude that they are more reliable than the opinions proffered, and, therefore, should be used to estimate the cost of DLCs. Although we would prefer to have a larger sampling of data, we note that the data represent the costs incurred by several of the largest non-rural carriers, as well as two of the smallest non-rural carriers. We also note that, throughout this proceeding, the Commission has repeatedly requested cost data on DLCs. We believe that we are using the best data available on the record to determine the cost of DLCs.

121. We note that ATU asserts that material handling and shipping costs should be added to the DLC prices

reflected in the contract it submitted. ATU suggests that these costs could represent up to 10 percent of the material cost of a DLC. It is unclear whether the DLC data submitted by other parties include these costs. We seek comment on the extent, if any, to which we should increase our proposed estimates for DLCs to reflect material handling and shipping costs.

122. We recognize that the cost of purchasing and installing a DLC changes over time. Such changes occur because of improvements in the methods and components used to produce DLCs, changes in both capital and labor costs, and changes in the functionality requirements of DLCs. Thus, we believe it is appropriate to adjust the contract data to reflect 1999 prices. In order to capture changes in the cost of purchasing and installing DLCs over time, we propose a 2.6 percent annual reduction in both fixed DLC cost and per line DLC cost. This proposed rate is based on the change in cost calculated for electronic digital switches over a four year period. We believe that the change in the cost of these switches over time is a reasonable proxy for changes in DLC cost, because they are both types of digital telecommunications equipment. We also note that the 2.6 percent figure is a conservative estimate, based on the change in cost of remote switches. Our analysis suggests that the change in cost of host switches over the past four years is much higher. Finally, we note that use of the current consumer price index results in a similar figure over four years. The indexed amount is based on the effective date of the contracts. Based upon an average of the contract data submitted on the record, adjusted for cost changes over time, we tentatively adopt the cost estimates for DLCs. We seek comment on this proposed analysis and the proposed values.

V. Switching and Interoffice Facilities

A. Issues for Comment

1. Switch Costs

123. We now examine the inputs associated with the purchase and installation of new switches. Specifically, we must select values for the fixed and per-line cost of host and remote switches, respectively.

124. *Switch Cost Data.* Both the sponsors of BCPM and HAI have submitted default values for switch costs. To a large extent, however, these values are based on non-public information or opinions of their experts, but without data that enable us adequately to substantiate those opinions. Consistent with the recommendation of the Joint Board and criterion eight in the *Universal Service Order,* we tentatively conclude that we should not rely on these submissions because the underlying data are not sufficiently open and available to the public. We also tentatively conclude that it is not necessary to rely on this information, because the Commission, in conjunction with the work of Gabel and Kennedy, the Bureau of Economic Analysis (BEA) of the Department of Commerce, and the U.S. Department of Agriculture Rural Utility Service (RUS), has compiled publicly available data on the cost of purchasing and installing switches. This information was gathered from depreciation reports filed by LECs at the Commission and from reports made by LECs to RUS.

125. The depreciation data contains, for each switch reported: the model designation of the switch; the year the switch was first installed; and the lines of capacity and book-value cost of purchasing and installing each switch at the time the depreciation report was filed with the Commission. The RUS data contains, for each switch reported: the switch type (i.e., host or remote); the number of equipped lines; cost at installation; and year of installation.

126. The sample that we propose to use to estimate switch costs includes 1,060 observations. The sample contains 921 observations selected from the depreciation data, which provide information on the costs of purchasing and installing switches gathered from 20 states. The sample also contains 139 observations selected from the RUS data, which provide information from across the nation on the costs of small switches purchased and installed by rural carriers. The combined sample represents purchases of both host and remote switches, with information on 468 host switches and 592 remote switches, and covers switches installed between 1989 and 1996. This set of data represents the most complete public information available to the Commission on the costs of purchasing and installing new switches.

127. In response to the *1997 Data Request,* the Commission received a second set of information pertaining to 1,486 switches. Upon analysis, however, Commission staff identified one or more problems with most of the data submitted: missing switch costs; zero or negative installation costs; zero or blank line counts; unidentifiable switches; or missing or inconsistent Common Language Local Identification (CLLI) codes. After excluding these corrupted observations, 302 observations remained. The remaining observations represented switches purchased by only four companies. We tentatively conclude that the data set we propose to use is superior to the data set obtained in response to the *1997 Data Request,* both in terms of the number of usable observations and the number of companies represented in the data set. We seek comment on this tentative conclusion.

128. Following the December 1, 1999 workshop, three companies voluntarily submitted further data regarding the cost of purchasing and installing switches. Because these submissions were received late in the process, Commission staff has not had sufficient time to analyze the quality and content of the information. We seek comment on the use of this data set as a substitute or complement to the data set we propose.

129. *Adjustments to the Data.* The cost figures reported in the depreciation information reflect the costs of purchasing and installing new switches. While the RUS cost data also contain information on purchasing and installing new switches, they do not include: (1) the cost associated with purchasing and installing the main distribution frame (MDF); (2) the cost associated with purchasing and installing power equipment; (3) the cost of connecting each remote switch to its respective host switch; and (4) LEC engineering costs. In order to make the depreciation and RUS information comparable, we propose to add estimates of these four components to the switch costs reported in the RUS information. These additions are discussed. We seek comment on this proposed approach.

130. In order to account for the cost of MDF equipment omitted from the RUS information, AT&T recommends using the HAI 5.0a default value of $12 per line for MDF. We tentatively conclude that $12 per line is a reasonable cost for purchasing and installing MDF equipment. No party contests this value. We seek comment on this tentative conclusion and invite commenters to submit alternative values.

131. In order to account for the cost of central office power equipment omitted from the RUS information, AT&T recommends using the HAI 5.0a default values for these inputs. We tentatively use the following input values for power equipment: $12,000 for switches with 0–999 lines; $40,000 for switches with 1,000–4,999 lines; and $74,500 for switches with 5,000–25,000 lines. These values are derived from a range of values on the record in this proceeding, including state cost studies. We seek comment on the values we

tentatively adopt and invite commenters to submit alternative values.

132. Gabel and Kennedy estimate that the average cost of terminating a remote on a host switch is $27,598. Relying on this estimate, we tentatively conclude that $27,598 should be added to the cost of each remote switch reported in the RUS data. We seek comment on this tentative conclusion and invite commenters to submit alternative values.

133. Gabel and Kennedy also recommend, based on a data analysis undertaken by RUS, that the cost of switches reported in the RUS data should be increased by 8 percent in order to account for the cost of LEC engineering. Relying on those estimates, we tentatively conclude that 8 percent should be added to the total cost, including MDF, power, and remote connection costs, of each switch reported in the RUS data. We note that the proposed value is based on the only information on the record on this issue. We seek comment on this tentative conclusion and invite commenters to submit alternative values.

134. We tentatively conclude that switch costs should be estimated based on a sample of public data that includes both RUS and depreciation data. As noted, this information represents the broadest range of data publicly available for both small and large switches. We seek comment on the appropriateness of merging the two data sets.

135. *Methodology.* In order to determine the reasonable forward-looking cost of switches, based on the selected data set, we propose to employ regression analysis. In the process of estimation, we propose, where appropriate, to make adjustments to the information compiled by the parties. These proposed modifications to the data and estimation techniques used by the Commission are discussed.

136. We tentatively conclude that the cost of a switch should be estimated as a linear function of the number of lines connected to the switch, the type of switch installed (i.e., host or remote), and the date of installation. We adopt a linear function based on examination of the data and statistical evidence. Sprint recommends using a non-linear function, such as the log-log function, to take into account the declining marginal cost of a switch as the number of lines connected to it increases. We tentatively conclude that the linear function we adopt provides a better fit with the data than the log-log function. A discussion of the effect of time and type of switch on switch cost is presented. We seek comment on these tentative conclusions.

137. Based upon an analysis of the data and the record, we tentatively conclude that the fixed cost (i.e., the base getting started cost of a switch, excluding costs associated with connecting lines to the switch) of host switches and remote switches differ, but the per-line variable cost (i.e., the costs associated with connecting additional lines to the switch) of host and remote switches are approximately the same. This is consistent with statistical evidence and the comments of the HAI sponsors. We seek comment on this tentative conclusion.

138. *Accounting for Changes in Cost Over Time.* We recognize that the cost of purchasing and installing switching equipment changes over time. Such changes result, for example, from improvements in the methods used to produce switching equipment, changes in both capital and labor costs, and changes in the functional requirements that switches must meet for basic dial tone service. In order to capture changes in the cost of purchasing and installing switching equipment over time, we propose to modify the data to adjust for the effects of inflation, and explicitly incorporate variables in the regression analysis that capture cost changes unique to the purchase and installation of digital switches. We describe this process.

139. To the extent that the general level of prices in the economy change over time, the purchasing power of a dollar, in terms of the volume of goods and services it can purchase, will change. In order to account for such economy-wide inflationary effects, we propose to multiply the cost of purchasing and installing each switch in the data set by the gross-domestic-product chain-type price index for 1997 and then divide by the gross-domestic-product chain-type price index for the year in which the switch was installed, thereby converting all costs to 1997 values.

140. In order to account for cost changes unique to switching equipment, we propose to enter time terms directly into the regression equation. GTE expresses concern that, under certain specifications of time, the regression equation produces investments for remote switch ''getting started'' costs that are negative and that such specifications overstate the decline in switch costs. The HAI sponsors also caution that the historical large percentage price declines seen in recent years may not continue. We tentatively conclude that the reciprocal form of time in the regression equation proposed would satisfy these concerns by yielding projections of switch purchase and installation costs that are positive yet declining over time.

141. Ameritech and GTE advocate the use of the Turner Price Index, which is an index designed to measure the changing cost of telecommunications plant, to convert the embedded cost information contained in the depreciation data to costs measured in current dollars. We note, however, that this index and the data underlying it are not on the public record. We prefer to rely on public data when available. Moreover, we tentatively conclude it is not necessary to rely on this index to convert switch costs to current dollars. As described in the preceding paragraph, the Commission has proposed to account for costs explicitly in the estimation process, rather than adopt a surrogate such as the Turner Price Index. We seek comment on this proposed approach. In addition, we seek comment on the potential impact of increased use of packet switches, including the possibility that manufacturers will reduce the price of circuit switches to maintain market share.

142. *Treatment of Switch Upgrades.* The book-value costs recorded in the depreciation data include both the cost of purchasing and installing new equipment and the cost associated with installing and purchasing subsequent upgrades to the equipment over time. Upgrades costs will be a larger fraction of reported book-value costs in instances where the book-value costs of purchasing and installing switching equipment are reported well after the initial installation date of the switch. In order to estimate the costs associated with the purchase and installation of new switches, and exclude the costs associated with upgrading switches, we propose to remove from the data set those switches installed more than three years prior to the reporting of their associated book-value costs. We believe that this restriction would eliminate switches whose book values contain a significant amount of upgrade costs, and recognizes that, when ordering new switches, carriers typically order equipment designed to meet short-run demand.

143. We tentatively conclude that we should reject the suggestion of Ameritech, GTE, and Sprint that the costs associated with purchasing and installing switching equipment upgrades should be included in our cost estimates. The model platform we adopted is intended to use the most cost-effective forward-looking technology available at a particular period of time. The installation costs of switches, as configured by us, reflect the

most cost-effective forward-looking technology for meeting industry performance requirements. Switches, augmented by upgrades, may provide carriers the ability to meet performance requirements, but do so at greater costs. Therefore, such augmented switches do not constitute cost-effective forward-looking technology. In addition, as industry performance requirements change over time, so will the costs of purchasing and installing new switches. The historical cost data employed in this proposed analysis reflect such changes over time, as do the time-trended cost estimates. We seek comment on this tentative conclusion.

144. *Additional Variables.* Several parties contend that additional independent variables should be included in our regression equation. Some of the recommended variables include minutes of use, calls, digital line connections, vertical features, and regional, state, and vendor-specific identifiers. For the purposes of this analysis, our proposed model specification is limited to include information that is in both the RUS and depreciation data sets. Neither data set includes information on minutes of use, calls, digital line connections, vertical features, or differences between host and stand-alone switches. Nor do they contain detail sufficient to allow us to obtain such information from other sources. State and regional identifiers are not included in the proposed regression because we only have depreciation data on switches from 20 states. Thus, we could not accurately estimate region-wide or state-wide differences in the cost of switching. Our proposed model specification also does not include vendor-specific variables or variables distinguishing host switches from stand-alone switches because the model platform does not distinguish between different types of switches.

145. *Switch Cost Estimates.* Using the regression analysis discussed, we tentatively adopt the fixed cost (in 1999 dollars) of a remote switch as $186,400 and the fixed cost (in 1999 dollars) of both host and stand-alone switches as $447,000. We tentatively adopt the additional cost per line (in 1999 dollars) for remote, host, and stand-alone switches as $83. We seek comment on these tentative conclusions.

2. Use of the Local Exchange Routing Guide (LERG)

146. We tentatively conclude that the Local Exchange Routing Guide (LERG) database should be used to determine host-remote switch relationships in the federal universal service mechanism. In the *1997 Further Notice,* the Commission requested ''engineering and cost data to demonstrate the most cost-effective deployment of switches in general and host-remote switching arrangements in particular.'' In the *Switching and Transport Public Notice,* the Bureau concluded that the model should permit individual switches to be identified as host, remote, or stand-alone switches. The Bureau noted that, although stand-alone switches are a standard component of networks in many areas, current deployment patterns suggest that host-remote arrangements are more cost-effective than stand-alone switches in certain cases. No party has placed on the record in this proceeding an algorithm that will determine whether a wire center should house a stand-alone, host, or remote switch.

147. In the *Platform Order,* we concluded that the federal mechanism should incorporate, with certain modifications, the HAI 5.0a switching and interoffice facilities module. In its default mode, HAI assumes a blended configuration of switch technologies to develop switching cost curves. HAI also allows the user the option of designating, in an input table, specific wire center locations that house host, remote, and stand-alone switches. When the host-remote option is selected, switching curves that correspond to host, remote, and stand-alone switches are used to determine the appropriate switching investment. The LERG database could be used as a source to identify the host-remote switch relationships. In the *Platform Order,* we stated that ''[i]n the inputs stage of this proceeding we will weigh the benefits and costs of using the LERG database to determine switch type and will consider alternative approaches by which the selected model can incorporate the efficiencies gained through the deployment of host-remote configurations.''

148. The majority of commenters support the use of the LERG database as a means of determining the deployment of host and remote switches. These commenters contend that the use of the LERG to determine host-remote relationships will incorporate the accumulated knowledge and efficiencies of many LECs and engineering experts in deploying the existing switch configurations. Commenters also contend that an algorithm that realistically predicts this deployment pattern is not feasible using publicly available data and would be ''massive and complex.'' The HAI proponents argue, however, that use of the LERG to identify host-remote relationships may reflect the use of embedded technology, pricing, and engineering practices. Although the HAI proponents oppose the use of the LERG, they have taken steps to ensure that the LERG database is compatible with use in the switching module in the synthesis model.

149. We tentatively conclude that the LERG database is the best source currently available to determine host-remote switch relationships in the federal universal service mechanism. As noted, no algorithm has been placed on the record to determine whether a wire center should house a stand-alone, host, or remote switch. In addition, a majority of commenters agree that development of such an algorithm would be difficult using publicly available data. We tentatively conclude that the use of the LERG to identify the host-remote switch relationships is superior to HAI's averaging methodology which may not, for example, accurately reflect the fact that remote switches are more likely to be located in rural rather than urban areas. We therefore tentatively agree with the BCPM proponents and other commenters that use of the LERG is the most feasible alternative currently available to incorporate the efficiencies of host-remote relationships in the federal universal service mechanism. We seek comment on these tentative conclusions. In particular, we encourage parties to comment on any alternative source or methodology that will identify host-remote switch relationships on a forward-looking basis.

3. Other Switching and Interoffice Transport Inputs

150. *General.* Several commenters assert that the depreciation studies on which the Commission relied to develop switch costs include all investments necessary to make a switch operational. These investments include telephone company engineering and installation, the main distribution frame (MDF), the protector frame (often included in the MDF), and power costs. To avoid double counting these investments, both as part of the switch and as separate input values, the model proponents agree that the MDF/Protector investment per line and power input values should be set at zero. In addition, commenters agree that the Switch Installation Multiplier should be set at 1.0. We agree that including these investments both as part of the switch cost and as separate investments would lead to double counting of these costs. We therefore tentatively conclude that the MDF/Protector investment per line and power input values should be set at zero. We further tentatively conclude that the Switch Installation Multiplier should be

set at 1.0. We seek comment on these tentative conclusions.

151. *Analog Line Offset.* We tentatively conclude that the ''Analog Line Circuit Offset for Digital Lines'' input should be set at zero. The HAI proponents contend that the switch investment in the model should be adjusted downward to reflect the cost savings associated with terminating digital, rather than analog, lines. The HAI proponents assert that this cost savings is due primarily to: (1) the elimination of a MDF and protector frame termination; and (2) the economic efficiencies of terminating multiple lines on a DS–1 trunk termination instead of individual analog line terminations. Further, HAI contends that the depreciation data on which the Commission relied in developing switch investments do not reflect adequately the cost savings that would be realized if ''60+% of lines are terminated on DLC—as occurs in the TELRIC models.'' HAI contends that the depreciation data used to determine costs reflect the use of only approximately 15 percent digital lines.

152. The HAI proponents suggest that the analog line offset input should be set to $15.00 per line to reflect additional savings in switch investment for terminating digital lines in the model. The BCPM proponents and GTE recommend setting the analog line offset to zero. Sprint contends that the analog line offset is inherent in the switching curve in the model, thus making this input unnecessary. Sprint argues that an unknown mixture of analog and digital lines are taken into consideration in developing the switch curve. GTE asserts that the analog offset must be set to zero to ''track with the switching inputs.''

153. We note that the record contains no basis on which to quantify savings beyond those taken into consideration in developing the switch cost. We also note that the depreciation data used to determine the switch costs reflect the use of digital lines. The switch investment value will therefore reflect savings associated with digital lines. We also note that HAI's proposed analog line offset of $15.00 per line is based on assumptions that are neither supported by the record nor easily verified. For example, it is not possible to determine from the depreciation data the percentage of lines that are served by digital connections. It is therefore not possible to verify HAI's estimate of the digital line usage in the ''historical'' data. In addition, HAI provides little support for its conclusion that there is a $20.00 per line cost savings using digital lines. HAI merely attributes a portion of this estimate to certain ''efficiencies'' realized from terminating digital rather than analog lines. In the absence of more explicit support of HAI's position, we tentatively conclude that the Analog Line Circuit Offset for Digital Lines should be set at zero. We seek comment on this tentative conclusion.

154. *Switch Capacity Constraints.* We tentatively adopt the HAI default switch capacity constraint inputs as proposed in the HAI 5.0a model documentation. The forward-looking cost mechanism contains switch capacity constraints based on the maximum line and traffic capabilities of the switch. The HAI proponents now recommend increasing the switch line and traffic capacity constraints above the HAI input default values for those inputs. HAI contends that the default input values no longer reflect the use of the most current technology. For example, HAI contends that the maximum equipped line size per switch should be increased from 80,000 to 100,000 lines.

155. We tentatively conclude that the original HAI switch capacity constraint default values are reasonable for use in the federal mechanism. We note that commenters have reviewed these values and are in general agreement with the HAI default values. For example, we note that the HAI and BCPM default values for maximum equipped lines per switch are identical at 80,000 lines per switch. We also note that the HAI model documentation indicates that the 80,000 line assumption was based on a conservative estimate ''recognizing that planners will not typically assume the full capacity of the switch can be used.'' The HAI proponents therefore selected the 80,000 line limitation as the maximum equipped line size value with the knowledge that the full capacity of the switch may be higher. We seek comment on our tentative conclusion.

156. *Switch Port Administrative Fill.* We tentatively adopt a switch port administrative fill factor of 94 percent. HAI defines the switch port administrative fill as ''the percent of lines in a switch that are assigned to subscribers compared to the total equipped lines in a switch.'' HAI assigns a switch port administrative fill factor of 98 percent in its default input values. The BCPM default value for the switch percent line fill is 88 percent.

157. The BCPM proponents contend that switches have significant unassigned capacity due to the fact that equipment is installed at intervals to handle one to three years' growth. BCPM most recently contends that U S WEST and BellSouth have company-wide average fills in the range of 76 percent. Sprint, on behalf of the BCPM proponents, now recommends an average fill factor of 80 percent.

158. We note that the switch port administrative fill factor of 94 percent has been adopted in several state universal service proceedings and is supported by the Georgetown Consulting Group, a consultant of BellSouth. We also note that this value falls within the range established by the HAI and BCPM default input values. The BCPM model documentation established a switch line fill default value of 88 percent that included ''allowances for growth over an engineering time horizon of several years.'' BCPM has provided no additional evidence to support its revised value of 80 percent. We therefore tentatively adopt a switch port administrative fill factor of 94 percent. We seek comment on this tentative value.

159. *Trunking.* We tentatively conclude that the switch module should be modified to disable the computation that reduces the end office investment by the difference in the interoffice trunks and the 6:1 line to trunk ratio. In addition, we tentatively adopt the HAI suggested input value of $100.00 for the trunk port investment, per end.

160. The HAI switching and interoffice module developed switching cost curves using the Northern Business Information (NBI) publication, ''U.S. Central Office Equipment Market: 1995 Database.'' These investment figures were then reduced per line to remove trunk port investment based on NBI's implicit line to trunk ratio of 6:1. The actual number of trunks per wire center is calculated in the transport calculation, and port investment for these trunks is then added back into the switching investments.

161. The BCPM proponents contend that, under the HAI trunk investment approach, raising the per-trunk investment leads to a decrease in the switch investment per line under the HAI approach, ''despite a reasonable and expected increase'' in the investment per line. The BCPM proponents argue that the trunk port input value should be set at zero to avoid producing ''contradictory'' results. GTE also notes that the selection of the trunk port input value creates a dilemma in that it is used to reduce the end office investment, as noted, and to develop a tandem switch investment. GTE recommends that the switch module be modified by disabling the computation that reduces the end office investment by the difference in the computed interoffice trunks and the 6:1 line to trunk ratio. The HAI sponsors

agree that the trunk port calculation should be deactivated in the switching module.

162. We agree with commenters that the trunk port input creates inconsistencies in reducing the end office investment. We do not, however, agree with the suggestion of the BCPM sponsors to simply set this input value at zero. As noted by GTE, this input value is also used to calculate the tandem switch investment. Consistent with the suggestions by GTE and the HAI sponsors, we tentatively conclude that the switch module should be modified to disable the computation that reduces the end office investment by the difference in the computed interoffice trunks and the 6:1 line to trunk ratio.

163. Because the trunk port input value is also used to determine the tandem switch investment, we must determine the trunk port, per end investment. The HAI input value for trunk port investment per end is $100.00. GTE and Sprint contend that this value should be much higher—ranging from $200.00 to $500.00. BellSouth notes that four states have issued orders addressing the cost of the trunk port for universal service. These states estimate the cost of the trunk port ranging from $62.73 to $110.77. We tentatively conclude that the record supports the adoption of a trunk port investment per end of $100.00, as suggested by the HAI sponsors. As noted, this value is consistent with the findings of several states and BellSouth. In addition, GTE and Sprint provide no data to support their proposed trunk port investment value. We therefore tentatively adopt the HAI suggested input value of $100.00 for the trunk port investment, per end. We seek comment on our tentative conclusions.

VI. Expenses

164. We address the inputs in the model related to expenses, including general support facilities (GSF) expenses. In light of the criteria identified in the *Universal Service Order*, the Commission intends to select inputs that will result in a reasonable allocation of joint and common costs for non-networked related costs such as GSF, plant specific and non-specific expenses, and corporate and customer operations. The Commission seeks to develop an appropriate methodology for estimating these types of expenses to ''ensure that the forward-looking economic cost [calculated by the federal mechanism] does not include an unreasonable share of the joint and common costs for non-supported services.''

A. Issues for Comment

1. Plant Specific Operations Expenses

165. We first address the inputs related to plant specific operations. Plant specific operations expenses are the expense costs related to the maintenance of specific kinds of telecommunications plant.

166. *Nationwide Estimates.* We tentatively conclude that we should adopt input values that reflect the average expenses that will be incurred by non-rural carriers, rather than a set of company-specific maintenance expense estimates. We make this tentative conclusion for a number of reasons. First, we note that this tentative conclusion is consistent with a recommendation of the state Joint Board members. Second, we have not been able to obtain current cost-to-book cost ratios for each ARMIS reporting firm, which would be necessary to calculate company or study area specific expense-to-investment ratios in the proposed methodology described. Further, we tentatively conclude that the use of national or regional averages for input factors is more consistent with the forward-looking nature of the high cost model because it mitigates the rewards to less efficient companies. We seek comment on these tentative conclusions. Parties advocating the use of company-specific values or other alternatives to nationwide or regional estimates should identify the method and data readily available to firms that would be used to estimate plant-specific expenses. Commenters should also indicate how their proposal is consistent with the goal of estimating forward-looking costs. We note that the proposed expense estimates are nationwide averages.

167. In support of the use of company-specific factors, a number of commenters and workshop participants argue that maintenance expenses vary widely by geographic area and the type of plant installed. Others contend that plant-specific expenses are highly dependent on regional wage rate differentials. At this time, we have been unable to verify significant regional differences among study areas or between companies based solely on labor rate variations using the publicly available ARMIS expense account data for plant-specific maintenance costs. Nonetheless, we believe that expenses vary by the type of plant installed. The synthesis model takes this variance into account because, as investment in a particular type of plant varies, the associated expense cost also varies. We seek comment on the degree to which regional wage rate differentials exist and are significant. We ask parties to suggest independent data sources on variations of wage rates between regions. We seek comment on a methodology that permits such distinctions without resorting to self-reported information from companies.

168. One possible approach would be to use indexes calculated by the President's Pay Agent for calculating locality pay differentials for Federal employees. Under this methodology, we would first calculate a baseline expense factor for the labor-related portion of each plant-specific expense account according to a formula which is based on the sum of an expense factor for that category by study area, a weight representing the total investment in a study area, and the regional wage differential deflator calculated in the Pay Agent's report applicable to the study area. The baseline expense would then be disaggregated to each wire center or study area using the deflator. We seek comment both on the validity of this approach as well as on the specific implementation.

169. We also tentatively conclude that we should not adopt different expense estimates for small, medium, and large non-rural companies on a per line basis. In order to determine if economies of scale should be a factor in plant-specific expenses, Commission staff tested whether significant differences in maintenance expenses per line could be discerned from segmenting companies into small carriers with less than 500,000 access lines, medium carriers with between 500,000 and 5,000,000 access lines, and those large carriers with over 5,000,000 access lines. We have found no significant differences in the expense factor per-line or per-investment estimates based on these criteria. Therefore, to estimate costs associated with an efficient network as determined by the forward-looking mechanism, we tentatively conclude that plant-specific maintenance factors should be estimated on a national basis. We seek comment on these tentative conclusions.

170. *Methodology.* Commenters advocate two methods of estimating plant specific operations expenses. The BCPM sponsors contend that all expenses should be calculated on a per-line basis. The BCPM default estimates for these accounts are based on a survey of companies. The HAI sponsors argue that expenses should be calculated as a percentage of investment. Specifically, the HAI sponsors assert that plant specific operations expenses should be calculated as a fixed percentage of investment.

171. Although we agree with the HAI sponsors that plant specific operations expenses should be estimated as a percentage of investment, we tentatively decline to adopt the flat percentages they advocate. By using ARMIS investment values that are not converted to current levels, the flat-rate method proposed by the HAI sponsors does not attempt to use forward-looking estimates. We also tentatively decline to adopt the per-line BCPM default estimates. Based on a private survey of companies, the BCPM values fail to comply with criterion eight identified in the *Universal Service Order*, because the underlying data for these values are not open to and verifiable by the public nor made available under the *Protective Order*. In contrast to the BCPM proposal, the methodology that we tentatively adopt here is primarily based on readily identifiable and publicly available ARMIS data. Although ARMIS data reflect the embedded costs incurred by incumbent LECs, we take steps in our proposed methodology to convert these costs to forward-looking estimates, as described. We note that this methodology was proposed by Commission staff in the public workshop on maintenance expenses on December 10, 1998.

172. In order to estimate forward-looking plant specific operations expenses, we have considered the requirements set forth in the *Platform Order*, and information provided in workshops, comments and *ex-partes*. We tentatively conclude that the input values for each plant specific operations expense account should be calculated as the ratio of booked expense to current investment. These expense-to-investment ratios would then be multiplied in the model by the model-derived investment for each investment account or group of accounts, to produce an estimate of the plant specific operations expenses.

173. Our proposed methodology for estimating expense to investment ratios consists of four steps. First, staff obtained from some of the ARMIS-filing companies, account-specific current cost to book cost (current-to-book) ratios for the related investment accounts. The current-to-book ratio is a tool that is used to restate the historic, financial account balance on a company's books, which reflects investment decisions made over many years, to present day replacement cost. For each account or sub-account, a current-to-book ratio is developed by first revaluing each type of equipment at its current replacement cost. The sum of these current costs are then divided by the total, embedded cost account balance. The resulting current-to-book ratio will be greater than one if current costs are rising relative to the historic costs and less than one if current costs are declining. Current-to-book ratios for the years ending 1995 and 1996 were provided by the following five holding companies: Ameritech, Bell Atlantic, Bell South, GTE, and Southwestern Bell. Although we would prefer to have data from more companies, the other ARMIS-filing carriers informed us that, they either no longer maintain this type of information, or never used current-to-book ratios for accounting purposes.

174. Second, staff calculated composite current-to-book ratios for each account. For each study area of the five holding companies that provided current-to-book ratios, we obtained year-end 1995 and 1996 investment balances from ARMIS for the plant accounts consistent with the aforementioned plant-specific expense accounts. Study area-specific current-to-book ratios for the two periods were multiplied by the 1995 and 1996 ARMIS investments in each account to derive the forward-looking, ''current,'' year-end 1995 and 1996 investment levels by account and by study area. The ARMIS and current investments were then summed separately, by year and by account, for all study areas of the five holding companies. The resulting total current investment (by year and by account for the sum of all study areas) was then divided by the total ARMIS investment (by year and by account for the sum of all study areas) producing two sets of composite current-to-book ratios (year end 1995 and 1996).

175. Third, to calculate the expense-to-investment ratios for the plant-specific operations expense accounts, staff obtained total, year-end 1995 and 1996 investment account balances from the ARMIS 43–03 reports for all ARMIS-filing companies. To make these embedded account balances forward-looking, staff next multiplied each investment account balance for each year by the current-to-book ratios for the same year developed earlier. The 1995 and 1996 ''current'' balances for each account were then averaged by adding the two years together and dividing by two.

176. Finally, from the 1996 ARMIS 43–03 report, staff obtained the 1996 balances for each plant-specific operations expense account for all ARMIS-filing companies. The expense account balances were divided by their respective average ''current'' investment to obtain expense-to-investment ratios. We tentatively conclude that these expense-to-investment ratios should be applied in the mechanism to the model-derived investment balances to obtain forward-looking plant-specific operations expense estimates. The industry-wide expense-to-investment ratios are listed. We seek comment on these proposed input values, tentative conclusions, and the proposed methodology outlined.

177. *Converting Expense Estimates to Current Values.* We recognize that plant specific expenses will change over time. Because we initially used data from 1996 in the methodology described, we tentatively conclude that it is appropriate to adjust this data to account for inflation and changes in productivity by obtaining revised 1997 current-to-book ratios from those companies providing data. In addition, we tentatively conclude that we should use the most current ARMIS data available necessary for the maintenance factor methodology. Because expense and investment balances for 1998 are not available from ARMIS at this time, we have also not been able to include them in calculating the plant-specific maintenance factors. We tentatively conclude that we should use these data in the final computation of expense estimates. We seek comment on these tentative conclusions.

178. *GSF Investment.* GSF investment includes buildings, motor vehicles, and general purpose computers. The synthesis model uses a three-step algorithm to estimate GSF for each study area. First, the model calculates a GSF investment ratio for each GSF account by dividing the ARMIS investment for the account by the ARMIS total plant in service (TPIS). Second, the model calculates a preliminary estimate GSF investment for each account by multiplying the GSF investment ratio for that account times the model's estimate of TPIS. Finally, the model reduces each of the preliminary GSF investment estimates by multiplying by one of two factors, which are the same as those used in the HAI model.

179. We tentatively conclude that the model's preliminary estimate of GSF investment should be reduced, because only a portion of GSF investment is related to the cost of providing the services supported by the federal mechanism. We also tentatively conclude that the synthesis model should not use the same factors as those used in the HAI model. The HAI sponsors, who developed the expense module in the synthesis model, have not shown why these particular factors should be used for this purpose. Instead, we tentatively conclude that total GSF investment should be reduced by factors that reflect the percentage of customer

operations, network operations, and corporate operations used to provide the supported services. We seek comment on these tentative conclusions.

2. Common Support Service Expenses

180. We next address common support service expenses, which are comprised of corporate operations, customer service expenses, and plant non-specific expenses. Corporate operations expenses are those costs associated with general administrative, executive planning, human resources, legal, and accounting expenses for total company operations. Customer service expenses include marketing, billing, operator services, directory listing, and directory assistance costs. Plant non-specific expenses are common network operations and maintenance type of expenses, including engineering, network operations, power and testing expenses, that are considered general or administrative overhead to plant operations. Commission staff held public workshops where they sought comment on various paradigms and econometric estimation techniques used to calculate these factors. Commission staff also discussed possible methods for subtracting non-recurring costs from expense estimates and for adjusting estimates for inflation and potential wage differentials.

181. *Per-Line Basis.* Common support services are costs that cannot readily be associated with any particular maintenance expense or investment account. As a result, we tentatively conclude that these expenses (unlike plant-specific expenses) should be estimated on a per-line basis, as advocated by the BCPM sponsors. We tentatively conclude that the HAI sponsors have failed to justify their proposal that expense estimates for certain accounts be based on a percentage of ARMIS-reported expenses or a percentage of total capital costs and operations expenses. We seek comment on these tentative conclusions.

182. *Nationwide Estimates.* Commenters such as Aliant, Sprint, GTE, and Bell South have argued for the inclusion of all accounts, and have argued further that these types of corporations and customer service expenses are inherently company specific in nature and should be evaluated in this manner. We tentatively conclude that inputs for corporate operations, customer services, and plant non-specific expenses should also be estimated on a nationwide basis rather than a more disaggregated basis. We seek comment on this tentative conclusion.

183. Costs associated with plant non-specific expenses used to supply and run network operations by definition cannot be directly allocated to individual maintenance or investment accounts. Commenters have suggested that these types of expenses may vary among carriers and between study areas. They argue that these differences may be a result of company specific plant configurations, geographic and labor demographic variables, one-time exogenous costs, and non-recurring adjustments such as re-engineering expenses. They further argue that administrative support expense differences are also a function of regional wage differentials and plant specifications. As stated earlier, we cannot at this time distinguish significant differences in regional wage differentials for administrative services based solely on ARMIS expense data for these accounts. Further, costs associated with corporate overhead and customer services accounts are not directly linked to specific company investment levels. We tentatively conclude that, for forward-looking cost estimates, these types of administrative and service expenses are less dependent on carrier physical plant or geographic differentials than those that also correlate to company size (number of lines) and demand (minutes of use), which were used as estimation variables to develop the model inputs. We seek further comment on this analysis.

184. We also tentatively conclude that we should not adopt different estimates for small, medium, and large high cost non-rural companies for common support service expenses. As with plant specific expenses, Commission staff tested whether statistically significant differences in common support service expenses per line could be determined from segmenting companies into small carriers with less than 500,000 access lines, medium carriers with between 500,000 and 5,000,000 access lines, and those large carriers with over 5,000,000 access lines. We have further reviewed whether expense estimates varied due to the total number of Dial Equipment Minutes (DEMs) reported by companies in addition to the number of lines. As with the plant-specific accounts, we could find no significant differences in the expense factor per-line based on these criteria. Therefore, consistent with the forward looking costs associated with an efficient network as determined by the federal mechanism, we tentatively conclude that we should estimate these non-specific network operations expenses on a nationwide, per-line basis. We seek comment on this tentative conclusion.

185. *Data Source.* Following standard economic analysis and forecasting methods, we propose to use publicly available 1996 ARMIS expense data and minutes of use information from NECA, by study area, to estimate the portion of these company-wide expenses to be covered by universal service support. We believe that consolidation of this data produces a sufficient number of observations by study area for each of these accounts. Public data for 1996 was used in this analysis in order to compare the estimates obtained with proprietary information received from a previous data request. We note that this methodology was proposed by Commission staff in a public workshop on December 1, 1998. We seek comment on this proposal.

186. *Regression Methodology.* Using standard multi-variate regression analysis, we developed two different specifications to determine the portion of corporate and customer operations and plant non-specific expenses subject to universal service support. Each equation estimates total expenses per total lines as a function of switched lines per total lines, special lines per total lines, and toll minutes per total lines, either in combination (Specification 1) or separated between intrastate toll and interstate toll minutes per total lines (Specification 2).

187. Each specification has been chosen to separate the portion of expenses that could be estimated as attributable to special access lines and toll usage, which are not supported by the high cost mechanism, rather than switched lines and local usage. Commission staff found from an earlier formulation that, when the model included both a switched line component and a local usage component, the number of switched lines and local DEMs were so highly correlated that it did not increase the explanatory power of the model to include both variables. As a result, we tentatively conclude that we should not include local dial equipment minutes per total lines as an explanatory variable, despite suggestions by a number of workshop participants and commenters. Because both regression equations produce reasonable estimates, and in order to prevent any potential advantage to firms which might have a different mix of toll minutes, we propose to use the average of the estimates from the two specifications. We seek further comment on this proposed regression methodology.

188. *Removal of One-Time and Non-Supported Expenses.* In order to

eliminate the impact of one-time non-recurring expenses on forward-looking estimates, we have sought verifiable public information on exogenous costs and those that are recovered through non-recurring charges and tariffs. These include specific one time charges for the cost of mergers, acquisitions, and process re-engineering. We also sought to estimate the cost of providing permanent number portability, network and interexchange carrier connection, disconnection, and re-connection (i.e., churn) costs. Other recurring functions that we have attempted to identify include vertical features expenses, billing and collection expense not related to supported services, operational support systems and other expenses associated with providing unbundled network elements and wholesale services to competitive local exchange carriers, collocation expenses, and costs associated with SS7 services.

189. Without obtaining proprietary information from carriers, we have been unable to find an objective public data source or discern a systematic method for excluding many of these costs from the expense data used to calculate the input factors. AT&T and MCI WorldCom presented an analysis to Commission staff on January 14, 1999, proposing a method to estimate, non-supported, non-recurring, or one-time expenses for customer, network, and corporate operations expenses. Averaging data for five years (1993–1997) of corporate Security and Exchange Commission (SEC) 10–K and 10–Q filings, a percentage of corporate and network operations identified as one-time charges were estimated for the BOCs and all Tier One companies. Because the SEC reports do not specifically indicate whether the one-time expenses were actually made during the year(s) indicated, we tentatively conclude that we should not use these figures to adjust the 1996 ARMIS data used in estimating the expense input values. The analysis does indicate, however, that one-time expenses for corporate operations can be significant and should be estimated, if possible. Because this type of data detail is not publicly available from ARMIS or easily reconcilable from other public company financial reports to individual account expenses for a specific year, we invite comment on how to identify and estimate these expenses.

190. We tentatively conclude that, if it is determined that expense estimates to be used as inputs in the high-cost mechanism are to be revised annually, as suggested by various parties, one-time non-recurring costs should be systematically excluded. We further recommend that, to the extent possible, efforts be made to use current information supplied and verified by the companies, if none can be found independently, to more accurately reflect forward-looking expenses. We seek comment on this tentative conclusion and recommendation.

191. *Removal of Non-Supported Expenses.* Cost reductions were made for continuous non-supportable services which could be identified and estimated from publicly available (ARMIS) expense data. Expense adjustments were made to calculated input values for marketing expenses. Though the HAI sponsors and state Joint Board members suggested that marketing expenses be excluded entirely, commenters and workshop participants noted that Section 214 of the Communications Act requires eligible telecommunications carriers to advertise the availability of residential local exchange and universal service supported services.

192. We tentatively conclude that an analysis made by Economics and Technology, Inc., regarding the disaggregation of marketing and advertising expenses made by companies for basic telephone service, is the most accurate method on the record for apportioning marketing expenses between supported and non-supported services. This analysis attributes an average of 95.6 percent of company marketing costs to non-supported customers or activities, such as vertical and new services. We seek comment on this proposed analysis for estimating marketing expenses.

193. We also propose adjustments for non-supported service costs related to coin operations and collection, published directory, access billing, interexchange carrier office operation, and service order processing, which are associated with specific expense accounts used in the regression analysis. Under this methodology, percentage reductions would be made to the estimated coefficients for those accounts using calculations based on a time trend analysis of average ARMIS 43–04 expense data for five years (1993–1997). We seek comment on this proposed methodology.

194. *Converting Expenses to 1999 Values.* In order to bring forward the 1996 data relied upon for estimating common support service expenses, we propose to use a 6.0 percent productivity factor for each year (1997 and 1998) to reduce the estimated input values for each account. The 6.0 percent productivity factor is based on the 6.5 percent ''X-factor'' used in the Commission's price cap methodology. We note that the D.C. Circuit Court of Appeals recently reversed and remanded for further explanation the Commission's decision to select 6.0 percent as the first component of the X-factor. In light of that remand, we seek comment on whether we should continue to adjust our expense input values to reflect productivity gains. If we determine that such adjustment is appropriate, we may want to use an alternative method of estimating productivity. We seek comment on what other measures we could use to adjust our expense data for gains in productivity. We further propose to add an inflation factor for each year based on the fixed weighted Gross Domestic Product Price Index (GDP-PI) for 1997 (2.1120 percent) and for 1998 (2.1429 percent). Thus, we propose a net reduction of 3.888 percent for 1997 and 3.8571 percent for 1998 when using the 6.0 percent productivity factor. We seek comment on this method for converting expenses to 1999 values.

195. *Estimates of Corporate Operations, Customer Operations, and Plant Non-Specific Expenses.* This Further Notice contains a summary of the proposed per-line, per-month input figures for both plant non-specific expenses, corporate operations, and customer operations adjusted expenses as calculated using the aforementioned methodology. We seek comment on these proposed values.

VII. Capital Costs

196. We address the inputs in the model related to capital costs: depreciation, cost of capital, and annual charge factors.

A. Depreciation

1. Issues for Comment

a. Method of Depreciation.

197. Before selecting values for projected life and future net salvage value, we first tentatively adopt the method of depreciation that should be used in the model, that is, how depreciation allowances should be allocated over the life of an asset. The Commission's depreciation accounting rules require carriers to use straight-line equal-life group depreciation. Both the HAI and BCPM proponents advocate the use of straight-line depreciation in calculating depreciation expenses. Ameritech suggests that the depreciation method used for a specific geographic area should be consistent with any studies that underlie the development of economic lives or net salvage values for that same area. GTE proposes that incumbent LECs be allowed to use depreciation lives based on the expected economic life of the asset. Because the Commission's rules require the use of straight-line

depreciation, rather than a more accelerated depreciation method, we tentatively conclude that this method, which is used for all Commission-proposed depreciation, is also appropriate for use in the high cost support mechanism. We seek comment on this tentative conclusion.

b. Depreciation Lives and Future Net Salvage Percentages.

198. In estimating depreciation expenses, the model uses the projected lives and future net salvage percentages for the asset accounts in Part 32 of the Commission's rules. Traditionally, the projected lives and future net salvage values used in setting a carrier's rates have been determined in a triennial review process involving the state commission, the Commission, and the carrier. In order to simplify this process, the Commission has prescribed ranges of acceptable values for projected lives and future net salvage percentages. The Commission's prescribed ranges reflect the weighted average asset life for regulated telecommunications providers. These ranges are treated as safe harbors, such that carriers that incorporate values within the ranges into their depreciation filings will not be challenged by the Commission. Carriers that submit life and salvage values outside of the prescribed range must justify their submissions with additional documentation and support. Commission authorized depreciation lives are not only estimates of the physical lives of assets, but also reflect the impact of technological obsolescence and forecasts of equipment replacement. We believe that this process of combining statistical analysis of historical information with forecasts of equipment replacement generates forward-looking projected lives that are reasonable estimates of economic lives and, therefore, are appropriate measures of depreciation.

199. In the *1997 Further Notice*, the Commission tentatively concluded that it should adopt depreciation expenses that reflect a weighted average of the rates authorized for carriers that are required to submit their rates to us. The values submitted by the HAI sponsors essentially reflect such a weighted average. The HAI values represent the weighted average depreciation lives and net salvage percentages from 76 study areas. According to the HAI sponsors, these depreciation lives and salvage values reflect the experience of the incumbent LEC in each of these study areas in retiring plant, and its projected plans for future retirements.

200. We tentatively conclude that HAI's values represent the best forward-looking estimates of depreciation lives and net salvage percentages. We seek comment on this tentative conclusion. Generally, these values fall within the ranges prescribed by the Commission for projected lives and net salvage percentages. Although the HAI values for four account categories fall outside of the Commission's prescribed ranges, these values still reflect the weighted average of projected lives and net salvage percentages that were approved by the Commission and therefore are consistent with the approach proposed in the *1997 Further Notice*. As noted, the fact that an approved value falls outside of the prescribed range simply means that the carrier that proposed the value was required to provide additional justification to the Commission for this value. We are satisfied that HAI calculated its proposed rates using the proper underlying depreciation factors and that HAI's documentation supports the selection of these values.

201. We disagree with the BCPM sponsors and other incumbent LECs that the Commission's prescribed ranges are not appropriate for determining depreciation rates in a competitive environment. These parties argue that rapid changes in technology and the opening of local telecommunications markets to competition shorten asset lives significantly beyond what the Commission has prescribed. The BCPM sponsors claim that these factors cause existing equipment to become obsolete at a faster pace, thus reducing the overall economic value of the assets more quickly. We agree with the HAI sponsors that there is no evidence to support the claim that increased competition or advances in technology require the use of shorter depreciation lives in the model than are currently prescribed by the Commission. The Commission's prescribed lives are not based solely on the engineered life of an asset, but also consider the impacts of technological change and obsolescence. We note that the depreciation values we tentatively adopt are generally at the lower end of the prescribed range. We further note that although the average depreciation rate for an incumbent LEC's Total Plant in Service is approximately seven percent, incumbent LECs are retiring plant at a four percent rate. This difference has allowed depreciation reserves to increase so that the depreciation reserve-ratio is greater than 50 percent. We tentatively conclude that the existence of this difference implies that the prescribed lives are shorter than the engineered lives of these assets. In addition, this difference provides a buffer against technological change and competitive risk for the immediate future. We therefore tentatively conclude that the Commission's prescribed ranges are appropriate to determine depreciation rates for the model. We seek comment on these tentative conclusions.

202. We tentatively decline to adopt the values for projected lives and net salvage percentages submitted by the BCPM proponents. The BCPM proponents based their default values for projected lives and salvage on a LEC industry data survey requesting forward-looking values. With regard to projected lives, the BCPM values generally fall outside of the Commission's prescribed ranges. Because the BCPM sponsors fail to introduce sufficient evidence supporting their values, we tentatively decline to accept their approach. The BCPM proponents submitted values for projected life that are significantly shorter than the already shortened Commission's prescribed life ranges. This is significant because BCPM's values that fall outside of the prescribed ranges represent accounts that reflect the overwhelming majority of plant investment, thus potentially triggering a dramatic increase in support. We seek comment on this assessment.

B. Cost of Capital

203. The cost of capital represents the annual percentage rate of return that a company's debtholders and equity holders require as compensation for providing the debt and equity capital that a company uses to finance its assets. In the *Universal Service Order*, the Commission concluded that the current federal rate of return of 11.25 percent is a reasonable rate of return by which to determine forward-looking costs.

204. The HAI proponents have submitted data indicating that the incumbent LEC's cost of capital is 10.01 percent, not the current 11.25 percent federal rate of return. The HAI proponents also contend that certain state commissions have determined that even lower costs of capital are appropriate. The BCPM proponents advocate a cost of capital rate of 11.36 percent.

205. We find that both BCPM and HAI proponents have failed to make an adequate showing to justify rates that differ from the current 11.25 percent federal rate of return. We tentatively conclude, therefore, that the current rate is reasonable for determining the cost of universal service. If the Commission, in a rate represcription order, adopts a different rate of return, we tentatively

conclude the model should use the more recently determined rate of return. We seek comment on these tentative conclusions.

C. Annual Charge Factors

206. Incumbent LECs develop cost factors, called ''annual charge factors,'' to determine the dollar amount of recurring costs associated with acquiring and using particular pieces of investment for a period of one year. Incumbent LECs develop these annual charge factors for each category of investment required. The annual charge factor is the sum of depreciation, cost of capital, adjustments to include taxes on equity, and maintenance costs.

207. To develop annual charge factors, the BCPM proponents propose a model with user-adjustable inputs to calculate the depreciation and cost of capital rates for each account. The BCPM proponents state that this account-by-account process was designed to recognize that all of the major accounts have, *inter alia,* differing economic lives and salvage values that lead to distinct capital costs. HAI's model is also user adjustable and reflects the sum for the three inputs: depreciation, cost of capital, and maintenance costs.

208. Because the synthesis model uses HAI's expense module, with modifications, we tentatively conclude that HAI's annual charge factor should be used. We believe that HAI's annual charge factor is consistent with other inputs used in the model adopted by the Commission, and therefore easier to implement. We seek comment on this analysis and our tentative decision to use HAI's annual charge factor.

VIII. Other Issues Related to the High Cost Mechanism

A. Alternatives to the Forward-Looking Cost Model

209. It is our expectation that the model outputs will be fully verified in time for implementation on January 1, 2000, and we remain firmly committed to the idea that support based on forward-looking costs will provide the best assurance of predictable, specific, and sufficient support as competition develops. In the unlikely event that the model is not ready for timely implementation, however, we seek comment on how the Commission might determine support levels without resort to a forward-looking cost model. Commenters addressing this issue should specifically describe how their proposal will generate sufficient support to meet the goals of section 254, even as competition develops in the local exchange.

B. Proposed Modification to Procedures for Distinguishing Rural and Non-Rural Companies

1. Issues for Comment

210. On June 22, 1998, the Accounting Policy Division released a Public Notice with a list of the approximately 1,400 carriers that had certified as rural carriers as of April 30, 1998. Because a vast majority of the carriers certifying as rural serve under 100,000 access lines, we tentatively conclude that we should adopt new filing requirements for carriers filing rural self-certification letters. We propose that carriers who serve under 100,000 access lines should not have to file the annual rural certification letter unless their status has changed since their last filing. We believe that this is a better approach because the overwhelming majority of the companies that filed rural certification letters qualified as rural telephone companies because they provide service to fewer access lines than either the 50,000 or 100,000 line thresholds identified in the statute. Access line counts can be verified easily with publicly-available data. Further, this relaxation in filing requirements would lessen the burden on many rural carriers and Commission staff. We estimate that this change will eliminate the filing requirement for approximately 1,380 of the carriers that filed this year. We seek comment on this proposal.

211. As noted, the Commission can easily determine whether a carrier satisfies criteria (B) or (C) of the rural telephone company definition, because these criteria are based on information that can be verified easily with publicly available data—the number of access lines served by a carrier. In contrast, criteria (A) and (D) require additional information and analysis to verify a carrier's self-certification as a rural company. Specifically, under criterion (A) a carrier is rural if its study area does not include ''any incorporated place of 10,000 inhabitants or more'' or ''any territory * * * in an urbanized area,'' based upon Census Bureau statistics and definitions. Under criterion (D) a carrier is rural if it had ''less than 15 percent of its access lines in communities of more than 50,000 on the date of enactment of the [1996 Act].''

212. We tentatively conclude that, once we have clarified the meaning of ''local exchange operating entity'' and ''communities of more than 50,000'' in section 153(37), we should require carriers with more than 100,000 access lines that seek rural status to file certifications for the period beginning January 1, 2000, consistent with the Commission's interpretation of the rural telephone company definition. We seek comment on this tentative conclusion. We also seek comment on whether we should require these carriers to re-certify each year (after the filing for January 1, 2000) or, in the alternative, whether they should be required to re-certify only if their status has changed.

213. Most of the carriers asserting rural status under criterion (A) or (D) also claim rural status under the access line thresholds in criterion (B) or (C). In these cases, the Commission does not need additional information to verify the carrier's rural status. If a carrier serves a local exchange study area with more than 100,000 access lines, however, the Commission needs additional information about the study area to determine whether criterion (A) or (D) is met. Based on the certifications we have received, we believe that carriers have adopted differing interpretations of criterion D. We tentatively conclude that criterion A, on the other hand, by referencing Census Bureau sources, can be applied consistently without further interpretation by the Commission. We seek comment on this tentative conclusion.

214. We have identified at least two issues in the rural telephone company definition for which carriers have adopted different interpretations that affect the determination of whether a carrier satisfies the requirements of criterion D. Specifically, carriers differ on whether criterion (D) should be applied on a holding company or study area-by-study area basis. For example, while most carriers have asserted that they meet the 15 percent/50,000 test in criterion (D) for a particular study area because less than 15 percent of its access lines within that study area are in communities of more than 50,000, at least one carrier claims it meets this criterion for all of its study areas, because less than 15 percent of its access lines nationwide are in such communities. In order to resolve these differences, we must interpret the phrase ''local exchange operating entity'' in the introductory text of section 153(37).

215. We therefore seek comment on how we should interpret the phrase ''local exchange operating entity'' in section 153(37) of the Communications Act. Specifically, we seek comment on whether that term refers to an entity operating at the study area level or at the holding company level. Although most of the carriers certifying under

subparagraph (D) have construed the term to refer to an entity at the study area level, we note that at least one state commission, in denying a carrier's request for an exemption under section 251(f)(1) of the Communications Act, viewed the exemption claim from the perspective of the national operating entity. We also request information on how states have construed the rural telephone company definition in exercising their authority under section 251(f)(1) and section 214(e)(2) of the Act.

216. Carriers also have used different interpretations of the phrase ''communities of more than 50,000'' in criteria (D) of the rural telephone company definition. Some carriers have used Census Bureau statistics for legally incorporated localities, consolidated cities, and census-designated places, to identify communities of more than 50,000. Other carriers have provided lists of communities without identifying the source of the designation or the population information. Some carriers have attempted to distinguish between rural communities and communities that may be characterized as urban or suburban. One carrier, for example, based its analysis of its service territories on the Commission's definition of ''rural area'' in section 54.5 of the Commission's rules. The carrier calculated its percentage of rural/non-rural lines by determining whether each of its wire centers is associated with a metropolitan statistical area (MSA). If so, these lines were considered to be urban, unless the wire center has rural pockets, as defined by the most recent Goldsmith Modification.

217. We seek comment on how we should interpret the phrase ''communities of more than 50,000'' in section 153(37) of the Act. We seek comment on whether we should define communities of more than 50,000 by using Census Bureau statistics for legally incorporated localities, consolidated cities, and census-designated places. In the alternative, we seek comment on whether we should distinguish between rural and non-rural communities in applying criterion D of section 153(37). Specifically, we seek comment on whether we should use the methodology in section 54.5 of the Commission's rules to determine whether a community is in a rural area. We also seek comment on other methods of defining communities with populations greater than 50,000 for purposes of applying criterion D.

218. As noted, states apply the definition of rural telephone company in determining whether a rural telephone company is entitled to an exemption under section 251(f)(1) of the Act and in determining, under section 214(e)(2) of the Act, whether to designate more than one carrier as an eligible telecommunications carrier in an area served by a rural telephone company. Although the Commission used the rural telephone company definition to distinguish between rural and non-rural carriers for purposes of calculating universal service support, there is no statutory requirement that it do so. The Commission adopted the Joint Board's recommendation to allow rural carriers to receive support based on embedded cost for at least three years, because, as compared to large LECs, rural carriers generally serve fewer subscribers, serve more sparsely populated areas, and do not generally benefit as much from economies of scale and scope. The Commission also noted that for many rural carriers, universal service support provides a large share of the carriers' revenues, and thus, any sudden change in the support mechanisms may disproportionately affect rural carriers' operations. We seek comment on whether the Commission should reconsider its decision to use the rural telephone company definition to distinguish between rural and non-rural carriers for purposes of calculating universal service support. That is, we seek comment on whether there are differences between our universal service policies and the competitive policies underlying sections 251(f)(1) and 214(e)(2) that would justify definitions of ''rural telephone company'' and ''rural carrier'' that differ.

219. Finally, we address a necessary procedural matter. Currently, carriers are required to file rural certifications by July 1, 1999 to be classified as rural for January 1, 2000. Given our tentative conclusions that we should modify the current filing requirements for rural certification, including eliminating the filing requirement for most carriers that have filed previously, we move the July 1, 1999 filing deadline to October 15, 1999.

IX. Procedural Matters and Ordering Clause

A. Ex Parte Presentations

220. This is a permit-but-disclose notice-and-comment rulemaking proceeding. *Ex parte* presentations are permitted, except during the Sunshine Agenda period, provided that they are disclosed as provided in Commission's rules.

B. Initial Regulatory Flexibility Act

221. As required by the Regulatory Flexibility Act (RFA), the Commission has prepared this Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities by the proposals in this Further Notice. Written public comments are requested on the IRFA. These comments must be filed in accordance with the same filing deadlines as comments on the rest of this Further Notice, and should have a separate and distinct heading designating them as responses to the IRFA. The Commission will send a copy of this Further Notice, including the IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA) in accordance with the RFA. In addition, the Further Notice and IRFA (or summaries thereof) will be published in the **Federal Register**.

222. *Need for and Objectives of Proposed Rules.* In the *Universal Service Order*, the Commission adopted a plan for universal service support for rural, insular, and high cost areas to replace longstanding federal subsidies to incumbent local telephone companies with explicit, competitively neutral federal universal service mechanisms. In doing so, the Commission adopted the recommendation of the Joint Board that an eligible carrier's support should be based upon the forward-looking economic cost of constructing and operating the networks facilities and functions used to provide the services supported by the federal universal service mechanism.

223. Our plan to adopt a mechanism to estimate forward-looking cost has proceeded in two stages. On October 28, 1998, the Commission completed the first stage of this proceeding: the selection of the model platform. The platform encompasses the aspects of the model that are essentially fixed, primarily assumptions about the design of the network and network engineering. In this Further Notice we move toward completion of the second stage of this proceeding, by proposing input values for the cost model, such as the cost of cables, switches and other network components, in addition to various capital cost parameters. In addition, we propose adoption of a road surrogate algorithm to determine the location of customers and a data set of customer locations. This Further Notice also seeks comment on other issues related to the federal high cost mechanism, including alternatives to the forward-looking cost model and modifications to the procedures for distinguishing rural and non-rural companies.

224. *Legal Basis:* The proposed action is supported by sections 4(i), 4(j), 201–205, 254, and 403 of the Communications Act of 1934, as amended, 47 U.S.C. 154(i), 154(j), 201–205, 254, and 403.

225. *Description and Estimate of the Number of Small Entities to which the Further Notice will Apply.*

226. The RFA generally defines ''small entity'' as having the same meaning as the term ''small business,'' ''small organization,'' and ''small government jurisdiction.'' In addition, the term ''small business'' has the same meaning as the term ''small business concern'' under the Small Business Act, unless the Commission has developed one or more definitions that are appropriate to its activities. Under the Small Business Act, a ''small business concern'' is one that: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) meets any additional criteria established by the SBA. The SBA has defined a small business for Standard Industrial Classification (SIC) category 4813 (Telephone Communications Except Radiotelephone) to be small entities when they have no more than 1,500 employees.

227. The most reliable source of information regarding the total number of certain common carriers appears to be data the Commission publishes annually in its *Carrier Locator* report, derived from filings made in connection with the Telecommunications Relay Service (TRS).

228. Although some affected incumbent LECs may have 1,500 or fewer employees, we do not believe that such entities should be considered small entities within the meaning of the RFA because they are either dominant in their field of operations or are not independently owned and operated, and therefore by definition not ''small entities'' or ''small business concerns'' under the RFA. Accordingly, our use of the terms, ''small entities'' and ''small businesses'' does not encompass incumbent LECs. Out of an abundance of caution, however, for regulatory flexibility analysis purposes, we will separately consider small incumbent LECs within this analysis and use the term ''small incumbent LECs'' to refer to any incumbent LEC that arguably might be defined by the SBA as ''small business concerns.''

229. *Local Exchange Carriers.* Neither the Commission nor SBA has developed a definition of small local exchange carriers. The closest applicable definition for these carrier-types under SBA rules is for telephone communications companies other than radiotelephone (wireless) companies. The most reliable source of information regarding the number of these carriers nationwide of which we are aware appears to be data that we collect annually in connection with the TRS. According to our most recent data, there are 1,410 LECs. Although it seems certain that some of these carriers are not independently owned and operated, or have more than 1,500 employees, we are unable at this time to estimate with greater precision the number of these carriers that would qualify as small business concerns under SBA's definition. Consequently, we estimate that there are fewer than 1,410 small entity LECs that may be affected by the proposals adopted in this Further Notice. We also note that, with the exception of a modification in reporting requirements, the proposals in this Further Notice apply only to larger ''non-rural'' LECs.

230. *Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements.*

231. On June 22, 1998, the Accounting Policy Division released a Public Notice with a list of the approximately 1,400 carriers that had certified as rural carriers as of April 30, 1998. Because a vast majority of the carriers certifying as rural serve under 100,000 access lines, we tentatively conclude that we should adopt new filing requirements for carriers filing rural self-certification letters. We propose that carriers who serve under 100,000 access lines should not have to file the annual rural certification letter unless their status has changed since their last filing. We believe that this is a better approach because the overwhelming majority of the companies that filed rural certification letters qualified as rural telephone companies because they provide service to fewer access lines than either the 50,000 or 100,000 line thresholds identified in the statute. Access line counts can be verified easily with publicly-available data. Further, this relaxation in filing requirements would lessen the burden on many rural carriers and Commission staff. We estimate that this change will eliminate the filing requirement for approximately 1,380 of the carriers that filed this year.

232. We tentatively conclude that, once we have clarified the meaning of ''local exchange operating entity'' and ''communities of more than 50,000'' in section 153(37), we should require carriers with more than 100,000 access lines that seek rural status to file certifications for the period beginning January 1, 2000, consistent with the Commission's interpretation of the rural telephone company definition. We also seek comment on whether we should require these carriers to re-certify each year (after the filing for January 1, 2000) or, in the alternative, whether they should be required to re-certify only if their status has changed.

233. In addition, we address a necessary procedural matter. Currently, carriers are required to file rural certifications by July 1, 1999 to be classified as rural for January 1, 2000. Given our tentative conclusions that we should modify the current filing requirements for rural certification, including eliminating the filing requirement for most carriers that have filed previously, we propose moving the July 1, 1999 filing deadline to October 15, 1999.

234. *Steps Taken to Minimize Significant Economic Impact on Small Entities and Significant Alternatives Considered.* Throughout the Further Notice, we seek comment on the tentative conclusions that we propose. In addition, we believe that the reporting modifications that are proposed will reduce the burden on rural LECs. As noted, we propose that carriers serving fewer access lines than either the 50,000 or 100,000 line thresholds should not be required to file annual rural certification letters unless their status has changed since their last filing.

235. *Federal Rules That May Overlap, Duplicate or Conflict with the Proposed Rule.* None.

C. Initial Paperwork Reduction Act Analysis

236. This Further Notice contains a proposed information collection. As part of its continuing effort to reduce paperwork burdens, we invite the general public and the Office of Management and Budget (OMB) to take this opportunity to comment on the information collections contained in this Further Notice, as required by the Paperwork Reduction Act of 1995, Public Law No. 104–13. Public and agency comments are due at the same time as other comments on this Further Notice; OMB comments are due 60 days from date of publication of this Further Notice in the **Federal Register**. Comments should address: (a) whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimates; (c) ways to enhance the quality, utility, and clarity of the information collected; and (d) ways to minimize the burden of the collection of information on the

respondents, including the use of automated collection techniques or other form of information technology.

D. Deadlines and Instructions for Filing Comments

237. Pursuant to 47 CFR 1.415, 1.419, interested parties may file comments on or before July 2, 1999 and reply comments on or before July 16, 1999. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS) or by filing paper copies. *See Electronic Filing of Documents in Rulemaking Proceedings,* 63 Fed. Reg. 24,121 (1998).

238. Comments filed through the ECFS can be sent as an electronic file via the Internet to <http://www.fcc.gov/e-file/ecfs.html>. Generally, only one copy of an electronic submission must be filed. If multiple docket or rulemaking numbers appear in the caption of this proceeding, however, commenters must transmit one electronic copy of the comments to each docket or rulemaking number referenced in the caption. In completing the transmittal screen, commenters should include their full name, Postal Service mailing address, and the applicable docket or rulemaking number. Parties may also submit an electronic comment by Internet e-mail. To get filing instructions for e-mail comments, commenters should send an e-mail to ecfs@fcc.gov, and should include the following words in the body of the message, ''get form <your e-mail address.'' A sample form and directions will be sent in reply. Parties who choose to file by paper must file an original and four copies of each filing. If more than one docket or rulemaking number appear in the caption of this proceeding, commenters must submit two additional copies for each additional docket or rulemaking number. All filings must be sent to the Commission's Secretary, Magalie Roman Salas, Office of the Secretary, Federal Communications Commission, 445 Twelfth Street, S.W., TW–A325, Washington, D.C. 20554.

239. Parties must also send three paper copies of their filing to Sheryl Todd, Accounting Policy Division, 445 Twelfth Street S.W., 5–A523, Washington, D.C. 20554. In addition, commenters must send diskette copies to the Commission's copy contractor, International Transcription Service, Inc., 1231 20th Street, N.W., Washington, D.C. 20037.

E. Ordering Clauses

240. *It is ordered,* pursuant to sections 1, 4(i) and (j), 201–209, 218–222, 254, and 403 of the Communications Act, as amended, 47 U.S.C. 151, 154(i), 154(j), 201–209, 218–222, 254, and 403 that this Further Notice of Proposed Rulemaking is hereby adopted and comments are requested as described.

241. *It is further ordered* That the Commission's Office of Public Affairs, Reference Operations Division, shall send a copy of this Further Notice of Proposed Rulemaking, including the Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

List of Subjects

47 CFR Part 36

Reporting and recordkeeping requirements, Telephone.

47 CFR Part 54

Universal service.

47 CFR Part 69

Communications common carrier.

Federal Communications Commission

Magalie Roman Salas,

Secretary.

[FR Doc. 99–15025 Filed 6–11–99; 8:45 am]

BILLING CODE 6712–01–U

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 216

[Docket No. 990324081–9081–01; I.D. 072098G]

RIN 0648–AI85

Taking of Marine Mammals Incidental to Commercial Fishing Operations; Tuna Purse Seine Vessels in the Eastern Tropical Pacific Ocean (ETP)

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce.

ACTION: Proposed rule; request for comments and notice of public hearings.

SUMMARY: NMFS proposes regulations to implement provisions of the International Dolphin Conservation Program Act (IDCPA). These regulations would allow the entry of yellowfin tuna into the United States under certain conditions from nations signatory to the International Dolphin Conservation Program (IDCP) that otherwise would be under embargo. It would also allow U.S. fishing vessels to participate in the fishery in the ETP on equivalent terms with the flag vessels of other IDCP signatory nations. A U.S. citizen employed on a purse seine vessel of another IDCP signatory nation with an affirmative finding would not be in violation of U.S. prohibitions on the taking of marine mammals if that vessel takes marine mammals incidentally during fishing operations outside the U.S. exclusive economic zone (EEZ) in compliance with the requirements of the IDCP. The standard for use of ''dolphin-safe'' labels for tuna products would also change. General requirements also are proposed to ensure adequate tracking and verification of tuna imports from the ETP.

DATES: Comments on the proposed regulations must be received on or before July 14, 1999. Public hearings on this proposed rule will be held on Thursday, July 8, 1999, in Long Beach, CA, at 10:00 a.m.- 1:00 p.m. and on Wednesday, July 14, 1999, in Silver Spring, MD, at 1:00 p.m.- 4:00 p.m.

ADDRESSES: Send comments to J. Allison Routt, NMFS, Southwest Region, Protected Resources Division, 501 W. Ocean Blvd., Suite 4200, Long Beach, CA 90802–4213. The locations of the public hearings on this proposed rule are: (1) Room 3400, 501 W. Ocean Blvd., Long Beach, CA 90802–4213; and (2) NOAA Building, SSMC IV, Room 1W611, 1305 East-West Highway, Silver Spring, MD 20910.

FOR FURTHER INFORMATION CONTACT: J. Allison Routt, NMFS, Southwest Region, Protected Resources Division, (562) 980–4020. For additional information about the public hearing in Long Beach, CA, contact J. Allison Routt. For additional information about the public hearing in Silver Spring, MD, contact Cathy Eisele, NMFS, Headquarters, Marine Mammal Division,(301) 713–2322.

SUPPLEMENTARY INFORMATION:

Background

In 1992, nations fishing for tuna in the ETP, including the United States, reached a non-binding international agreement (referred to as the La Jolla Agreement) that included, among other measures, a dolphin mortality reduction schedule providing for significant reductions in dolphin mortalities. By 1995, nations fishing in the ETP under the La Jolla Agreement had reduced dolphin mortality to less than 5,000 dolphins annually, two years ahead of the schedule established in that Agreement. In October 1995, the success of the La Jolla Agreement led the United States, Belize, Colombia, Costa Rica, Ecuador, France, Honduras, Mexico, Panama, Spain, Vanuatu, and Venezuela to sign the Panama Declaration to strengthen and enhance the IDCP.

The program outlined in the Panama Declaration will provide greater