Without further delay, therefore, the Commission should adopt the per-line formula.[29]

Finally, the Commission has raised the question whether the use of a TFP methodology to calculate the X-Factor might eliminate the need for a separate common line formula. See Fourth Further Notice, ¶¶ 133-35 (Issue 6a). With respect to this issue, calculation of an X-Factor based on a TFP methodology would not differ in any relevant sense from the current system.[30] There is no sound basis for the Commission to abandon a separate common line formula depending on the method it adopts to measure the LECs' X-Factor. Adoption of the per-line formula, however, is essential to the proper functioning of the LEC price cap plan. Otherwise, the carrier common line rates will continue to send erroneous economic signals to both the LECs and the interexchange carriers (IXCs). These signals would distort the incentives in the LEC price cap plan: In effect, the LECs would continue to be rewarded for gains that are, in fact, attributable to the efforts of the IXCs. Therefore, regardless of which X-Factor methodology the Commission adopts, a separate formula should be maintained

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[29] Despite its conclusions that the per-line formula was superior to the "Balanced 50/50" formula, the Commission did not adopt the per-line formula for the interim plan. First Report and Order, 10 FCC Rcd. at 9079-80 (¶ 271). As AT&T has demonstrated, the Commission has not offered any defensible justification for deferring its decision to adopt the per-line formula. See AT&T's Petition for Limited Reconsideration or, in the Alternative, Clarification, CC Docket No. 94-1, pp. 10-13 (filed May 19, 1995).

[30] See, e.g., LEC Price Cap Order, 5 FCC Rcd. at 6798 (¶ 95).

for the common line basket, and this formula should be determined on a per-line basis.[31]

IV. THE COMMISSION SHOULD NOT CHANGE ITS EXISTING RULES GOVERNING EXOGENOUS COST ADJUSTMENTS.

The Commission also seeks comment on whether it should make adjustments to the rules governing treatment of exogenous costs. Fourth Further Notice, ¶¶ 138-41. No changes in the present exogenous cost rules, as modified in the First Report and Order, are required for the long term plan.

The Commission should maintain the course it set in the LEC Price Cap Performance Review proceeding. See First Report and Order, 10 FCC Rcd. at 9089-9100 (¶¶ 292-320). There, the Commission amended the rules to permit exogenous cost adjustments for changes in accounting rules (changes in Uniform System of Accounts requirements) only when such changes impact the LECs' "economic costs". Id. at 9090-92 (¶¶ 293-299). As the Commission explained, exogenous cost treatment should be limited

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[31] Also, the current mechanism for calculating the carrier common line (CCL) charge contains an anomaly that should be rectified by the Commission. Under the existing rules, changes in interstate loop costs can result in opposite changes to the CCL charge. For example, if a LEC's interstate cost per loop is less than the $6 cap on multiline business subscriber line charges (SLCs), the multiline SLC is set at the interstate cost per loop. Any reduction in the cost per loop will thus cause the multiline SLC to decrease by the same amount, which then permits an offsetting increase in the CCL charge under the price cap system. The Commission should prevent any such unintended increases in the CCL charge by modifying the common line formula to remove this anomaly.

to "economic cost changes caused by administrative, legislative, and judicial requirements beyond the control of the carriers that are not reflected in the GNP-PI." Id., at 9090 (¶ 293). The Commission observed that it will only treat an accounting change as exogenous if it "affects cash flow." Id. at 9090 (¶ 294). That is, "[w]ithout a cash flow impact, carriers will not be able to raise PCIs to recognize an accounting change." Id. The Commission thus noted that, under its new standard, "most accounting changes will not have an economic cost associated with them." Id. at 9095 (¶ 306).

The Commission found that narrowing the test for allowing exogenous cost adjustments will improve the efficiency standards of the LEC price cap plan. Accordingly, regardless of which methodology for determining the X-Factor the Commission adopts in this rulemaking proceeding, the Commission should adhere to the exogenous cost approach established in the First Report and Order. The Commission clearly intended in its First Report and Order to restrict further the availability of exogenous cost treatment under the LEC price cap plan, particularly eliminating exogenous cost treatment for accounting changes, most of which do "not have an economic cost associated with them." Id. at 9095 (¶ 306).

Therefore, because most accounting changes are treated as endogenous under the Commission's newly adopted standard,

maintaining the current system should not be unduly burdensome to the Commission. Moreover, the Commission should maintain the flexibility that the current system permits. In the First Report and Order, the Commission established a set of procedures under which interested parties can make a showing regarding whether exogenous treatment for a given change is appropriate. Id. at 9097-9100 (¶¶ 312-18). These procedures adequately protect all parties by giving them the an opportunity to show, on an individual case-by-case basis, that a given change should be allowed exogenous cost treatment. Those procedures should also be continued.

V. THE COMMISSION SHOULD CONDUCT ANNUAL PERFORMANCE REVIEWS, WITH MORE INTENSIVE PERFORMANCE REVIEWS SCHEDULED EVERY THREE YEARS.

Finally, the Commission seeks comment on whether it would be "desirable to schedule a LEC price cap performance review, and if so, when?" Fourth Further Notice, ¶ 142 (Issue 8).

Regardless of whether the Commission adopts a moving average calculation of the X-Factor (which it should not), the Commission should conduct a performance review annually, with more intensive performance reviews taking place every three years. As the Commission itself suggests, such a proceeding would be warranted to examine how well incentive regulation is working in light of developments in the telecommunications

industry.[32] See Fourth Further Notice, ¶ 142. The technological and economic environment in the telecommunications industry is now going through rapid change, and therefore modifications of LEC incentive regulation will inevitably be required on an ongoing basis. Moreover, the Commission should be particularly sensitive to the effects on the LECs' quality of service associated with price cap regulation, and it would be desirable to schedule consideration of such service quality effects on an annual basis as part of the LEC performance review.

An intensive LEC performance review, to be held every three years, should be coordinated with the Commission's requirements for adjusting the LECs' X-Factor measurement. Each such performance review should begin a year before the LECs' annual tariff filings. Thus, the next intensive LEC performance review should occur in 1998, so that changes adopted in that proceeding could take effect for the July 1999 tariff year.

The Commission also seeks comment on whether any aspects of the price cap system should be included or excluded from consideration in the next performance review. Fourth Further Notice, ¶ 143. The Commission should not unnecessarily

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[32] Indeed, even if the Commission were to adopt a moving average X-Factor, the Commission should conduct a performance review in 1998 to assess how well the moving average approach is working, as well as to examine other aspects of the price cap system (as the Commission suggests, Fourth Further Notice, ¶ 142).

tie its hands. Because of the complexity of the LEC price cap scheme of regulation and because of the unpredictability of the changing economic conditions affecting the industry, it is impossible at this time to identify all the other issues that should necessarily be included in the next LEC performance review. The Commission should retain the flexibility to make the appropriate changes as the need arises.

CONCLUSION

For the reasons stated in these Comments and in the Appendices attached hereto, the Commission should adopt the recommendations of AT&T set forth herein with respect to the long-term structure of the LECs' price cap plan. Specifically, AT&T recommends that (1) the procedures used to measure the productivity offset (X-Factor) in the LEC price cap formula should be based on publicly available, verifiable and auditable data and well-documented methodologies; (2) the measurement of the LECs' X-Factor for their interstate access services should follow the procedures of the Performance-Based Model to determine the applicable total factor productivity (TFP) and the input price differential; (3) the measurement of the X-Factor should be based on interstate data only; (4) a Consumer Productivity Dividend of 0.5 percent should continue to be reflected in the X-Factor measurement; (5) the LECs should have two X-Factor options, which are determined to be 7.8 percent and 8.8 percent under current conditions; (6) the lower X-Factor option would

continue to be subject to the sharing mechanism according to the presently existing sharing reuqirements and rate-of-return ranges, and the higher X-Factor option would not be subject to sharing; (7) the low-end adjustment mechanism should be eliminated; (8) the existing "Balanced 50/50" common line formula should be replaced with a per-line formula; (9) the treatment of exogenous costs in the LEC price cap plan should be limited to economic cost changes and other requirements, as adopted in the Commission's First Report and Order in this docket; and (10) a LEC price performance review should be scheduled annually, with a more extensive and intensive review scheduled to take place every three years.

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January 11, 1996

CERTIFICATE OF SERVICE

I, Ann Marie Abrahamson, do hereby certify that on this 11thday of January, 1996, a copy of the foregoing "Comments of AT&T," together with attached Appendices, were mailed by U.S. First class mail, postage prepaid, to the parties listed on the attached Service List.

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APPENDIX A

Statement of Dr. John R. Norsworthy

ANALYSIS OF TFP METHODS FOR MEASURING THE X-FACTOR OF THE LOCAL EXCHANGE CARRIERS' INTERSTATE ACCESS SERVICES

In the performance review of the Local Exchange Carriers (LECs) in the Commission's CC Docket No. 94-1 proceeding, the United States Telephone Association (USTA) presented a model of total factor productivity (TFP) proposing to measure the X-Factor for use in the LECs' price cap regulation. This Statement presents, first, comments on the appropriateness for that purpose of USTA's TFP model and its related analysis put forward by Christensen Associates (Christensen, Schoech, and Meitzen, 1994). Second, this Statement describes a more appropriate TFP model, developed in conjunction with AT&T Corp., known as the "Performance-Based Model," that more accurately measures the X-Factor for the interstate access services of the LECs.

I. CRITIQUE OF THE USTA TFP MODEL AND ITS OMISSION OF THE INPUT PRICE DIFFERENTIAL

In the first part of this Statement, I appraise the USTA model with reference to the economic theory of production and its applications to the measurement of the productivity of regulated enterprises. My objective is to identify its departures from the best practice

standards that have evolved in recent years, and to assess, where possible, the effects of the deficiencies in the USTA model as they may affect the incentives facing the LECs and the interstate access charges permitted under the LEC price cap regulation. Concerning one of the most important matters at issue in the appraisal of the LEC price cap formula -- the input price differential -- USTA has offered an analysis by Christensen, Schoech, and Meitzen (Christensen Study), as well as one by National Economic Research Associates (NERA). The analyses of both of these parties are also addressed in this statement.

My assessment of the USTA TFP model and its associated X-Factor measurement covers six main topics:

(1) The USTA model's use of proprietary data, not made publicly available, in the computation of TFP.

(2) The USTA model's omission of the input price differential to adjust for the difference between prices paid for capital, labor and other inputs by the LECs and in the private non-farm business sector of the U.S. economy.

(3) The failure of the USTA model to separate productivity in interstate access services from productivity in other parts of the LECs' regulated businesses.

(4) The USTA model's use of an out-dated framework for measuring and analyzing the capital input employed by the LECs, including its treatments of depreciation, the return to capital, and the financial structure of the LECs.

(5) USTA's use of revenue weights, rather than marginal cost weights, to compute the aggregate output used in the TFP measurement.

(6) Its neglect of quality of service, and the consequent incentive under the LECs' price cap plan to reduce service quality in favor of higher productivity and profitability.

In assessing the effects of some of the defects in the USTA model, I sometimes report their quantitative impacts from estimates based on the TFP model developed in conjunction with AT&T, referred to herein as the "Performance-Based Model" or the "AT&T model". That model is discussed more extensively in Part II of this Statement.

1. The USTA Model Relies Heavily on Non-Public Proprietary Data.

Measurement of TFP for the LECs requires a rather large array of data, although the total volume of such data is much less than is reported annually to the FCC by each LEC. Most of the required data are available from the Automated Reporting Management Information System (ARMIS). TFP measurement requires data describing the prices and quantities of outputs and inputs by year for each Regional Bell Operating Company (RBOC) or LEC that will be measured. The chief flaws in the USTA approach are that (a) proprietary data withheld from the public play a crucial role in the model's capital stock estimates, (b) often the USTA model does not use the best data that are available, and (c) some of the proprietary data have been subject to substantial and unexplained revision.[1] In certain instances, USTA's data sources and methods underlying the intitial estimates, as well as its subsequent revisions, were unavailable to the Commission and interested parties for inspection and audit during the current comment period.

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1 At para. 42 of the Fourth Further Notice, the Commission seeks comment on the reliability of the method and data used in the Christensen Study to compute replacement values for capital. The Commission notes that one ex parte statement revised the NYNEX's replacement costs downward by $13.5 Billion. It is further noted that USTA's response to the Common Carrier Bureau's 1/18/95 request showed that such reductions resulted in a reduced rate of productivity growth as measured by TFP.

USTA's measurement of capital input is a major concern that arises from appraisal of its model. Inaccuracies in the capital input measure distort the rate of return, depreciation, the growth of TFP, and the input price differential. In short, such inaccuracies would bias the whole spectrum of performance indicators that enter the LECs' price cap index. In the USTA model, publicly reported data from the LECs are combined with important "proprietary" data to arrive at the measure of **real capital input** by using the **perpetual inventory method**. The historical **asset prices**, or acquisition prices of the various types of telephone plant and equipment are required to build the capital stock estimates. In broad terms, the procedure is to obtain **investment expenditure** series for each of several main categories of capital goods expressed in historical (or accounting) dollars. These expenditure series must then be adjusted for changes in their prices – that is, converted **into constant dollars as of a reference or "base" year** – to create ***real* investment** series by year. The real investment data are combined through the perpetual inventory method to estimate the real capital stock. This procedure starts from a **benchmark level** of the capital stock at the beginning of the base year; for each year, the **depreciation** on the stock is removed from the stock, and the **real investment** for that year is added. The result is a **net capital stock** series that is adjusted for depreciation and for changes in the purchase price of that type of asset.

The data requirements to carry out USTA's procedure are the investment expenditures, asset prices, depreciation rates, and the benchmark values of the capital stock. Investment expenditures by class are reported currently in ARMIS and earlier in Form M.[2] The

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[2] This reporting has been spotty for some LECs in some years.

benchmark value of the stock can be obtained from the same source. This benchmark must then be adjusted to a current value basis from a historical accumulated value basis. Asset prices used in the USTA calculation of TFP are applied by each LEC for each of several categories of assets, with the resulting capital stock measures supplied to USTA's consultants, Christensen Associates. When the capital stock data are combined into an overall measure, Christensen Associates do not know whether the procedures have been accurately applied by the LECs. Further, they do not have the data that entered the calculations made by the LECs, and so they cannot verify their reasonableness. These practices have led to anomalies in the results that are quite apparent and that are still unresolved.[3] Consequently, the crucial capital stock inputs and the inferences from them are based on data and compilation procedures that are not revealed or available to the public, the FCC, or other interested parties. Neither the data nor the compilation procedures can be audited even though their results give rise to serious questions that are material to the determination of the TFP, the input price differential and other measures in the price cap formula.

However, there are publicly available data that could be applied in the computation of capital stocks for the LECs. The U.S. Bureau of Economic Analysis, the federal agency that compiles the national income and product accounts, and reports the quarterly GDP, maintains asset price series for several types of capital that are quite close to the asset classes reported in historical dollars to the FCC in the ARMIS 4308 report. These series include (1) Office, Computing and Accounting Machinery; (2) Communication Equipment; (3) Electrical

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3 These problems in the Christensen procedures were brought out in the cross-examination of L.R. Christensen in hearings before the California Public Utilities Commission in September 1995.

Transmission, Distribution and Industrial Apparatus; and (4) telecommunications buildings.[4] If the data on which the LEC asset prices cannot be revealed, these data from the Bureau of Economic Analysis provide an alternative that could be supplemented by the LECs in cases where an individual company's experience can be shown to differ materially from the national data. The burden of demonstrating the inapplicability of the national data would then be shifted to the LECs. If the LECs fail to meet this burden, the national data would provide a workable alternative based on publicly available data for computing capital input.

2. The USTA Model Omits the Input Price Differential.

a. The input price differential is not zero

It has been asserted by Christensen and NERA on behalf of USTA that the input price differential, measured by Bush and Uretsky of the FCC Staff at 2.2 percent, is not significantly different from zero and that therefore the input price differential in the LECs' price cap formula should be taken as equal to zero. This assertion is not in fact an answer to the inquiry by the FCC in connection with price cap regulation of the LECs. The relevant question is: "How did movements in LEC input prices differ from input prices in the national economy?" The answer to this question is a quantitative estimate of the input price differential, which is obtained by measuring it directly.

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[4] These series seem to show more rapid decline than the series used in the USTA capital stock calculations.

This has been done by Bush and Uretsky[5] for the FCC. They analyzed the data supplied by Christensen[6], and used them to infer the input price differential. These data report input prices for telephone companies and for the U.S. economy, and cover the period 1949-1992. Using these price data, Bush and Uretsky conclude that the average annual input price differential for 1985-92 period is 2.2 percent.[7] They apply econometric methods to compare longer term movements in telephone and economy-wide input prices. They find that there are significant differences between movements of telephone input prices before and after divestiture, and that post-divestiture prices should be the basis of price cap regulation of the LECs. Their results using the same data are shown in Table 1 as annual averages for each time period 1949-92, 1949-84, and 1985-92.

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5 Bush, C. Anthony and Mark Uretsky, "Input Prices and Total Factor Productivity," Appendix F in *In the Matter of Price Cap Performance Review for Local Exchange Carriers*, CC Docket No. 94-1, First Report and Order, released April 7, 1995. A list of all references set forth in this Statement (Appendix A) and in the other Statement (Appendix B) is attached hereto as Attachment 1 to Appendix A.

6 USTA Ex Parte Filing to the FCC in CC Docket No. 94-1 dated February 1, 1995, Christensen Affidavit. The data, as shown in the Bush and Uretsky paper, are reporduced here in Table 1.

7 Bush and Uretsky, op. cit. at p. 10.

Table 1

Comparison of Price Movements in LEC and US Input Prices			
	LECs	**US**	**Difference**
Average Annual Change: 1949-92	**4.70**	**4.75**	**0.05**
CHI-SQ: Pr(LEC=US) 1949-92	0.0000000001		
Standard Deviation: 1949-92	4.44	2.64	4.02
Average Annual Change: 1949-84	**5.36**	**4.93**	**-0.43**
CHI-SQ: Pr(LEC=US) 1949-84	0.0000119396		
Standard Deviation: 1949-84	4.12	1.49	2.88
Average Annual Change: 1985-92	1.73	3.95	2.23
CHI-SQ: Pr(LEC=US) 1985-92	0.0000000091		
Standard Deviation: 1985-92	4.89	0.70	4.85
Confidence Interval for differential: 95%		-7.28	11.78
Source: Computed from data in Table 2.			

The argument put forth by USTA seeks to divert attention from this straightforward determination shown above. NERA, on behalf of USTA, poses a somewhat different question: "Have LEC input prices changed differently from the national economy input prices?" The answer to this question is not a number; it is a yes-or-no reply, in the manner of academic discourse. When actually addressing the question, NERA and USTA alter it further, asking a *statistical* question: "Can we reject the hypothesis that *input price movements are the same* for LECs and for the national economy?" That is, *if we assume* that LEC input prices and US economy-wide input prices move in the same way, *and if we assume* that the annual price movements in each series are random samples taken independently of each other and independently in time, is there statistical evidence that forces us to conclude that the two sets of

price changes move differently? By asking and answering the question in this way, NERA and USTA create a bias in a direction that most favors the LECs -- a bias toward *accepting the assumption* that there is no difference between the movements of the two series of input prices.

The correct way to assess whether the two series are the same is to compare them directly. When USTA proposes using the movements in the US input price index to represent or be equivalent to movements in the LEC input price index, *it is proposing that the series are the same*. USTA's proposition is *not* the same as saying that there is no significant difference between the movements of the series. A chi-squared test compares the two series (of price changes in this case) and gives the probability that the series are the same. The results of the chi-squared test are shown in Table 1 above for the three time periods examined by Bush and Uretsky. For each time period, the probability that the two series are the same is extremely small. **I therefore conclude, in agreement with Bush and Uretsky, that it is inappropriate to use the US input price index to represent movements in the LEC input price index, i.e. to assume that the movements are the same.**

In order to understand the fallacies in the USTA reasoning and its conclusion, I have reproduced a similar hypothesis test based on the 1985-1992 period, the latest that Bush and Uretsky examined. Table 1 shows the standard deviations for the differences between the series for each time period. The standard deviation is a measure of the sampling error for a set of observations that are assumed to come from the same distribution. For 1985-1992, the average annual change in LEC input prices was 1.725 percent, and for US input prices, 3.95 percent,

giving a difference of 2.23 percent per year. The standard deviation of this difference is computed to be 4.85 percent. (As shown in Table 2 below, the unusual difference in 1990 accounts for a large part of the standard deviation for the 1985-92 period.)

Table 2

Telephone Company Input Prices and National Input Prices, 1949-1992			
Year	**Telephone**	**US**	**Difference: US - Tel**
1949	3.2	-1.0	-4.2
1950	5.1	6.3	1.2
1951	8.8	7.9	-0.9
1952	8.6	1.2	-7.4
1953	2.4	3.7	1.3
1954	1.9	0.6	-1.3
1955	5.4	6.6	1.2
1956	1.7	0.7	-1.0
1957	-1.1	3.7	4.8
1958	3.3	0.5	-2.8
1959	5.4	7.0	1.6
1960	4.2	-0.6	-4.8
1951	3.9	3.6	-0.3
1963	2.2	4.4	2.2
1963	1.0	3.8	2.8
1964	6.0	4.5	-1.5
1965	0.5	5.7	5.2
1966	1.1	4.6	3.5
1967	1.9	2.0	0.1
1968	4.2	4.4	0.2
1969	2.1	3.7	1.6
1970	3.8	3.3	-0.5
1971	4.2	6.8	2.6
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