If the continued use of a productivity adjustment factor is necessary, U S WEST supports the Christensen methodology to develop output price indexes for use in the LEC TFP calculations.[17] The economic indexing technique utilized by Christensen involves computing price and quantity indexes for services provided by the LECs for each year of the study. The price and quantity indexes would be aggregated into a price index of total output and a quantity index of total output. However, due to the large array of services provided by the LECs, price and quantity information is not readily available in an indexed form. As a result, Christensen developed price cap indexes which utilize publicly available data and widely accepted price index methodologies.

The categories of output defined by Christensen are reasonable and appropriate. The seven simplified categories are: local service, long distance service, interstate end-user access, interstate switched access, interstate special access, intrastate access, and miscellaneous. The Christensen simplified model uses booked revenues as a substitute for billed revenues which were used in the Original Christensen Study, achieving the Commission's goal of using publicly verifiable information.

There is no better way to categorize LEC services for purposes of developing output indexes. Substituting other methods which are not LEC specific does not accurately represent the true price and quantity indexes for a category and is subject to data availability.

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[17] See Attachment 1, Christensen Study at 3-8.

The Christensen method uses revenue to weigh the various services. This method is appropriate as cost weights reduce the measured rate of total productivity growth, since the cost weights give greater weight to output categories that have experienced lower growth. The appropriateness of alternative weighting schemes in developing the output indexes is analyzed and well described in the Original Christensen Study and the Christensen Study attached to this filing.[18]

Issue 1b: *What is the most appropriate measure of the cost of capital for a TFP study?*

As described in the Christensen Study, several methods were analyzed and the cost of capital implicit in the U.S. National Income and Products Accounts was used.[19] This measure treats LEC and economy-wide costs of capital symmetrically and is based on an independently calculated, publicly available data source, the U.S. Bureau of Economic Analysis. The U.S. economy cost-of-capital method includes both equity and debt components.

The use of U.S. economy cost of capital represents a simplified approach from the Original Christensen Study which used Moody's bond yield as the proxy for the development of accepted annual data series on the opportunity cost of equity. The use of U.S. economy cost of capital as an opportunity cost-of-equity substitution should end the debate on this issue. The U.S. economy cost-of-capital alternative does not

[18] See also USTA Comments, filed concurrently with this filing at 17-18.

[19] See Attachment 1, Christensen Study at 9-12.

change substantially the TFP and provides a readily available, verifiable substitution.

No basis exists for using Commission authorized rate of return prescriptions for cost-of-capital proxies as they do not represent true market costs of capital and inappropriately link the Price Cap Plan to rate of return regulation. Such use also requires that the Commission continue to hold represcription proceedings for the development of such rates when its stated goal is to move away from rate of return regulation toward a more efficient market-dictated form of regulatory oversight. Cost-of-capital calculations should be updated annually using the U.S. economy cost-of-capital measure recommended in the Christensen Study.

Issue 1c: What are appropriate depreciation rates for a TFP study?

The most appropriate depreciation rates for use in the TFP study are the ones that reflect the underlying economic costs. Therefore, economic depreciation rates are the most appropriate measure. The Christensen model incorporates depreciation lives currently used by the U.S. Bureau of Economic Analysis and U.S. Bureau of Labor Statistics ("BLS").[20]

Prescribed depreciation rates are not based on economic theory or research on economic depreciation and may differ substantially from true economic depreciation. Such prescribed depreciation rates contain implicit political assumptions that are not

[20] See id. at 12-14.

relevant or appropriate for use in an otherwise purely economic calculation of TFP and should not be considered.

Issue 1d: *What is the most reasonable method to estimate capital stock?*

The Christensen Study describes the most reasonable method to estimate capital stock and is supported by U S WEST.[21]

Issue 1e: *Is the imputation of capital services from capital stock rather than from capital consumption reasonable?*

As described in the Christensen Study, capital stock is the most reasonable basis for measuring the quantity of capital input and is the standard approach in productivity research.[22] Both the Original Christensen Study and the revised Christensen Simplified TFP approach use the quantity of capital stock to measure the quantity of capital input for each asset class.

Issue 1f: *What is the most reasonable method for developing an implicit rental price?*

The Christensen approach supported by U S WEST is developed from the economic theory of capital.[23] This theory is based on a market equilibrium

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[21] See id. at 14-20. See also USTA Comments, filed concurrently with this filing at 23-25.

[22] See Attachment 1, Christensen Study at 20-21.

[23] See id. at 21-23.

relationship between the price a firm is willing to pay to acquire an asset and the services it provides over its lifetime. Christensen bases the rental price equation on a three-year moving average of the cost of capital and capital gains instead of their current values.

Issue 1g: *What is the most reasonable method for developing a labor index for inclusion in a TFP calculation?*

The ideal measure of labor input would be based on hours worked by LEC employees by skill level, with the hours for each employee then weighted by total compensation. The detail required to develop such a labor index is not feasible, and there is no real evidence that it would have any impact on the resulting TFP calculation. The data from such a study would also not be publicly available or verifiable. The simplest approach is to use total employees reported in the publicly available ARMIS reports.

The Christensen approach simplifies the original TFP study by streamlining the labor input and using total employees weighted by total compensation.[24] The sensitivity analysis performed on this variable reflects no change when compared to the Original Christensen Study.

Issue 1h: *What is the most reasonable method for developing a materials index for inclusion in a TFP calculation?*

[24] See id. at 23-25.

Data is not publicly available for the development of a specific LEC materials price index for use in the Simplified TFP calculation. The ARMIS information on material purchases does not lend itself to an itemization of the types of materials purchased by the LECs. As a reasonable proxy, a broad-based price index such as the GDP-PI should be used.

Issue 1i: *What is the most reasonable way to account for changes in LECs' input prices for use in a TFP approach to calculating the X-Factor?*

Studies and analysis performed by Christensen and the National Economic Research Associates, Inc. ("NERA") support that the best estimate of the expected long-term input price differential is zero.[25] There is no statistical basis for using an observed short-run input price differential as a projection of expected future trends.

In an effort to limit the debate on the appropriate productivity method, U S WEST proposes that the most reasonable way to account for changes in LECs' input prices is the method used by Christensen and NERA for the long-term input price study. However, U S WEST proposes the use of a five-year rolling average for inputs which would be consistent with the TFP calculation. This calculation would derive a short-term input price differential.

Issue 1j: *Is there a valid distinction between intrastate and interstate productivity for the purposes of calculating a TFP index and*

[25] See id. at 26. Also see Attachment 2, Economic Evaluation of Selected Issues From the Fourth Further Notice of Proposed Rulemaking in the LEC Price Cap Performance Review, National Economic Research Associates, Inc. dated Dec. 18, 1995 ("NERA Study") at 6-10.

an input price index and, if so, does a satisfactory method exist to account for such differences?

The measurement of historic LEC industry TFP growth was calculated for all inputs and outputs of the local telephone companies. There is no economically meaningful way to assign portions of common facilities to individual services, and there is no satisfactory method which exists to account for such differences as indicated by the NERA and Christensen analyses of distinguishing intrastate and interstate productivity.[26] Therefore, U S WEST recommends that the Commission not attempt to distinguish interstate productivity changes from overall changes in TFP.

Issue 1k: *Is there a valid distinction between regulated and nonregulated productivity, or the productivity associated with specific services, such as video dialtone, or groups of services, for the purposes of calculating a TFP index and an input price index? If so, does a satisfactory method exist to account for such differences?*

As described in detail in the NERA and Christensen Studies, no distinction between regulated and nonregulated productivity can be calculated with verifiable, public data.[27] If a productivity factor is required, one that is calculated at a total company basis is the recommended economic approach.

Issue 1l: *How do state and federal universal service and other subsidy programs implemented by the LECs affect the*

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[26] See Attachment 1, Christensen Study at 26-27. Also see Attachment 2, NERA Study at 15-20.

[27] See Attachment 1, Christensen Study at 27, and Attachment 2, NERA Study at 21-22.

industry's TFP? Should the TFP be adjusted to account for such effects?

State and federal universal service and other subsidy programs are captured in the outputs created by increased access to the public switched network facilitated by these plans. Likewise, the costs of compliance with regulatory mandates and obligations are included in the input side of the TFP method. The TFP should not be adjusted to account for these effects.

Issue 1m: *Should the productivity of firms other than LECs be included in a TFP-based X-Factor calculation?*

The Price Cap Plan productivity adjustment should be closely linked with the inputs and outputs specific to the firms regulated by the Plan. The productivity of firms other than LECs should not be included in a TFP-based X-Factor calculation.

Issue 1n: *Are there superior alternatives to Christensen's method of calculating TFP?*

The superior alternative to the requirement of a productivity offset is U S WEST's "Capped Index Plan." The other methods presently suggested as means to calculate a productivity factor are not TFP based, and, therefore, the Christensen method is superior to those available for review.

Issue 2a: *Is the Historical Revenue Method superior to a TFP-based approach for developing an X-Factor?*

The proposed Historical Revenue Method is not superior to a TFP-based approach for developing an X-Factor, because the Historical Revenue Method determines an X-Factor which is linked to a certain rate of return earning level. An earnings-based method is incompatible with the core principle of price regulation which introduces efficiency incentives by severing ties to cost plus pricing as practiced in traditional rate of return regulation.[28]

Issue 2b: *Is the Historical Price Method superior to the TFP approach for developing an X-Factor?*

The Historical Price Method is also not superior to a TFP-based approach for developing an X-Factor. While some versions of the Historical Price Method utilize some valid premises which are shared by a TFP approach, the data used to calculate a productivity factor using the Historical Price Method is not publicly available or verifiable.

Issue 2c: *Should the X-Factor in the long-term price cap plan include a consumer productivity dividend?*

The Commission introduced the consumer productivity dividend ("CPD") in the LEC Price Cap Order; the Commission concluded that setting a productivity factor equal to historical productivity levels under rate of return regulation would not necessarily force carriers to share with consumers the efficiencies derived from

[28] See Attachment 2, NERA Study at 29-32. And see USTA Comments, filed concurrently with this filing.

incentive regulation. To ensure sufficient consumer benefits, an upward adjustment of 0.5 percent was applied to the historical productivity rate. Now that the Simplified Christensen TFP calculation uses four years of data on LEC productivity under incentive regulation, the need identified previously by the Commission for including a CPD is eliminated. Consequently, the Commission should eliminate the CPD from the calculation of all X-Factors. Even the presence of an "additional incentive" of a non-sharing X-Factor does not require the continuation inclusion of a CPD. Any additional productivity improvements associated with a non-sharing X-Factor will be reflected in Christensen's Simplified TFP calculations and, hence, in the X-Factor itself, ensuring that these productivity gains are shared with customers.

Issue 3a: *Should we base the X-Factors in the long-term plan on a moving average, or should we establish fixed X-Factors to be reviewed and revised periodically in performance reviews?*

X-Factors in a long-term plan are not an issue if the Capped Index Plan is adopted. If an X-Factor is required, the factor should be based on a moving average, which would eliminate the review of productivity factors in performance reviews. The Commission notes that an X-Factor calculated as a moving average would also be superior to a fixed factor as a moving-average X-Factor could function to reflect both the dynamics of LEC performance and flow through the most recent productivity gains.

Issue 3b: *If we adopt moving average X-Factors, how many years of data should be included in the average?*

Issue 3c: *If we adopt moving average X-Factors, should there be any lag? If so, how long should that lag be?*

U S WEST supports the USTA proposal that five years of data be included in a moving average. U S WEST also supports a two-year lag in the moving average calculation to ensure that the BLS data (relied upon extensively in the Christensen Simplified TFP calculation) is available.

Issue 4: *Should there be multiple X-Factors in the long-term price cap plan and, if so, how many should there be and how should they be determined?*

As noted previously, should the Commission choose not to implement U S WEST's proposed Capped Index Plan and instead selects a plan which is based on an annually adjusted productivity factor, then multiple no-sharing X-Factors are appropriate. While U S WEST does not propose a specific number of X-Factors, it does propose that such multiple X-Factors be based on geographic density.[29] The Commission raised such geographic serving area differences (rural to urban) among the LECs in the 4th FNPRM:

> A single X-Factor, however, would not adequately reflect differences in the economic conditions faced by each LEC and thus could unfairly penalize or reward LECs which face conditions that differ from the industry average. For example, there are variations among the LECs' service regions with respect to level of growth in the overall economy, the proportion of rural and urban areas for which service is provided,

[29] See Section IV supra.

and level of competition in the provision of telecommunications services.[30]

Geographic density is an appropriate distinction as a basis for multiple options, since such factors have a large impact on the overall unit costs and, thus, on the productivity of various LEC companies. At least one lower X-Factor option should be available to price cap LECs which face lower productivity as a result of geographic density disadvantages.

B. Sharing Requirements And Alternatives

Issue 5a: *If we establish a plan in which LECs have a choice of X-Factor, what incentive mechanism should be used to encourage each LEC to choose an X-Factor that is appropriate for its economic circumstances? Is it possible to develop an incentive mechanism other than one based on sharing?*

Again, U S WEST proposes that the Commission base any multiple X-Factor options available to the LECs on geographic density. No sharing options are necessary or appropriate in a going-forward plan.

Issue 5b: *If we use sharing as an incentive mechanism, what sharing requirements should be associated with those X-Factors for which sharing is required? How should we structure sharing bands?*

[30] 4th FNPRM ¶ 109 (emphasis added).

As noted previously, U S WEST believes that sharing is inappropriate in a going-forward price cap plan. However, should the Commission establish a plan in which sharing is used as an incentive mechanism, it is critical that sharing should not penalize more efficient companies. The Commission needs to balance the goal of establishing an incentive for companies to elect a higher productivity factor without penalizing LECs which are unable to achieve higher productivity levels.

U S WEST agrees with the Commission's tentative conclusion that at least one X-Factor should have a no-sharing requirement. This non-sharing X-Factor should be associated with an industry-average X-Factor calculated using the Simplified Christensen TFP method as that method best models the impact of competition on prices. The Commission should then set lower X-Factors with a sharing component. To achieve the balance between setting an appropriate incentive that is not punitive, the sharing component should include a broad sharing range. As discussed below in response to Issue 5d, LEC-specific X-Factors are inappropriate. Therefore, the elimination of sharing cannot be dependent on the value of the X-Factor that applies to a particular LEC.

Issue 5c: *If we establish a plan in which LECs have a choice of X-Factor, how much flexibility should LECs have to change their choice? Should we continue to allow annual selection?*

The development of a long-term plan with multiple X-Factors should allow unlimited flexibility in their election. The LECs would be able to elect the same or a different X-Factor option each year for that year's annual filing requirements.

Issue 5d: *Instead of allowing LECs to choose among several X-Factors, should we establish criteria and procedures by which we can assign an appropriate X-Factor to each LEC?*

The Commission should not establish criteria or procedures to assign X-Factors to each LEC. Company-specific X-Factors are a throwback to rate of return regulation, and such a plan would require the annual review of each LEC's financials, thus returning to the administratively complex regulation of the past. The efficiency incentives of price cap regulation would be eliminated and higher productivity achievers would be punished and the least productive rewarded. A return to the perverse incentives of rate of return regulation would inevitably occur.

Issue 5e: *To what extent and under what conditions would it be possible to eliminate the sharing mechanism from the long-term price cap plan?*

Under U S WEST's proposed Capped Index Plan, sharing is no longer required. Additionally, if a TFP-based approach is deemed essential, U S WEST's multiple option plan which links options to measurable geographic density differences eliminates the need for a sharing mechanism. The Commission adopted sharing and the low-end adjustment to compensate for the possibility of an error in the choice of productivity factor and variations among the different LECs, not to regulate LEC earnings. The potential for such errors going forward is minimized, especially if the Commission selects a methodology which uses publicly available data to calculate the X-Factor and measurable geographic density differences for

multiple options. A sharing option is no longer necessary or appropriate in any newly developed price cap plan.

Issue 5f: *Should the low-end adjustment mechanism be eliminated?*

The elimination of sharing with all relevant election options under a price cap plan also eliminates the requirement for a low-end adjustment mechanism.

C. Common Line Formula

Issue 6a: *Under what circumstances would the adoption of a particular X-Factor method justify elimination of a separate common line formula?*

As previously stated, it is U S WEST's position that the current price cap regulatory scheme, replete with indexes, baskets, bands, and formulas, is unnecessary and unduly burdensome in the current environment. In this proceeding, we are urging the Commission to make a bold move away from this outdated form of regulation and instead adopt the proposed Capped Index Plan. With the Capped Index Plan, there are no formulas for any of the price cap baskets, including the Carrier Common Line ("CCL") basket.

In the event the Commission maintains the current price cap scheme of regulation, the adoption of the TFP method for productivity selection eliminates the need for a separate common line formula. Growth in access lines and minutes of use is appropriately reflected in the TFP calculation., and an additional adjustment

would double count increased usage per access line and would be punitive to the price cap companies.

With the Capped Index Plan or the continuation of the current Price Cap Plan and the adoption of the TFP methodology for productivity selection, the need for a separate common line formula is eliminated.

Issue 6b: *Assuming we decide to retain a separate common line formula, should we adopt a per-line common line formula or some other formula? What should the mechanics of that formula be?*

As previously stated, there are no circumstances under which the Commission should retain a separate common line formula. Therefore, there is no rationale which would support either a per-line or any other formula.

However, if the Commission retains a separate common line formula, regardless of the compelling evidence supporting the elimination of any such adjustment, the existing adjustment (g/2) should be retained. The g/2 formula adjustment is more appropriate than a per-line formula and would limit the double count to one-half of the growth in usage per line.

Issue 6c: *Should carrier common line rates be based on historical rather than forecasted data for end user common line revenues?*

U S WEST supports the change in the CCL formula to include the use of historical demand and historical Base Factor Productivity ("BFP") (interstate

recovery of the loop revenue requirement). Except for CCL, all data in the annual filing represents actual historical information. Modifying the CCL formula will standardize the annual filing process.

D. Exogenous Costs

Issue 7a: *Is it feasible to fashion an X-Factor that will routinely include costs currently classified as exogenous and exclude costs that the Commission has determined are not exogenous?*

Issue 7b: *Would it be reasonable to limit exogenous cost treatment to changes that result in a jurisdictional cost shift?*

The use of TFP does not eliminate the required adjustment for items which are considered exogenous under the current rules. The rule changes have narrowly defined the items to industry-specific costs which require adjustment of the indexes. These costs would not be captured in the inputs and outputs related to TFP. Christensen supports the adjustment for the exogenous items as they relate specifically to the telecommunications industry because they will not be factored in to the extent they are industry specific using an X-Factor with TFP and input price. The Christensen information provides support that the four major exogenous adjustments (Inside Wire, Reserve Depreciation Amortization ("RDA"), Subscriber Plant Factor ("SPF"), and Dial Equipment Minutes ("DEM")) in the past would not have been captured in the indexes.

E. Length Of Plan

If U S WEST's proposed Capped Index Plan is adopted, no plan-length considerations which address PCI adjustments are necessary. Should the Commission adopt a plan using a TFP-based productivity adjustment, then plan-length considerations are important. U S WEST believes there are several factors to be considered in determining the length of any newly selected price cap plan, including: 1) the plan's ability to respond to the impact of competition and competitive entry; 2) the flexibility offered by the plan's productivity options and their relevance to LEC serving area differences; and 3) the continuing validity of the assumptions and models which are the basis of the plan. As the marketplace for telecommunications services is changing rapidly, a price cap plan which meets all of the above criteria would still be relevant only for a maximum of three to five years. U S WEST proposes that the Commission undertake a limited review of the newly selected plan in three years, with another complete review of the plan in five years, if necessary. Of course, the Commission can avoid any further reviews of PCI adjustments by simply adopting U S WEST's Capped Index Plan approach.

VII. CONCLUSION

The Commission has the opportunity to avoid future debates, conserve valuable resources, and move to a much simpler form of market-based regulation by choosing to implement U S WEST's proposed Capped Index Plan. As demonstrated

herein, such a plan benefits all affected parties. The Commission should take this opportunity to move away from the current archaic and cumbersome form of price cap regulation toward a more simplified and efficient approach. The Capped Index Plan presents such an option, and U S WEST urges the Commission to adopt it forthwith.

Respectfully submitted,

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ATTACHMENT 1

TOTAL FACTOR PRODUCTIVITY METHODS FOR LOCAL EXCHANGE CARRIER PRICE CAP PLANS

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Philip E. Schoech
Mark E. Meitzen

December 18, 1995

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EXECUTIVE SUMMARY

TOTAL FACTOR PRODUCTIVITY METHODS FOR LOCAL EXCHANGE CARRIER PRICE CAP PLANS

Laurits R. Christensen, Philip E. Schoech
and Mark E. Meitzen
Christensen Associates
December 18, 1995

In its Fourth Further Notice of Proposed Rulemaking,[1] the FCC has raised a number of questions regarding the appropriate methods for measuring local exchange carrier total factor productivity (LEC TFP). In particular, various questions have been posed by the FCC regarding the TFP study we submitted in May of 1994 and updated in January of 1995.[2] In this paper, we respond to the issues directly relevant to the Christensen TFP methods.

In particular, the FCC has stated a concern that some of the data used in our TFP study are not accessible and verifiable. Because of this concern, we have developed a simplified method of TFP measurement based solely on publicly-available data. We have also simplified some of the computations, while continuing to apply standard practices in TFP

[1] Federal Communications Commission, Fourth Further Notice of Proposed Rulemaking, FCC 95-406, September 27, 1995.
[2] Laurits R. Christensen, Philip E. Schoech, and Mark E. Meitzen, "Productivity of the Local Operating Telephone Companies Subject to Price Cap Regulation," Christensen Associates, May 3, 1994, and "Productivity of the Local Operating Telephone Operating Companies Subject to Price Cap Regulation, 1993 Update," Christensen Associates, January 10, 1995. We refer to these collectively as our original study.

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measurement. We believe that the simplified TFP method maintains accuracy and addresses concerns about verifiability.

Overview of Simplified TFP Method

The simplified TFP method is consistent with accepted productivity measurement practices and provides an accurate measure of productivity trends for LECs. It is based entirely on publicly-available data and contains other modifications to address concerns raised by the FCC. This allows the simplified model to be updated and verified in a straightforward manner. The simplified approach forms the basis of the "TFP Review Plan," submitted with the United States Telephone Association's comments in this proceeding.

We now summarize the differences between the methods and data sources in our original study and the methods and data sources in the simplified TFP study:

Output. The only way in which the measurement of output in the simplified model differs from the measurement of output in the original study is that the quantity of long distance service and the quantity of intrastate access service are derived by dividing booked revenue (as opposed to billed revenue), reported in the Form M (ARMIS 43-02), by the price indexes for long distance and intrastate access service.

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Capital. There are five differences between the simplified model and the original TFP study regarding the measurement of capital. First, the simplified study uses the U.S. economy cost of capital implicit in the U.S. National Income and Product Accounts as the cost of capital in the rental price equation, instead of Moody's average yield on public utility bonds. Second, the simplified TFP method uses investment price indexes published by the U.S. Bureau of Economic Analysis instead of Telephone Plant Indexes. Third, the simplified TFP method employs beginning-of-year 1988 book values of gross plant, reported in the Form M, in the derivation of the capital benchmarks, instead of end-of-year 1984 current-cost of gross plant. Fourth, the simplified TFP method uses three-year moving averages of the cost of capital and capital gains in the rental price equation. Fifth, since some of the asset classes have the same BEA price indexes and depreciation rates, it is possible to simplify the computational procedures by consolidating those accounts. This consolidation does not affect the computed value of capital input. Buildings and cable and wire are consolidated into structures. Switching, transmission, and information origination/termination equipment are consolidated into communications equipment. General support equipment is not affected by this consolidation.