

Before the
 FEDERAL COMMUNICATIONS COMMISSION
 Washington, D.C. 20554

In the Matter of)	
)	
Price Cap Performance Review for Local Exchange Carriers)	CC Docket No. 94-1
)	
Access Charge Reform)	CC Docket No. 96-262
)	

FOURTH REPORT AND ORDER IN CC DOCKET NO. 94-1 AND
 SECOND REPORT AND ORDER IN CC DOCKET NO. 96-262

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By the Commission: Commissioners Quello, Ness, and Chong issuing separate statements.

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I. INTRODUCTION

1. In this Order, we make significant revisions to our current price cap plan for regulating incumbent local exchange carriers (incumbent LECs) as part of our plan to construct a dynamic regulatory framework to further the new pro-competitive, deregulatory paradigm set out in the Telecommunications Act of 1996 (1996 Act).¹ In conjunction with the Access Reform First Report and Order² and the Universal Service Order,³ this Order adopts reforms needed to set the stage for the progressive deregulation of incumbent LECs with the development of competition. We adopt a reasonable, challenging price cap plan that effectively requires price cap LECs to reduce inflation-adjusted prices for interstate access services by approximately 6.5 percent annually. This new price cap reflects a more reliable productivity estimate than in past Orders, one that is based on a careful analysis of the rate of growth of incumbent LEC total factor productivity (TFP) and the rate of change of LEC input prices. We also eliminate the sharing requirements of the current rules, which substantially undercut the efficiency incentives of price cap regulation and retained some of the cost-misallocation incentives inherent in rate-of-return regulation. These forward-looking reforms to our price cap plan for incumbent LECs will allow services to be more readily removed from price regulation as warranted by the development of a competitive marketplace.

II. BACKGROUND AND OVERVIEW

A. Background

¹ Telecommunications Act of 1996, Pub.L.No. 104-104, 110 Stat. 56 (1996) to be codified at 47 U.S.C. §§ 151 et seq.) For clarity, we refer to provisions of the 1996 Act using the sections at which they will be codified.

² Access Charge Reform, First Report and Order, CC Docket No. 96-262, FCC 97-158 (rel. May 16, 1997) (Access Reform First Report and Order).

³ Federal-State Board on Universal Service, First Report and Order, CC Docket No. 96-45, FCC 97-157 (rel. May 8, 1997) (Universal Service Order).

2. Price cap regulation seeks to replicate the beneficial incentives of competition in the provision of interstate access services,⁴ while striking a reasonable balance between the interests of ratepayers and stockholders. Price cap regulation is intended to encourage growth in productivity by permitting incumbent LECs that increase their productivity to earn higher profits,⁵ while at the same time ensuring that interstate access customers share in the benefits of productivity growth in the form of lower rates.⁶ The price cap formula was designed to ensure that "[b]oth carriers and customers will be better off" under price cap regulation.⁷

3. The Commission adopted LEC price cap regulation in 1990 because it found that rate-of-return regulation did not create adequate efficiency incentives for incumbent LECs, and required administratively burdensome cost allocation rules to enforce.⁸ Rather than adjusting prices to allow LECs the opportunity to earn a pre-determined return on interstate investment, price cap regulation directly regulates prices and allows earnings to vary. Under price cap regulation, the ceiling or maximum price a LEC can charge for interstate access services is adjusted annually by a measure of inflation minus an "X-Factor." A separate adjustment is made for "exogenous" cost changes, which are changes outside the carrier's control and not otherwise reflected in the price cap formula.⁹

⁴ Price Cap Performance Review for Local Exchange Carriers, CC Docket No. 94-1, First Report and Order, 10 FCC Rcd 8961, 9001-03 (paras. 90-96) (1995) (LEC Price Cap Performance Review), aff'd sub. nom. Bell Atlantic Telephone Companies v. FCC, 79 F.3d 1195 (D.C. Cir., 1996) (Bell Atlantic v. FCC).

⁵ Policy and Rules Concerning Rates for Dominant Carriers, CC Docket No. 87-313, 5 FCC Rcd 6786, 6789 (para. 22) (1990) (LEC Price Cap Order), Erratum, 5 FCC Rcd 7664 (Com. Car. Bur. 1990), modified on recon., 6 FCC Rcd 2637 (1991) (LEC Price Cap Reconsideration Order); aff'd sub nom. National Rural Telecom Ass'n v. FCC, 988 F.2d 174 (D.C. Cir. 1993).

⁶ LEC Price Cap Order, 5 FCC Rcd at 6790 (para. 30).

⁷ LEC Price Cap Order, 5 FCC Rcd at 6790 (para. 30).

⁸ LEC Price Cap Order, 5 FCC Rcd at 6789-91 (paras. 21-37).

⁹ LEC Price Cap Order, 5 FCC Rcd at 6792 (paras. 47-48). For a complete summary of the original price cap plan, see LEC Price Cap Order, 5 FCC Rcd at 6787-89 (paras. 5-20).

4. In the 1990 LEC Price Cap Order, the Commission scheduled a review of the performance of the price cap plan, to begin in 1994, to determine whether any revisions or modifications to the plan would be necessary.¹⁰ In the first phase of that performance review, completed in 1995,¹¹ we made several revisions to the price cap plan.¹² We also concluded, however, that we required a more complete record to resolve several important issues, including how the X-Factor should be calculated in the future,¹³ and whether it would be possible to develop a price cap plan that did not impose sharing obligations.¹⁴ Accordingly, we adopted an "interim plan" in the LEC Price Cap Performance Review and sought comment on additional issues in the Price Cap Fourth Further Notice.¹⁵

5. In that Notice, we sought comment on methods for developing an X-Factor, the appropriate number of X-Factor options, and whether we should re prescribe the X-Factor periodically or adopt a method for recalculating the X-Factor annually. We requested comment on sharing, the price cap common line formula, and our exogenous cost rules. We tentatively concluded that the X-Factor should have three characteristics. First, it should provide a reliable measure of the extent to which changes in LECs' unit costs have been less than the change in level of inflation.¹⁶ Second, it should pass through ongoing unit cost

¹⁰ LEC Price Cap Order, 5 FCC Rcd at 6834-35 (paras. 385-94).

¹¹ LEC Price Cap Performance Review), 10 FCC Rcd 8961.

¹² For a summary of those revisions to the price cap plan, see LEC Price Cap Performance Review, 10 FCC Rcd at 8970-73 (paras. 19-26).

¹³ See LEC Price Cap Performance Review, 10 FCC Rcd at 8967-69 (paras. 9-13).

¹⁴ See LEC Price Cap Performance Review, 10 FCC Rcd at 8969 (paras. 15-16).

¹⁵ LEC Price Cap Performance Review, 10 FCC Rcd at 8967 (para. 7), 8968 (para. 14); Price Cap Performance Review for Local Exchange Carriers, Fourth Further Notice of Proposed Rulemaking, CC Docket No. 94-1, 10 FCC Rcd 13659 (1995) Price Cap Fourth Further Notice).

¹⁶ In the LEC Price Cap Performance Review, we explained that changes in a firm's unit costs come from two sources: (1) changes in productivity, and (2) changes in input prices. LEC Price Cap Performance Review, 10 FCC Rcd at 9033 (para. 160). See also Price Cap Fourth Further Notice, 10 FCC Rcd at 13668 (para. 54).

reductions to consumers. Finally, the calculation of the X-Factor should be relatively simple and based on publicly available data.¹⁷

6. In the Access Reform Notice,¹⁸ we invited further comment on whether and how we should revise our LEC price cap plan as part of access reform. We sought comment, inter alia, on whether we should adopt a higher X-Factor based on the record developed in response to the Price Cap Fourth Further Notice or on similar, more recent economic studies.¹⁹

B. Overview of Revised Price Cap Plan

7. In this Order, we make significant changes to our interim price cap plan and adopt the revised plan as our permanent price cap regulatory regime for incumbent LECs. Incumbent LECs have distributed their interstate services among four groups of access services, called baskets.²⁰ A price cap index (PCI) limits the weighted average of rate increases for each basket to the rate of inflation minus an "X-Factor."

8. In the original and the interim price cap plans, the baseline X-Factor was based on the average of the short-term and long-term trends in rate reductions prior to our adoption of the original price cap plan in 1990, plus a consumer productivity dividend (CPD) of 0.5 percent. We selected the X-Factor and the CPD so that, at minimum, rates would decline more quickly than they had declined before 1990, and thus would ensure that the first benefits of price cap regulation would flow to access customers in the form of lower rates. In the LEC Price Cap Performance Review, we tentatively concluded that an analysis that directly measured the growth of LEC productivity and input prices

¹⁷ Price Cap Fourth Further Notice, 10 FCC Rcd at 13662 (para. 16).

¹⁸ Access Charge Reform, Notice of Proposed Rulemaking, CC Docket No. 96-262, Price Cap Performance Review for Local Exchange Carriers, Third Report and Order, CC Docket No. 94-1, FCC 96-488 (rel. Dec. 24, 1996) (Access Reform Notice).

¹⁹ Access Reform Notice at paras. 231-35.

²⁰ Our companion Access Reform First Report and Order has added a new price cap basket for recovery of marketing expenses. Access Reform First Report and Order at paras. 317-25.

would provide a better basis for prescribing an X-Factor.²¹ In the Price Cap Fourth Further Notice, we invited comment on the total factor productivity (TFP) methodology and other alternatives for calculating the X-Factor. We also tentatively concluded that we should base our X-Factor on a TFP-based measure of productivity and an input price differential.²² We find below that the record supports prescribing a single X-Factor of 6.5 percent, based on our conclusions regarding a reasonable method of calculating LEC TFP and input prices, our findings regarding the input price differential, and our decision to retain the 0.5 percent CPD.

9. In its simplest form, total factor productivity is the ratio of a firm's (or industry's, or nation's) total output to its total input.²³ A firm can become more productive by producing greater output from the current level of inputs, by producing the same level of output from fewer inputs, or through a combination of both. In TFP calculations, output and input are represented by indices. The output index represents the quantities of goods or services produced, and the input index represents the quantities of capital, labor, and materials used in the production of those goods and services. TFP studies most often develop output and input price indices to adjust output and input quantities for the effects of inflation. The development of composite quantity and price indices, and the weighting of these indices in TFP calculations, raise important issues that we decide in Section III.C. of this Order. In addition to these TFP calculation issues, we also resolve issues about whether to adjust the X-Factor for the difference between LEC input prices and input prices for the national economy (an "input price differential"), and about whether to adjust for any difference between interstate and intrastate productivity growth.

10. Our interim price cap plan permits LECs to choose among three X-Factors, two of which include obligations to share certain earnings. Sharing requires incumbent LECs to "share" half or all earnings above specified rates of return with their access customers by lowering the maximum prices LECs may charge during the next year.

²¹ LEC Price Cap Performance Review, 10 FCC Rcd at 9031-32 (para. 157).

²² See Price Cap Fourth Further Notice, 10 FCC Rcd at 13664 (para. 25). See also LEC Price Cap Performance Review, 10 FCC Rcd at 9031 (para. 155). Price Cap Fourth Further Notice, 10 FCC Rcd at 13668 (paras. 54-55).

²³ LEC Price Cap Performance Review, 10 FCC Rcd at 9008-09 (para. 106).

We tentatively concluded in the LEC Price Cap Performance Review that we should move to a system of pure price caps, without sharing, because we found that sharing tends to blunt the efficiency incentives that we sought to create with price cap regulation.²⁴ We retained sharing in our interim plan, however, because we found that it served three beneficial functions: a "flow-through" function, a "matching" function, and a "backstop" function.²⁵ In the Price Cap Fourth Further Notice, we proposed to eliminate sharing if we found a way to replace these three beneficial functions or if we found these functions no longer necessary to the operation of our price cap regulatory regime.²⁶ The "backstop" and "flow-through" functions were necessary in part because we were not certain that the productivity targets established by our X-Factors were sufficiently challenging.

11. We conclude that, under the price cap plan we adopt today, the beneficial aspects of these functions are outweighed by the benefits of eliminating sharing. As explained in detail below, we consider the X-Factor we adopt today to be based on a much more reliable estimate of incumbent LEC potential productivity gains. Therefore, we have substantially more confidence that this X-Factor will flow through a reasonable portion of LEC productivity gains to access customers. We also find that, because we establish a price cap plan with only one X-Factor, a matching mechanism is no longer necessary. To guard against our new X-Factor requiring individual LECs to charge unreasonably low rates, we will retain our current low-end adjustment mechanism.

12. In the Price Cap Fourth Further Notice, we sought comment on updating the X-Factor annually using a moving average of TFP, or

²⁴ LEC Price Cap Performance Review, 10 FCC Rcd at 9045-46, 9049 (paras. 187-89, 197).

²⁵ The "flow-through" function of sharing ensures that a reasonable portion of the productivity gains of incumbent LECs are flowed through to access customers. The "matching" function encourages incumbent LECs to select an X-Factor that most closely matches their reasonably expected productivity growth in a price cap plan with more than one X-Factor. The "backstop" function ensures that rates under price cap regulation do not become unreasonably high or low. LEC Price Cap Performance Review, 10 FCC Rcd at 9047-49 (paras. 191-96). See also Price Cap Fourth Further Notice, 10 FCC Rcd at 13676-77 (paras. 112-15). These three functions are discussed in more detail in Section IV. of this Order below.

²⁶ Price Cap Fourth Further Notice, 10 FCC Rcd at 13679 (para. 127).

periodically during performance reviews. We decide, in light of the fundamental changes to the marketplace resulting from the new competitive paradigm of the 1996 Act, that the better course is to select a new generally applicable X-Factor, based on the current record, that will remain in place until we change it in a new performance review.

13. We also sought comment on how to revise the common line PCI formula and the exogenous cost rules should we decide to adopt a TFP-based X-Factor. In our companion Access Reform First Report and Order, we are revising the PCI formula for the common line basket to reflect our revisions to common line recovery, and we therefore decline to discuss common line issues further here. We also conclude that our decision to adopt a fixed X-Factor precludes the revision of the exogenous cost rules that we contemplated in the Price Cap Fourth Further Notice.

C. Price Cap Regulation and Access Reform

14. The rules we adopt in this Order are an essential part of access reform. They are necessary to promote, and plan for, the growth of competition envisioned by the Telecommunications Act of 1996. An X-Factor based on TFP and an input price differential provides, with the Consumer Productivity Dividend, a reasonable, challenging target for LEC access prices. Importantly, eliminating the sharing requirement will increase the incentive of incumbent LECs to become more productive and will enable us to deregulate competitive services while noncompetitive services remain under regulation. In addition, eliminating the sharing requirement will remove the incentives that incumbent LECs now have to misallocate costs from services not subject to sharing, such as those no longer subject to price cap regulation, to services that are subject to sharing. A price cap plan without sharing should greatly facilitate our overarching goal of deregulating services that face sufficient competition by making it easier to remove from regulation those services subject to competition.

15. In the Access Reform Notice, we invited comment on increasing the X-Factor, either on the basis of the record submitted in response to the Price Cap Fourth Further Notice, or on more recent economic studies.²⁷ In response to the Access Reform Notice, a number of parties have argued that, in light of the 1996 Act, we should move

²⁷ Access Reform Notice at para. 233.

forward to reform our current price cap plan.²⁸ In this Order, we consider all the comments filed in response to both the Price Cap Fourth Further Notice and the Access Reform Notice pertaining to calculation of the X-Factor and other price cap structure issues.²⁹

III. X-FACTOR CALCULATION ISSUES

A. Background

16. Under price cap regulation, the weighted average of the prices for the services in a given price cap basket, or the actual price index (API), must be less than or equal to the price cap index (PCI). An incumbent LEC's PCIs are adjusted annually pursuant to formulae set forth in our rules.³⁰ The PCI formula consists of an inflation measure, in this case the Gross Domestic Product Price Index (GDP-PI),³¹ minus the X-Factor, plus or minus any permitted exogenous cost changes.

17. In the Price Cap Fourth Further Notice, we proposed to adopt a total factor productivity (TFP) method for deriving the productivity component of the X-Factor, as advocated by USTA, but also sought comment on several other possible X-Factor calculation methods and invited parties to propose additional methods. For instance, we sought comment on AT&T's Historical Revenue Method, which would

²⁸ See, e.g., PacTel 1997 Comments at 41-42; Aliant 1997 Comments at 8; SNET 1997 Reply at 23-24; BA/NYNEX 1997 Reply at 32-33; CPI 1997 Comments at 23-25 (favoring new X-Factor). See also, e.g., USTA 1997 Comments at 18; BA/NYNEX 1997 Comments at 60; PacTel 1997 Comments at 43; GTE 1997 Comments at 56 (favoring elimination of sharing).

²⁹ In Appendix A of this Order, we list all the pleadings filed in response to the Price Cap Fourth Further Notice in 1996. For purposes of this Order, we refer to these pleadings as "Comment" or "Reply." In Appendix A of our companion Access Reform First Report and Order, we list all the pleadings filed in response to the Access Reform Notice in 1997. For purposes of this Order, we refer to these pleadings as "1997 Comment" or "1997 Reply."

³⁰ See Section 61.45(b) of the Commission's Rules, 47 C.F.R. § 61.45(b).

³¹ In the LEC Price Cap Performance Review, we adopted GDP-PI as the inflation measure, in place of the Gross National Product Price Index (GNP-PI) used in the original price cap plan. LEC Price Cap Performance Review, 10 FCC Rcd at 9116 (para. 351).

explicitly set the X-Factor to produce an industry-average rate of return of 11.25 percent.³² In addition, we considered the Historical Price Method, which would set the X-Factor based on updated versions of the two studies relied upon in the LEC Price Cap Order. The first, the Spavins-Lande study, compared prices for LEC services to price levels for the U.S. national economy between 1929 and 1989; the second, the Frentrup-Uretsky study, examined the trend in LEC prices for switched access between 1984 and 1990.³³ Additionally, we sought comment on combining elements of the Historical Revenue Method and the Historical Price Method, or retaining the interim price cap plan on a long-term basis.

18. In the next section of this Order, we find that the record provides compelling evidence in favor of adopting the TFP methodology. In Section III.C., we address the issues raised by TFP calculations. In Section III.D., we consider X-Factor calculation issues other than those raised by use of TFP, such as the input price differential. Finally, in Section III.E., we find that an X-Factor prescription of 6.5 percent, including a CPD of 0.5 percent, is a reasonable one.

B. X-Factor Approaches

I. Methods for Estimating the X-Factor

19. In the Price Cap Fourth Further Notice, we tentatively concluded that we should base our X-Factor on a TFP-based measure of productivity and an input price differential.³⁴ In line with a majority of the commenters, including Ad Hoc, AT&T, and USTA, who support TFP in some form, we base our X-Factor prescription on productivity growth and input price differential, derived on the basis of the TFP

³² Price Cap Fourth Further Notice, 10 FCC Rcd at 13671-72 (paras. 77-83).

³³ See LEC Price Cap Order, 5 FCC Rcd at 6885 (App. C).

³⁴ See Price Cap Fourth Further Notice, 10 FCC Rcd at 13664 (para. 25). See also LEC Price Cap Performance Review, 10 FCC Rcd at 9031 (para. 155). Price Cap Fourth Further Notice, 10 FCC Rcd at 13668 (paras. 54-55).

methodology.³⁵ For the reasons discussed below, we conclude that TFP measures productivity growth more accurately than the method we adopted in the LEC Price Cap Order and the LEC Price Cap Performance Review, and more accurately than any other method proposed in the record before us. In the LEC Price Cap Performance Review, we noted that we were forced to reject TFP-based productivity studies because they were not specific to the telephone industry, or because they were based on non-public information.³⁶ Pacific notes that the California Public Service Commission has based its intrastate price cap plan on a TFP model. Pacific cites a recent California Public Utilities Commission (California PUC) opinion finding that TFP lies between 1.8 percent and 2.6 percent.³⁷ We now have before us TFP studies that are specific to the telephone industry and rely on publicly available data. Finally, we note that the Bureau of Labor Statistics (BLS) uses TFP to measure productivity growth in the national economy.³⁸

20. Several parties oppose the use of TFP because they maintain that the X-Factor resulting from this method is lower than the X-Factors in the interim plan.³⁹ We interpret these arguments as opposing USTA's method of calculating TFP, not as objections to the principle of basing the X-Factor on TFP generally. Similarly, ICA opposes TFP because it anticipates that any TFP-based approach will inevitably raise data

³⁵ As explained further below, Ad Hoc, AT&T and USTA support using TFP to calculate the X-Factor, but Ad Hoc and AT&T disagree with USTA over the amount of the input price differential. USTA argues that the input price differential is zero, while Ad Hoc and AT&T contend that it is at least 2 percent. See Section III.D.1., infra.

³⁶ LEC Price Cap Performance Review, 10 FCC Rcd at 9031 (para. 157), citing Policy and Rules Concerning Rates for Dominant Carriers, CC Docket No. 87-313, 3 FCC Rcd 3195, 3406-07 (1988) (AT&T Price Cap Further Notice).

³⁷ Pacific Reply at 2-3, 14-16, citing Investigation on the Commission's Own Motion Into the Second Triennial Review of the Operations and Safeguards of the Incentive-Based Regulatory Framework for Local Exchange Carriers, I.95-05-047, Decision 95-12-052 (Dec. 20, 1995) (California PUC Opinion). Pacific attaches a copy of the California PUC Opinion to its reply.

³⁸ BLS Handbook of Methods, Bulletin 2285, Productivity Measures: Business Economy and Major Subsectors, Chapter 10.

³⁹ LDDS Comments at 3-4; Ad Hoc Reply at 2 and Att. at 39; MCI Reply at 5-6; NCTA Reply at 6; API Reply at 1-2; TRA Reply at 4-5.

availability problems.⁴⁰ We find that the record demonstrates that publicly available data can now provide an adequate basis for TFP analysis. We address TFP calculation issues below.

21. We have considered but do not rely on alternatives to our TFP approach. In the Price Cap Fourth Further Notice, we sought comment on alternative methods of calculating TFP, including an econometric estimation method.⁴¹ The only parties commenting in the record on the econometric estimation method opposed it. USTA and NYNEX assert that an econometric estimation of productivity growth sophisticated enough to be economically meaningful would not meet the goal we established in the Price Cap Fourth Further Notice of being relatively simple.⁴² No party to this proceeding has placed an econometric TFP model in the record. Therefore, we have no basis at this time on which to adopt an econometric estimation of productivity growth to measure TFP.

22. We also decline to adopt the Historical Revenue Method discussed in the Price Cap Fourth Further Notice and supported by GSA and TRA.⁴³ The Historical Revenue Method would set the X-Factor prospectively at the level that would have, in retrospect, produced an industry-wide average rate of return of 11.25 percent under price cap regulation.⁴⁴ Adopting the Historical Revenue Method on a moving-average basis, as GSA recommends, would create substantially similar incentives to those under rate-of-return regulation, because the X-Factor would be explicitly linked to earnings. The Historical Revenue Approach also would re-create many of the administrative burdens of rate-of-return regulation, including a substantial reliance on accurate demand and cost forecasts. In addition, in the Price Cap Fourth

⁴⁰ ICA Comments at 6-7.

⁴¹ Under this method, we would develop a "production function," or an equation explaining the mathematical relationship between inputs and outputs, and price cap LECs would then derive TFP from this equation. Price Cap Fourth Further Notice, 10 FCC Rcd at 13671 (para. 75).

⁴² USTA Comments at 6-8; NYNEX Comments at 27. See Price Cap Fourth Further Notice, 10 FCC Rcd at 13662 (para. 16).

⁴³ Price Cap Fourth Further Notice, 10 FCC Rcd at 13671-72 (paras. 77-83).

⁴⁴ LEC Price Cap Performance Review, 10 FCC Rcd at 9019 (para. 127), Price Cap Fourth Further Notice, 10 FCC Rcd at 13672 (para. 81).

Further Notice, we expressed concerns that the Historical Revenue Approach might not provide sufficient incentives for productivity growth, to the extent that increases in industry-wide earnings would increase the X-Factor.⁴⁵ No one has adequately responded to this concern. GSA recommends using a moving average to update an X-Factor developed pursuant to the Historical Revenue Method.⁴⁶ For the reasons set out below, however, we decline to adopt a moving average. TRA supports the Historical Revenue Method because it believes that it would help reduce rates to economic cost levels,⁴⁷ but presents no reasons why a "historical" revenue method better achieves that end than a TFP methodology. In addition, in our companion **Access Reform First Report and Order**, we reject proposals to adopt prescriptive measures at this time to drive access rates to economic cost-based levels.⁴⁸

23. We also decline to continue using the Historical Price Method developed in the **LEC Price Cap Order**. None of the commenters supports this approach.⁴⁹ Furthermore, the Historical Price Method bases the X-Factor on historical trends in prices of telecommunications prices relative to the economy as a whole, and thus uses price changes as a surrogate for productivity growth. We find that TFP is a more accurate measure of LEC productivity because it is based on incumbent LECs' actual outputs and inputs.

24. We also reject MCI's alternative to our TFP approach. MCI asserts that LECs electing the 5.3 percent X-Factor, which entails no obligation to share, must have believed that their unit costs (productivity growth plus decrease in input prices) would decrease by at least 8.54 percent. MCI claims that, otherwise, these incumbent LECs would have earned greater profits by selecting a lower X-Factor, notwithstanding the accompanying sharing obligations. Therefore, MCI recommends a fixed X-Factor of at least 8.54 percent.⁵⁰ In

⁴⁵ **Price Cap Fourth Further Notice**, 10 FCC Rcd at 13672 (para. 81).

⁴⁶ GSA Reply at 8.

⁴⁷ TRA Comments at 6-7.

⁴⁸ **Access Reform First Report and Order**, Section IV.B.2.

⁴⁹ See API Comments at 2-3; Bell Atlantic Comments at 7-8.

⁵⁰ MCI Reply at 9-11.

response, USTA criticizes MCI's calculations, in part because MCI implicitly assumes that all price cap LECs earned an 11.25 percent rate of return at the time of their 1995 annual access filings. According to USTA, correcting this error results in an X-Factor of 2.85 percent.⁵¹ In reply, MCI filed an ex parte statement agreeing with USTA's methodological point, but arguing that USTA erred in basing its analysis on a 13.78 percent return, the incumbent LECs' rate of return in 1994.⁵² According to MCI, the price cap LECs' 1994 rates of return are not the correct starting point because the LECs' expected earnings were depressed by two exogenous cost decreases required in the LEC Price Cap Performance Review in 1995.⁵³ MCI contends that, after adjusting the LECs' rates of return to remove the effects of these two exogenous cost decreases, its alternative X-Factor approach produces an X-Factor of 7.9 percent.

25. We conclude that MCI's method is inherently ill-suited for prescribing an X-Factor, regardless of whether MCI's calculation can be perfected. Fundamentally, MCI's alternative does not estimate expected productivity growth, but instead derives an X-Factor based on LEC X-Factor choices that depend critically on the LECs' earnings for a single tariff year. It would not be reasonable to base a long-term X-Factor prescription, as MCI suggests, on short-term LEC expectations. Furthermore, the results of MCI's alternative methodology rely heavily on LEC interstate earnings. For example, LECs choosing the 4.0 percent X-Factor under the interim plan are required to share half of their earnings in excess of 12.25 percent, and all of their interstate earnings in excess of 13.25 percent. As a LEC's sharing obligations increase, its gains from increases in productivity decrease. Thus, if an incumbent LEC expects its interstate earnings to exceed 12.25 percent, and also anticipates that it will increase its productivity, it is more likely to choose the no-sharing 5.3 percent X-Factor than a LEC that expects the same increases in productivity, but forecasts that its interstate rate of return will be 11.25 percent. As we have said consistently in our

⁵¹ USTA 1997 Comments, Att. 7 at 7-8.

⁵² Ex Parte Letter from Chris Frentrup, Senior Regulatory Analyst, MCI to William F. Caton, Secretary, FCC, April 18, 1997.

⁵³ MCI refers to our decisions to reinitialize PCIs to the levels at which they would have been had we adopted a 4.0 percent minimum X-Factor in the LEC Price Cap Order, and to remove OPEB costs from the PCIs. See LEC Price Cap Performance Review, 10 FCC Rcd at 9069-70 (paras. 245-50); 9095-97 (paras. 307-09).

discussions of price cap regulation over the years,⁵⁴ we achieve beneficial incentives by placing less rather than more importance on LEC interstate earnings. For these reasons, we reject that alternative as a means for prescribing an X-Factor.

26. US West suggests setting the X-Factor equal to the GDP-PI, and thereby freezing the PCIs at their current levels as a means of simplifying the price cap plan.⁵⁵ We reject US West's proposal, because it would not provide access customers with any benefits from productivity growth, and so would not strike a reasonable balance between stockholders and ratepayers.⁵⁶

2. Direct Approach

27. In the Price Cap Fourth Further Notice, we invited comment on replacing the PCI formula completely with a formula based on what we called the "direct approach."⁵⁷ Under the direct approach, the PCI would change by the percentage change in LEC input prices minus the percentage change in LEC TFP. The direct approach eliminates the GDP-PI (or any other measure of economy-wide inflation), nation-wide TFP indices, and nation-wide input price indices needed to calculate the X-Factor in our current PCI formula.

28. We decide not to modify our PCI formula so that the X-Factor can be calculated under the "direct approach," as suggested by Sprint and GTE, among other parties. First, for reasons discussed in Section V. below, we adopt in this Order a fixed X-Factor until the next scheduled performance review. Adopting a direct approach without also adopting a moving average-based method of updating the X-Factor on an annual basis would result in a PCI formula that reduces PCIs by a certain percentage every year. By definition, a direct approach without a moving average would require prices to decrease by the same nominal percentage regardless of whether the national economy is

⁵⁴ See LEC Price Cap Order, 5 FCC Rcd at 6791 (para. 34); LEC Price Cap Performance Review, 10 FCC Rcd at 8973-74 (paras. 27-29).

⁵⁵ US West Comments at 3-5; US West Reply 4-5.

⁵⁶ Price Cap Fourth Further Notice, 10 FCC Rcd at 13673 (para. 93).

⁵⁷ LEC Price Cap Performance Review, 10 FCC Rcd at 9216 (App. F, equation 7); Price Cap Fourth Further Notice, 10 FCC Rcd at 13668-69 (para. 61).

experiencing high or low inflation. Under a direct approach, with the PCI formula updated only in periodic performance reviews, there is no possible mechanism to incorporate an unexpected increase or decrease in inflation that occurs between performance reviews. Retaining a PCI formula that reflects changes in overall prices is more consistent with our decision to prescribe a fixed X-Factor rather than updating the X-Factor on a moving average basis. Second, we agree with AT&T that the direct approach does not simplify the PCI formula nearly as much as Sprint claims, because the approach eliminates only non-controversial terms from the PCI formula, or terms that can be based on publicly available data.

C. TFP Calculation Issues

1. Background

29. In the LEC Price Cap Performance Review, we noted that changes in a firm's costs of producing a unit of output are the product of both changes in the quantity of resources used, *i.e.*, changes in productivity, and changes in the prices paid for those resources, *i.e.*, changes in input prices.⁵⁸ We tentatively concluded that the X-Factor should include both a measure of productivity growth and a measure of input price changes.⁵⁹ In this Section, we consider methods to estimate changes in productivity. In Section D. below, we consider methods to estimate changes in LEC input prices.

30. In general, TFP models measure productivity as the ratio of an index of the outputs of a firm (or industry, or nation) to an index of its inputs over a given period of time.⁶⁰ The growth in productivity is simply the amount by which this ratio changes over time. In these calculations, every effort is made to isolate the real change in productivity from the effects of simple price changes. This is why, in a

⁵⁸ LEC Price Cap Performance Review, 10 FCC Rcd at 9033 (paras. 160-61) and 9213-40 (App. F). See also Price Cap Fourth Further Notice, 10 FCC Rcd at 13668 (para. 54).

⁵⁹ LEC Price Cap Performance Review, 10 FCC Rcd at 9033 (para. 160); Price Cap Fourth Further Notice, 10 FCC Rcd at 13668 (para. 54).

⁶⁰ We also provide overviews of the TFP method in the LEC Price Cap Performance Review, 10 FCC Rcd at 9008-10 (paras. 106-07), and the Price Cap Fourth Further Notice, 10 FCC Rcd at 13663-64 (paras. 23-24), and Att. A.

subsequent section, we consider separately the matter of changes in input prices.

31. A LEC's outputs are the services it provides, and the output index represents the quantities of services provided. For purposes of constructing the output index, quantities of services can be measured directly, based on such measures as minutes of use or number of access lines, or indirectly, by dividing revenues by an index of output prices. Output indices can be developed to represent changes in the quantity of each individual LEC service over time, or services can be aggregated into one or more categories. The categories are weighted, either on the basis of costs or revenues, to make the output index.

32. LEC inputs consist of three major factors of production: labor, materials, and capital services (services provided by plant and equipment). As explained further below, TFP analysis assumes capital services are a fixed proportion of the capital stock.⁶¹ TFP theory and practice estimates the growth in capital services using the assumption that the level of capital services is some fixed proportion of the capital stock available at the beginning of the year. Capital services can be measured as changes in the level of capital stock. Although these factors can be disaggregated further, all the parties presenting TFP models limited themselves to these three input factors. The growth rate of total input index is determined by the growth rates of the capital, labor, and materials input indices, and by their relative by the relative weight given each input index. As discussed below, measuring the growth rate of capital input is a particularly complicated procedure, requiring, among other things, a determination of capital stock and the flow of capital services from capital stock.

33. We have reviewed the TFP models submitted by Ad Hoc, AT&T, and USTA in response to the Price Cap Fourth Further Notice, the comments received in response to the Access Reform Notice, the numerous ex parte filings in both dockets providing additional or updated data or critiques, and the various estimates of TFP and input price differentials. On the basis of our review, we have determined the most reasonable method of performing each step of a TFP calculation.

⁶¹ Capital stock in the base year of a TFP study period is the book value of plant. For the second year, the capital stock is derived by reducing the first period's capital stock for depreciation, and increasing it by the second period's plant additions that have been deflated by the change in capital stock prices. See Section III.C.4.a.(2).

We discuss our conclusions on each of these TFP calculation issues below. We find that no study in the record embodies all the best TFP calculation practices. We then calculate TFP using the most reasonable parts of each TFP study as it was presented by the record. As explained in detail below, we rely primarily, but not exclusively, on the results of that analysis for our X-Factor prescription.⁶²

34. In Section 2., we summarize the results of USTA's, AT&T's, and Ad Hoc's models. In Section 3., we address output index issues. We address issues regarding the capital, labor, and materials input indices in Section 4. Subsequently, in Section D, we analyze other X-Factor calculation issues, such as how to calculate the input price differential, whether to adjust for claimed differences in interstate and intrastate productivity growth, whether to include a CPD, and whether to make adjustments at this time for the access charge reforms we adopt in the Access Reform First Report and Order. In Section E. below, we prescribe an X-Factor of 6.5 percent, based on our analysis of these issues.

2. TFP Models Placed in Current Record

35. USTA has submitted its simplified TFP model. That model is a revision of its original TFP model,⁶³ which was addressed in our LEC Price Cap Performance Review.⁶⁴ USTA supports updating the X-Factor

⁶² See Section III.E., *infra*.

⁶³ While the LEC Price Cap Performance Review was pending, USTA made two price cap proposals. The first, submitted in USTA's 1994 comments, based the X-Factor on TFP. LEC Price Cap Performance Review, 10 FCC Rcd at 9008 (paras. 104-11). In a January 18, 1995, *ex parte* statement, USTA submitted its second proposal, basing the X-Factor on a moving average of industry-wide TFP data, but did not make any significant revisions to its TFP calculations. In the Price Cap Fourth Further Notice, we often referred to USTA's original TFP study to illustrate the TFP issues on which we were seeking comment. Price Cap Fourth Further Notice, 10 FCC Rcd at 13663 (para. 22). For the purposes of this Order, we will refer to USTA's 1994 TFP calculations as the "Original TFP Model."

⁶⁴ Because USTA has made revisions to the original TFP model, we will not discuss that model in detail here, nor will we discuss in detail whether the data in USTA's original model met the general criteria discussed in the Price Cap Fourth Further Notice. See Ad Hoc Comments, Att. at 5-14, 60-61; AT&T Comments at 9-11, and App. A at 3-6; USTA Comments at 32-33 and App. A; MCI Comments at 9-11; TRA Comments at 2-3; LDDS Reply at 5.

annually on the basis of a five-year moving average. For the nine LECs included in its original TFP study, USTA claims its simplified TFP model results in average difference between LEC and U.S. national productivity growth of 2.9 percent from 1988 to 1993, 3.1 percent from 1989 to 1994,⁶⁵ and 2.7 percent from 1990-95.⁶⁶ USTA asserts that the input price differential is zero, and makes no adjustment for a consumer productivity dividend.⁶⁷

36. AT&T maintains that its TFP-based model corrects errors in USTA's original TFP model.⁶⁸ In response to the Price Cap Fourth Further Notice, AT&T recommends a baseline X-Factor of 7.8 percent, based on estimates of interstate-only TFP and an input price differential, and including a Consumer Productivity Dividend (CPD).⁶⁹ We discuss AT&T's interstate TFP adjustment in Section D.2. below. Later, in its 1997 pleadings, AT&T updated its study with 1995 data, and found an interstate-only TFP-based X-Factor of 9.0 percent from 1985 to 1995, including a CPD.⁷⁰

37. Ad Hoc also adjusts USTA's original TFP model to correct for alleged methodological errors. Specifically, Ad Hoc recommends adjusting TFP to estimate interstate-only productivity, and including an input price differential in the X-Factor. Ad Hoc proposes an X-Factor of

⁶⁵ USTA Comments, App. A at 30-32.

⁶⁶ USTA 1997 Comments, Att. 5 at 1-4.

⁶⁷ USTA Comments at 26 and App. C at 3-6; USTA Reply, Att. A at 23-25. See also US West Comments at 7, 16; Southwestern Bell Comments at 11; NYNEX Comments at 21; BellSouth Comments at 14-16; Bell Atlantic Comments at 11-12; Lincoln Comments at 4; Ameritech Comments at 4-5; GTE Comments at 11 and App. B, App. F; NYNEX Reply at 5; Pacific Reply at 4, citing California PUC Opinion at 68-69.

⁶⁸ AT&T Comments at 24-26; AT&T Reply at 35-37.

⁶⁹ AT&T Reply at 38 n.78. For purposes of comparison, AT&T would recommend setting the X-Factor at 5.42 percent, based on total company TFP and an input price differential, and excluding a CPD. AT&T Reply at 38-40. AT&T updated its results to include data BLS released between the time AT&T filed its reply and its comments. Compare AT&T Reply at 38-40 with AT&T Comments at 29.

⁷⁰ AT&T 1997 Reply, App. G at 31-32. AT&T's calculations would yield a total company TFP-based X-Factor, including the input price differential but excluding a CPD, of 6.20 percent. Id.

9.4 percent, which is composed of an estimated TFP growth of 6.0 percent for interstate services, and an input price differential of 3.4 percent.⁷¹ Ad Hoc states that adopting all its recommendations except its interstate/intrastate adjustment results in an X-Factor of 6.6 percent.⁷²

38. Ad Hoc submitted its models in the proprietary format of a commercial software program to which we do not have access. The format makes it quite difficult for us to validate its results or to compare them with those of other models in a manner similar to that shown in Section III.E. below. To the extent that Ad Hoc reveals its intermediate results, its input price index appears to suffer some of the same infirmities as USTA's original model, and to exhibit erratic fluctuations. Furthermore, as discussed further below, we find that the revisions Ad Hoc does make to USTA's original TFP model do not improve the model. Specifically, Ad Hoc makes an interstate-only TFP adjustment, recommends making a hedonic adjustment, and does not weight the capital input index on a residual earnings basis. Therefore, we do not give any weight to Ad Hoc's X-Factor estimates. We discuss AT&T's and USTA's models below in greater detail, and we resolve TFP calculation issues on the basis of that analysis.

3. Output Index Issues

a. Mathematical Construction of Output Indices

39. **Background.** In the **Price Cap Fourth Further Notice**, we invited parties to recommend appropriate methods for calculating output price indices for TFP studies.⁷³ As noted earlier, output quantities can be measured directly based on such measures as minutes of use or number of access lines, or indirectly, by deriving quantities by dividing output revenues by a price index. In the **Price Cap Fourth Further Notice**, we identified various potentially relevant mathematical

⁷¹ Ad Hoc Comments, Att. at 53-56. Ad Hoc's recommended adjustments are discussed in more detail below.

⁷² Specifically, Ad Hoc proposed an X-Factor of 7.1 percent, including a CPD of 0.5 percent. Ad Hoc Comments, Att. at 56. For purposes of comparison, Ad Hoc in its reply based its calculations on data submitted in USTA's comments. Ad Hoc claims that the X-Factor would be 7.9 percent, excluding a consumer productivity dividend, from 1989 to 1993; 5.9 percent from 1990 to 1994; and 7.3 percent from 1989 to 1994. Ad Hoc Reply, Att. at 36.

⁷³ **Price Cap Fourth Further Notice**, 10 FCC Rcd at 13994 (para. 26).

techniques for constructing indices: the Laspeyres Price Index, the Chained Laspeyres Index, the Paasche Price Index, and the Fisher Ideal Index.⁷⁴

40. **Discussion.** USTA and AT&T both use physical output measurements for certain access service categories.⁷⁵ While AT&T's TFP study measures all output directly⁷⁶ using the Fisher Ideal Index method,⁷⁷ USTA advocates indirect measures for certain outputs. For example, USTA uses deflated revenue to measure special access output, arguing that using special access line counts is too simplistic.⁷⁸ When it measures output indirectly, USTA divides total revenues by output price indices that are based on an approximation of a chain-linked Paasche method, and then creates output quantity indices using the Tornquist index method.⁷⁹ USTA also contends that using physical measures of output in its local service and toll service categories is inaccurate because it treats each local call identically, and does not capture differences such as the time of day of toll calls, or the effects of vertical services. USTA claims this causes AT&T's study to overstate TFP growth by 0.9 percent.⁸⁰

41. We find that, although both methods can be reasonable for calculating TFP growth in most contexts, use of physical output measures is better suited to calculating TFP for purposes of prescribing an X-Factor. Use of physical output measures simplifies the analysis, and USTA has not shown that that method yields results less accurate than use of deflated revenues. Specifically, USTA has not explained

⁷⁴ Price Cap Fourth Further Notice, 10 FCC Rcd at 13994 n.52. In Appendix D to this Order, we describe the Fisher Ideal Index in more detail. We discussed the Laspeyres and Paasche index forms in the AT&T Price Cap Further Notice, 3 FCC Rcd at 3435-36 (paras. 444-45).

⁷⁵ In its 1996 pleadings, USTA identifies its "end user access" and "interstate switched access" categories. USTA Reply, Att. at 10. In its 1997 pleadings, USTA identifies its "local service" and "LEC toll" categories. USTA 1997 Comments, Att. 6 at 9-10.

⁷⁶ AT&T Comments, Att. A at 72-73.

⁷⁷ AT&T Comments, App. B at 5-6.

⁷⁸ USTA Reply, Att. A at 9-12.

⁷⁹ USTA Comments at 14-15.

⁸⁰ USTA 1997 Comments, Att. 6 at 9-10.²³

why a toll call made during the day should count more than a night or weekend call for purposes of determining output in a TFP study. Furthermore, we disagree with USTA's contention that using physical measures overstates TFP growth because they do not adequately reflect vertical services. We expect that the quantities of vertical services will increase faster than the inputs used to provide those services in the future, because the price cap LECs have only relatively recently deployed the SS7 facilities necessary to provide vertical services widely in their networks. Thus, increased output of vertical services reasonably could occur as a result of such recent investment rather than directly requiring further inputs through new investment. To the extent that new investment does occur, we believe it likely would result in further or additional increases in output beyond the output increases generated by the prior investment. At the same time, since the LECs have begun marketing vertical services only relatively recently, demand for these services is likely to grow. Thus, physical measures of services should produce conservative measures of productivity and productivity growth.

42. In its 1997 comments, USTA claims that AT&T overstates output growth because it measures common line output by minutes of use rather than number of access lines.⁸¹ USTA also criticizes AT&T's model because it derives common line minutes of use for the period from 1984 to 1985 on the basis of an extrapolation of data for the period from 1986 to 1992.⁸² AT&T replies that its extrapolation is necessary in order to create a consistent series from divestiture to the present, because common line data were not recorded separately from switched access before 1988.⁸³ We find that where both line and minute data are available, converting all common line output to a per-minute basis is not desirable. Therefore, in our staff analysis, we measure end user common line growth on a per-line basis, and carrier common line growth on a per-minute basis. For the period before 1988, switched access minutes provide a reasonable surrogate for carrier common line minutes. Thus, in our staff analysis in Appendix D, we

⁸¹ USTA 1997 Comments, Att. 6 at 10-11.

⁸² USTA 1997 Comments, Att. 6 at 25-26.

⁸³ AT&T 1997 Reply, App. G at 29-30.

measure output quantities directly on the basis of switched access lines,⁸⁴ special access lines, and switched access minutes of use.

43. As a technical matter, our review of the relevant economic literature indicates that the Fisher Ideal Index is superior to the approximated Paasche chain index and Tornquist Index used by USTA for the construction of deflated revenue quantity indices.⁸⁵ For example, Diewert states that the Fisher Ideal Index is the only index that satisfies twenty well-defined mathematical tests.⁸⁶ We therefore use the Fisher Ideal Index form in our analysis.

b. Number of Output Categories

44. **Background.** In the Price Cap Fourth Further Notice, we noted that USTA developed output indices for seven categories in its original TFP study. We sought comment generally on whether USTA's output categorization was reasonable, or whether any of USTA's categories should be combined or subdivided.⁸⁷

45. **Discussion.** Both USTA and AT&T base their output categories on ARMIS 43-02 reporting groups. USTA uses seven categories, while AT&T uses three. We include three output categories in our analysis of the record: local, intrastate toll plus intrastate access, and interstate access. We find that this categorization is sufficiently disaggregated to provide an accurate measure of output growth, and is easy to implement because we have collected data in ARMIS on this basis.

46. USTA, in effect, holds that both we and AT&T should have retained miscellaneous services as a fourth category. The three output categories that both we and AT&T use include the services in six of USTA's seven output categories, but exclude those in USTA's miscellaneous services category. USTA claims that, by excluding these miscellaneous services, AT&T's model overestimates TFP growth by 0.4

⁸⁴ For the purposes of our TFP calculation, we define "access lines" as business lines, residential lines, and public access lines.

⁸⁵ Diewert, Fisher Ideal Output, Input and Productivity Indexes Revisited 3 J. Productivity Analysis 211 (1992).

⁸⁶ Diewert, id.

⁸⁷ Price Cap Fourth Further Notice, 10 FCC Rcd at 13994 (para. 27).

percent from 1988-94, and 0.5 percent from 1989-94, because miscellaneous services output has grown more slowly than other LEC outputs.⁸⁸ This apparently slower growth, however, is a direct result of USTA's use of GDP-PI when it calculates output quantities by deflating revenues by a price index. USTA used the GDP-PI because it did not have a specific measure of miscellaneous service prices. Because GDP-PI rose substantially over the period while the prices of LEC services other than miscellaneous services fell sharply, it is obvious that miscellaneous output estimated in this manner would grow more slowly. It is not at all obvious, however, that GDP-PI is an appropriate price index for miscellaneous services. Furthermore, examining the major components of this category reveals that it is a collection of highly diverse activities. Many of these, such as White and Yellow Pages operations,⁸⁹ are at best ancillary to telecommunications services. We also note that the composition of this category varies widely from year to year. Because of these characteristics, we do not believe it is feasible to construct a valid quantity measure for this category. Accordingly, we exclude USTA's miscellaneous services category from our analysis. Moreover, because most of the services in this category appear to be produced using a separate production function from that used to produce telecommunications services, it is not unreasonable to exclude miscellaneous services. For these reasons, we exclude the miscellaneous services output category completely from our output index.

c. Weighting of Output Categories

47. **Background.** Regardless of whether output quantity growth rates are based on physical measures or deflated revenues, TFP studies with more than one output category must adopt some weighting scheme to combine the categories into a single index. In the Price Cap Fourth Further Notice, we sought comment on the proper weights for aggregating output quantity categories. We observed that USTA's original TFP study used revenue weights for the output index, and we found that this weighting implicitly assumes that the revenue of a service is a reasonable measure of its value. We questioned whether it is reasonable to make this assumption in an industry where incumbent LECs face different levels of competition for their services, and rates diverge to varying degrees from the costs of producing those services.

⁸⁸ USTA 1997 Comments, Att. 6 at 8.

⁸⁹ See 47 C.F.R. § 32.5230.

Therefore, we sought comment on alternative weighting schemes for output categories.⁹⁰

48. **Discussion.** We conclude that, despite the doubts we expressed in the **Price Cap Fourth Further Notice**,⁹¹ revenue weights are the best weighting method available. In its comments in response to the **Price Cap Fourth Further Notice**, AT&T recommends weighting the output indices on a marginal cost basis, arguing that revenue weights will not approximate more economically meaningful marginal cost weights until competition has developed further.⁹² Neither AT&T nor any other party in this proceeding, however, has provided estimates of marginal cost weights. Instead, AT&T uses booked costs as a surrogate for marginal cost weights. BellSouth asserts that using fully distributed costs, such as booked costs, as a surrogate for marginal costs would be unreasonable except in cases where there are no economies of scale, and therefore booked cost weights are inappropriate for calculating LEC TFP.⁹³ In its TFP model, the Interstate Commerce Commission (ICC) concluded that use of revenue weights was unlikely to bias its output index seriously over time.⁹⁴ Finally, we note that AT&T has switched its recommendation from cost-based weights to revenue weights.⁹⁵ Accordingly, we agree with the parties that revenue weights are the most reasonable basis of aggregating output indices.

⁹⁰ **Price Cap Fourth Further Notice**, 10 FCC Rcd at 13994 (para. 28).

⁹¹ **Price Cap Fourth Further Notice**, 10 FCC Rcd at 13994 (para. 28).

⁹² AT&T Comments at 23-24 and App. A at 60-63; AT&T Reply at 34.

⁹³ BellSouth Reply. Att. at 29-30.

⁹⁴ **Railroad Cost Recovery Procedures - Productivity Adjustment**, Ex Parte No. 290 (Sub-No. 4), 5 ICC 2d 434, 462 (1989) (**ICC TFP Order**), **aff'd sub nom. Edison Electric Institute v. FCC**, 969 F.2d 1221 (D.C. Cir. 1989).

⁹⁵ **See Ex Parte Letter from Brian W. Masterson, Government Affairs Director, AT&T, to William F. Caton, Secretary, FCC, April 16, 1997.**

4. Input Index Issues

a. Capital

(1) Background

49. The capital input index measures the amount of capital services used by the LEC to produce output. "Capital services" represent the contribution capital makes to the production of output. Capital input quantities generally assume that the capital services in a time period are proportional to the stock of capital available in that period. Capital input quantities are constructed for a number of asset categories of plant and equipment.⁹⁶ The development of the aggregate capital input index requires three determinations: (1) the capital stock for each asset category, (2) the capital input quantities from these capital stocks, and (3) the relative weight that each asset category should have in the final aggregate capital input index.

50. Typically, the "perpetual inventory method" is used to develop a constant dollar capital stock. The nominal dollar level of capital stock in the first period, called the benchmark capital stock, is generally derived by adjusting gross booked investment, either by subtracting the associated accumulated depreciation and amortization reserves, or multiplying by a ratio of market to book value of investment derived from another source. The capital stock for the next period is derived by reducing the first period's capital stock for depreciation, and increasing it by the second period's plant additions that have been deflated by an asset price index.⁹⁷ We discuss this process in detail in subsections (2) and (3) below.

51. Once we have calculated constant dollar capital stocks, we need to measure the capital services that these stocks generated. In the Price Cap Fourth Further Notice, we sought comment on two measures. One measure assumes capital services are a constant proportion of

⁹⁶ For example, USTA based its capital input index on six asset types in its original TFP study. Fourth Further Notice, 10 FCC Rcd at 13664 (para. 29).

⁹⁷ The perpetual inventory method is also discussed briefly in the Price Cap Fourth Further Notice, 10 FCC Rcd at 13666 (para. 41). A more detailed description can be found in Christensen and Jorgenson, The Measure of U.S. Real Capital Input, 1929-1967, 15 Rev. of Income and Wealth 294 (December 1969).

capital stock, and that the growth of capital services is measured by the growth in capital stock. A second measure focuses on "capital consumption," *i.e.*, changes in the level of efficiency in the capital stock over time.⁹⁸ We discuss this issue further in subsection (5).

52. The aggregate capital input quantity is a weighted average of the input quantity of all the capital input categories.⁹⁹ The weights are based on the price, or "rental value" of the capital services provided by each asset category, or in other words, an estimate of what the rental value of those assets would be in an competitive market, if one existed. We stated in the Price Cap Fourth Further Notice that this "implicit rental price" includes the rate of return, the depreciation rate, and tax rates.¹⁰⁰ Below in subsection (2), we decide to have only one capital input index. Nonetheless, issues relating to weighting asset categories are still relevant because the method used to develop weights for aggregating asset categories into a single index are also used to aggregate capital, labor, and materials into the final, single input index. We discuss the weighting of the capital input index relative to the labor and materials indices in subsection (6).

(2) Capital Stock

53. Background. The capital input index for a TFP study requires the calculation of capital stock -- the real (or constant dollar) value of LEC net investment. In the Price Cap Fourth Further Notice, we invited comment on several issues related to the calculation of capital stock. We asked generally whether the perpetual inventory model in USTA's original model was the best method to derive capital stock quantity indices, and if not, what other method would be preferable.¹⁰¹ In particular, we asked whether the benchmark capital stock, *i.e.*, the capital stock level in the first period for the study, should be based on the original cost or current replacement cost of assets.¹⁰² We also noted that USTA used proprietary telephone plant indices (TPIs) to deflate

⁹⁸ Price Cap Fourth Further Notice, 10 FCC Rcd at 13667 (para. 47).

⁹⁹ In subsection (4) below, we address the issue of how many asset classes should be used in a TFP study.

¹⁰⁰ Price Cap Fourth Further Notice, 10 FCC Rcd at 13664-65 (para. 31).

¹⁰¹ Price Cap Fourth Further Notice, 10 FCC Rcd at 13666 (para. 46).

¹⁰² Price Cap Fourth Further Notice, 10 FCC Rcd at 13666 (para. 41).

plant additions to constant dollars, and asked several questions regarding the sources and reliability of USTA's TPIs.¹⁰³

54. In the Price Cap Fourth Further Notice, we also noted that USTA's original model aggregated capital into six asset categories, and then developed a depreciation rate for each category to use in calculating the implicit rental price of capital stocks. We asked whether USTA's six classes were the most appropriate classification scheme, noting that the Commission prescribes depreciation rates for 30 asset categories.¹⁰⁴

55. Discussion. Both USTA and AT&T agree that the perpetual inventory model is a theoretically correct and practical method of constructing capital stocks. Therefore, we have decided to use the Perpetual Inventory Model for calculating capital stocks in our analysis.

56. Both USTA and AT&T use BEA asset price indices to deflate their capital stock additions to constant dollars. USTA, AT&T, and Ad Hoc agree that BEA asset price indices avoid the proprietary issues raised by TPIs based on incumbent LEC data. BEA asset price indices measure the movement of asset prices in the U.S. economy. Although BEA asset price indices do not measure precisely the prices of LEC assets, BEA's indices are sufficiently disaggregated that they can be used to develop a surrogate for LEC capital asset prices. Therefore, we have decided to use BEA asset indices.

57. AT&T uses USTA's original six asset categories, but USTA's simplified TFP model reduced the number of asset categories to three. Although USTA and AT&T use different numbers of asset categories, they have not criticized each other's choices, and no one else has criticized either model on the basis of number of asset categories. In our staff analysis, we have used one asset category, and one depreciation rate, because further disaggregation does not appear to provide a more accurate measure of TFP growth, and one asset category simplifies the calculation.

¹⁰³ Price Cap Fourth Further Notice, 10 FCC Rcd at 13666 (para. 45).

¹⁰⁴ Price Cap Fourth Further Notice, 10 FCC Rcd at 13665 (para. 39).

(3) Adjustments to Capital Stock

58. **Background.** In the **Price Cap Fourth Further Notice**, we treated as separate issues measurement of the accumulated depreciation used in the perpetual inventory model used to calculate the benchmark capital stock, and the depreciation rates in the implicit rental price. Upon review of the record, we find that these issues are interrelated, and consider them together here. For example, USTA emphasizes the need for the starting value of capital in the perpetual inventory equation to be consistent with the depreciation assumptions used elsewhere in the study.¹⁰⁵

59. In the **Price Cap Fourth Further Notice**, we observed that the implicit rental price calculation in USTA's original study relied on depreciation rates it characterizes as "economic" depreciation rates, developed by an economist named Dale Jorgenson.¹⁰⁶ We questioned whether it was reasonable for carriers to use depreciation rates in TFP calculations that differ from the Commission's prescribed depreciation rates.¹⁰⁷ In our discussion of benchmark capital stock adjustments, we noted that the perpetual inventory model in USTA's original study multiplied the replacement cost of capital by "economic stock

¹⁰⁵ USTA Comments, App. A at 15.

¹⁰⁶ **Price Cap Fourth Further Notice**, 10 FCC Rcd at 13665 (para. 37), citing Jorgenson, **Productivity and Economic Growth in Fifty Years of Economic Measurement** (E.R. Berndt and J.E. Triplett, eds., 1990), at 19-118. In the **Price Cap Fourth Further Notice**, we sought comment on depreciation rates in the context of the "implicit rental price." Implicit rental prices are used to weight the indices for different asset categories into one aggregate capital input index. (We discuss the implicit rental price in detail below.)

¹⁰⁷ **Price Cap Fourth Further Notice**, 10 FCC Rcd at 13665 (para. 38), citing Section 220(b) of the Communications Act, 47 U.S.C. § 220(b). The 1996 Act subsequently revised Section 220 of the Communications Act so that the Commission is now permitted rather than required to prescribe depreciation rates. We asked whether we should require TFP depreciation rates to fall within the bands established in the **Depreciation Simplification Order**, if we were to permit TFP depreciation rates to differ from the prescribed depreciation rates. **Price Cap Fourth Further Notice**, 10 FCC Rcd at 13665-66 (para. 40), citing **Simplification of the Depreciation Prescription Process, Report and Order**, CC Docket No. 92-296, 8 FCC Rcd 8025 (1993) (**Depreciation Simplification Order**) (**petitions for reconsideration pending**). Because we decide below to rely on our prescribed depreciation rates in our analysis of the record, we need not address this issue further.

adjustment factors," and sought comment on economic stock adjustment factors.¹⁰⁸

60. **Discussion.** Ad Hoc and AT&T contend that we should use the depreciation rates prescribed by the Commission, and these parties use those rates in their studies.¹⁰⁹ They criticize Jorgenson's "economic" depreciation analysis on which USTA relied in its original TFP study, as well as in its simplified study. Ad Hoc and AT&T state that Jorgenson's analysis was based on a 1981 article by Hulten and Wykoff,¹¹⁰ which in turn was based on data ending in 1971, and examined depreciation of business assets for the economy as a whole rather than of telecommunications assets specifically.¹¹¹ USTA explains that it adopted only the depreciation method developed in the 1981 article, and substituted the most recent BEA data on telecommunications equipment lifetimes to develop depreciation rates.¹¹²

61. Some commenters argue that the depreciation rates should be those prescribed by the Commission.¹¹³ Ad Hoc maintains that the prescribed rates are designed to reflect the actual rate of plant retirement.¹¹⁴ MCI asserts that the prescribed rates in fact adequately reflect the economic life of plant and equipment.¹¹⁵ MCI includes a

¹⁰⁸ Price Cap Fourth Further Notice, 10 FCC Rcd at 13666 (para. 43).

¹⁰⁹ Ad Hoc Comments, Att. at 20; AT&T Comments at 22; Ad Hoc Reply at 5. See also MCI Comments at 18-19.

¹¹⁰ Charles R. Hulten and Frank C. Wykoff, The Measurement of Economic Depreciation, in Depreciation, Inflation, and the Taxation of Income from Capital (Charles R. Hulten, ed., 1981) at 95.

¹¹¹ Ad Hoc Comments, Att. at 20-21; Ad Hoc Reply, Att. at 33; AT&T Comments at 22, App. A at 47-49, App. B at 9; AT&T Reply at 32-34. But see AT&T Reply, App. B at 48-49 ("hyperbolic decay model" used by BLS inferior to "geometric decay model" used by Jorgenson).

¹¹² USTA Reply, Att. A at 19-20. See also Bell Atlantic Reply, Att. 1 at 11-12; Pacific Reply at 13-14.

¹¹³ MCI Comments at 18-19; Ad Hoc Comments, Att. at 20; AT&T Comments at 22; Ad Hoc Reply at 5.

¹¹⁴ Ad Hoc Comments, Att. at 22-23.

¹¹⁵ MCI Comments at 18-19; MCI Reply at 7.

study of depreciation rates to support its conclusions.¹¹⁶ In particular, MCI asserts that the study shows that depreciation reserve deficiencies are not excessively high at this time.¹¹⁷ A number of LECs criticize MCI's study.¹¹⁸

62. We conclude that USTA has not shown that the depreciation rates it developed for its TFP calculations are in fact "economic" depreciation rates, or are reasonable for use in a LEC TFP study. First, although USTA states that it has updated the depreciation rates from the 1981 Hulten-Wyckoff article with more recent BEA data, USTA has not shown that the depreciation rates it has developed are applicable to LEC equipment. Ad Hoc notes that the depreciation rates in the USTA study are lower than either the prescribed depreciation rates or the rates advocated by LECs in depreciation prescription proceedings, and argues that underestimating depreciation artificially reduces TFP and the X-Factor.¹¹⁹ USTA has not explained why it used depreciation rates lower than our prescribed rates,¹²⁰ when in other comments its members advocate higher depreciation rates.¹²¹

63. In our analysis, we have decided to use our prescribed depreciation rates. We find that it would not be reasonable, based on this record, to prescribe a set of depreciation rates for TFP calculations that differs from the depreciation rates currently in place for determining operating expenses. First, there is no sound basis in the record in this proceeding for determining whether and to what extent our depreciation rates differ from economic depreciation rates. Second, developing an additional distinct set of depreciation rates would clearly

¹¹⁶ MCI Comments, App. A.

¹¹⁷ See, e.g., MCI Comments, App. A at 1-4. See also NCTA Reply at 7-8.

¹¹⁸ Southwestern Bell Reply at 15-16 and App. A at 1-2; US West Reply at 23-28; NYNEX Reply at 11. USTA Reply, Att. C at 18-19, Att. D at 6-8, 12-13.

¹¹⁹ Ad Hoc Comments, Att. at 23.

¹²⁰ In the Price Cap Fourth Further Notice, we stated that our prescribed depreciation rates for the BOCs, GTE, and SNET from 1984 to 1992 was about 7.1 percent, while the depreciation rates in USTA's original TFP model averaged 5.7 percent for those BOCs over that period. Price Cap Fourth Further Notice, 10 FCC Rcd at 13665 n.59.

¹²¹ See, e.g., USTA 1997 Comments, Att. 13.

increase administrative burdens, and the record before us does not reveal any countervailing benefits that would justify this additional burden.¹²² Third, under our recently established streamlined procedures for determining LEC depreciation rates, incumbent LECs have considerable influence and some discretion in setting their specific depreciation rates.¹²³ Commenters in this proceeding have not persuaded us that the depreciation rates we have currently prescribed do not reflect the LECs' depreciation costs.

64. To incorporate the effects of accumulated depreciation on its benchmark capital stock level, USTA states that, in its simplified TFP model, it multiplies gross book values by "economic stock adjustment factors" derived by dividing BEA market value measures by BEA original cost measures for certain asset classes.¹²⁴ For the same reasons we find above that the Commission's prescribed depreciation rates are better suited than USTA's depreciation rates for our TFP analysis, we are not using USTA's economic adjustment factors to adjust the benchmark capital stock level for the effects of depreciation. Instead, we have decided to base the benchmark capital stock calculations in our analysis on net book costs: gross book costs minus the accumulated depreciation reserves associated with our prescribed depreciation rates.

65. We note that we are making only limited findings in this Order regarding depreciation: (1) TFP calculations for purposes of determining an X-Factor at this time should use the same depreciation rates as those the incumbent LECs are required to use to determine their operating expenses, and (2) USTA has failed to show that the depreciation rates used in its simplified TFP model measure depreciation better than the Commission's depreciation rates. We reach

¹²² USTA asserts that "the age-efficiency trends of assets" are independent of any regulatory depreciation rates, and therefore recommends using the depreciation rates in its simplified TFP model regardless of how the Commission may revise its depreciation rates in the future. USTA 1997 Comments, Att. 5 at 12-13. We can think of no reason why incumbent LECs should be permitted to use different depreciation rates for different regulatory purposes. Furthermore, we reject USTA's categorical claim that the Commission's depreciation rates do not and never will reflect the LECs' depreciation costs. We therefore disagree that USTA's depreciation rates are preferable to any depreciation rates we may develop in the future.

¹²³ Under this procedure, proposed depreciation rates are considered reasonable if the rates fall within specific bands established for each asset category by the Commission. See Depreciation Simplification Order, 8 FCC Rcd 8025.

¹²⁴ USTA Comments at 21 and App. A at 16.

no decision in this Order on the possible use of "economic" depreciation methods in general. In the Access Reform Notice, we sought comment on whether some portion of the incumbent price cap LECs' "residual" or "legacy" costs might be the result of underdepreciation.¹²⁵ We plan to address this issue in conjunction with the other residual cost issues we raised in the Access Reform Notice. Nor are we suggesting that we plan to continue exercising our Section 220(b) prescription authority indefinitely. The 1996 Act amended Section 220(b) of the Communications Act, so that we are no longer required to prescribe depreciation rates. The telecommunications industry is evolving, and this evolution may well require us to revise our prescription methods, or possibly discontinue depreciation rate prescriptions altogether. If we do revise the price cap LECs' depreciation rates substantially, or if we permit them to develop their own depreciation rates, we will determine the effect of the revised depreciation rates on TFP and the X-Factor in our next performance review.

(4) Hedonic Adjustments

66. **Background.** Both AT&T, initially, and Ad Hoc apply "hedonic" adjustments to their capital asset price indices, *i.e.*, adjustments to reflect that new equipment differs from the old in technology as well as in price. AT&T and Ad Hoc argue that capital input prices must be adjusted for technological improvements to avoid understating the change in the effective level of real capital stocks. AT&T states that, to the extent that succeeding generations of capital equipment are more productive, a hedonic adjustment increases the computed level of capital stock, increases the flow of capital services, and, holding output constant, decreases measured TFP. AT&T also states, however, that a hedonic adjustment would decrease the price of capital input, thus increasing the input price differential. AT&T therefore argues that its computed X-Factor is not greatly affected by its hedonic adjustment.¹²⁶ By contrast, Ad Hoc asserts that a hedonic adjustment would increase the X-Factor, rather than merely result in offsetting changes in TFP and the input price differential. Ad Hoc makes no recommendation at this time, however, as to how to adjust for technological improvements, but asserts that, if this adjustment caused a 10 percent annual decrease in the price indices for the capital

¹²⁵ Access Reform Notice at paras. 250-55.

¹²⁶ AT&T Comments, Att. A at 34-35.

input asset categories that include computers, the X-Factor would increase by about 0.4 percent.¹²⁷

67. **Discussion.** We find nothing in the record to suggest that our TFP calculation would be more accurate with a hedonic adjustment. AT&T observes that its hedonic TFP adjustment results in an offsetting adjustment to its input price differential, leaving its X-Factor recommendation unchanged.¹²⁸ In addition, neither AT&T nor Ad Hoc have shown that their hedonic adjustments accurately measure the effects of technological improvements. The hedonic adjustment to the price per unit of capital proposed by AT&T in its TFP model is incompletely documented, and the details on all the components of the hedonic adjustment are not clear and replicable. Ad Hoc's 10 percent per year adjustment to certain asset price indices is not supported, but stated as an assumption. Based on the record before us, there is no need to include a hedonic adjustment.

(5) Deriving the Level of Capital Services from Capital Stock

68. **Background.** We invited comment on whether capital services should be measured by "capital consumption," *i.e.*, the loss of efficiency in the capital over time, or by the level of capital stock. We noted that basing capital services on the level of capital stock assumes that the level of capital services is proportional to the level of the capital stock, and that the factor of proportionality does not vary over time. Alternatively, we sought comment on whether capital services could or should be based on some combination of the amount of capital consumption and the change in the level of capital stock.¹²⁹

69. **Discussion.** Our review of the economic literature on TFP and the pleadings of AT&T and USTA support the view that capital services (the quantity of capital services input) should be measured as proportional to the level of capital stock, and that capital consumption

¹²⁷ Ad Hoc Comments, Att. at 57-58. In its reply, Ad Hoc claimed that a 10 percent hedonic adjustment would increase the X-Factor by 1.0 when based on data from 1990 to 1994, or 1.1 percent when based on 1989 to 1993, or from 1989 to 1994. Ad Hoc Reply at 4 and Att. at 36-37.

¹²⁸ AT&T Comments, Att. A at 34-35.

¹²⁹ Price Cap Fourth Further Notice, 10 FCC Rcd at 13667 (para. 47).

(such as depreciation expense) should be included in the measure of the cost (price) of the capital stock.¹³⁰ Further, the parties argue that capital services do not decline over the useful life of a unit of the capital stock. A piece of capital equipment with a ten-year life does not provide 10 units of capital services in its first year and only 3 units in its eighth year.¹³¹ All the TFP studies submitted in the record of this proceeding measure the change in capital services as the change in the level of capital stock.

(6) Implicit Rental Price

70. **Background.** The weight given to the capital services input when it is aggregated with labor and materials inputs is based on the capital cost, which is the product of the implicit rental prices of the total capital stocks for the asset categories. The implicit rental price represents the hypothetical price of renting the LECs' capital stock in a competitive market, if such a market existed.¹³² In the **Price Cap Fourth Further Notice**, we observed that the implicit rental price in USTA's original TFP model is based on the rate of return, the depreciation rate, certain tax rates, and its TPIs.¹³³ In addition to asking specific questions regarding the rate of return, depreciation, and taxes, we sought comment on whether USTA's method of calculating the implicit rental price is reasonable. We also asked whether data would be available on a timely basis to make these calculations in the future, and about alternatives to USTA's method.¹³⁴

71. We also asked questions regarding the rate of return component of USTA's implicit rental price. We observed that USTA's original TFP model used Moody's Yield on Public Utility Bonds as the rate of return, and questioned whether it would not be more reasonable to include the cost of equity as well as the cost of debt in the rate of

¹³⁰ See, e.g., Berndt and Fuss, 33 J.Econometrics at 11.

¹³¹ See USTA Comments, Att. A at 21.

¹³² See Price Cap Fourth Further Notice, 10 FCC Rcd at 13677 (para. 48).

¹³³ Price Cap Fourth Further Notice, 10 FCC Rcd at 13667 (para. 48).

¹³⁴ Price Cap Fourth Further Notice, 10 FCC Rcd at 13667 (para. 49).

return.¹³⁵ We also noted that we have determined the LECs' rate of return in our past rate-of-return represcription orders, and questioned whether it would be reasonable to allow LECs to use any other rate of return. We also sought comment on how often, and by what method, the rate of return should be updated for purposes of TFP calculations. Finally, we invited comment on whether a represcription of the rate of return applicable to carriers subject to rate-of-return regulation should also be incorporated into TFP calculations.¹³⁶

72. **Discussion.** USTA estimates the rate of return in its implicit rental price calculation by deriving a nationally averaged return on capital from the National Income and Product Accounts. AT&T claims that USTA's implicit rental price introduces unreasonable distortions because it does not reflect price cap LECs' actual payments to capital. AT&T bases its weight for the capital input, or the "cost of capital" in terms of TFP calculations, on LEC revenues less the costs of labor and materials.¹³⁷ We find that AT&T's residual earnings method is a more accurate estimate of the contribution of capital to the production of output than USTA's method of measuring rate of return, because AT&T's method measures the actual flow of funds to capital. In other words, the residual earnings method reflects actual payments to capital. We have decided to use AT&T's approach in our analysis of the record, with the minor modifications discussed below.

73. AT&T cites several economic articles supporting the use of residual earnings as the cost of capital in TFP calculations.¹³⁸ For example, to correct for the potential distortion in the measurement of TFP growth, Berndt and Fuss propose two measures of implicit rental prices as alternatives to the equation proposed by USTA, one of which

¹³⁵ Price Cap Fourth Further Notice, 10 FCC Rcd at 13665 (para. 34).

¹³⁶ Price Cap Fourth Further Notice, 10 FCC Rcd at 13665 (paras. 35-36).

¹³⁷ Specifically, AT&T's proposed implicit rental price is calculated as property income divided by a measure of capital stock, where property income is total revenues plus depreciation less materials and labor payments.

¹³⁸ AT&T 1997 Reply, App. G at 27-29, citing e.g., Jorgenson and Griliches, The Explanation of Productivity Change, 34 Rev. Econ. Studies 249-80 (July 1967); Christensen and Jorgenson, The Measurement of Real Capital Input, 15 Rev. of Income and Wealth 293-320 (Dec. 1969); Berndt and Fuss, Productivity Measurement with Adjustments for Capacity Utilization and Order Forms of Temporary Equilibrium, 33 J.Econometrics 7-29 (Oct./Nov. 1986) (Berndt and Fuss).

is similar to the implicit rental price proposed by AT&T.¹³⁹ Dhrymes calculates an implicit rental price in a similar manner.¹⁴⁰ Additionally, AT&T states that Christensen, USTA's consultant, has used a similar construction in a TFP study Christensen presented to the Public Service Commission of North Dakota on behalf of US West.¹⁴¹

74. USTA and a number of LECs assert that AT&T's weighting of the capital input index replicates the incentives of rate-of-return regulation because it results in limiting carriers to a particular rate of return.¹⁴² We disagree. Under rate-of-return regulation, increases in a LEC's earnings lead directly to reductions in that LEC's rates. Under AT&T's capital weighting method, an increase in a LEC's earnings will increase the weight placed on its capital input index relative to its labor and materials indices. This would increase TFP and the X-Factor only to the extent that capital is growing less quickly than labor and materials. Also, the X-Factor is based on an industry average, and an increase in a particular LEC's TFP has only a limited effect on the industry average.

75. In our TFP calculation, we follow AT&T's proposal with modifications. The estimated implicit rental price is measured in terms of gross returns to capital divided by the capital stock. The weight used for aggregating capital services into the overall input quantity index is the share of gross payments to capital in total payments to all factors.

76. As a result of our decision to rely on AT&T's rather than USTA's implicit rental price, we need not determine whether a rate of return based on National Income and Product Accounts, Moody's bond indices, or the Commission's prescribed rate of return would be the most reasonable measure of the rate of return to incorporate into an implicit rental price calculation. We also do not need to address AT&T's contentions regarding USTA's treatment of depreciation or

¹³⁹ Berndt and Fuss.

¹⁴⁰ Dhrymes, The Structure of Production Technology: Evidence from LED Sample I in U.S. Dept. of Commerce, Bureau of the Census, Proceedings of the 1990 Annual Research Conference, at 206.

¹⁴¹ AT&T Reply, App.A.

¹⁴² USTA Reply at 20-21; Att. A at 17, Att. C at 4-6; NYNEX Reply at 15-16; BellSouth Reply, Att. at 23-29; GTE Reply at 9-10; Bell Atlantic Reply at 3; Southwestern Bell Reply at 10.

taxes in its calculation of the implicit rental price. Depreciation rates are relevant to AT&T's treatment of capital stock, however, and accordingly, we considered depreciation issues above.

b. Labor

77. **Background.** Labor is the second of the three factors of the TFP input index. In the Price Cap Fourth Further Notice, we noted that USTA's original TFP study used two categories of labor: management and non-management. We asked whether labor should be further disaggregated to account for different levels of education and vocational experience in the work force.¹⁴³ We also asked about adjustments for carrier "outsourcing," i.e., replacing the services of workers employed by carriers with services provided by outside firms.¹⁴⁴

78. **Discussion.** In USTA's simplified TFP model, there is one category of labor, and the quantity of labor is measured as the number of employees. AT&T's TFP calculations are based on two categories, full-time and part-time employees. AT&T measures the quantity of labor as number of employees, with part-time employees counted as a fraction of a full-time employee. No one has suggested a more disaggregated labor input index. In our analysis of the record, we base the rate of growth of labor on total number of employees, to be consistent with our current collections of ARMIS data.

79. We agree with USTA that, when outsourcing occurs, the decrease in labor input growth is offset by an increase in expenses for services, and is reflected in the materials index.¹⁴⁵ Because materials expenses are inputs to the TFP calculation, no additional adjustment for outsourcing is needed.

c. Materials

80. **Background.** The original USTA TFP study derived materials quantities indirectly. USTA calculated materials expenses by subtracting depreciation and amortization expense, and employee

¹⁴³ Price Cap Fourth Further Notice, 10 FCC Rcd at 13667 (para. 52).

¹⁴⁴ Price Cap Fourth Further Notice, 10 FCC Rcd at 13667 (para. 52).

¹⁴⁵ USTA Comments at 24.

wages, salaries, and benefits, from total operating expenses, and then deflated (or divided) this residual expense by the GDP-PI to construct a materials input index. AT&T's TFP study calculated materials expense by subtracting total labor compensation and the change in the depreciation reserve from total operating expense. AT&T deflated this residual expense by a materials price index. In the Price Cap Fourth Further Notice, we sought comment on whether it would be preferable or possible to construct a LEC-specific price index for deflating materials expense instead of relying on GDP-PI for that purpose. We stated that our objective was to measure TFP accurately with data that are verifiable and publicly available. In this section, we address only materials price and quantities index issues. We will address materials index weighting issues below.

81. Discussion. All the parties use the residual expense method of measuring materials. USTA uses the GDP-PI as the materials price index to deflate residual expense to derive materials quantities in its simplified TFP model. We find that USTA has not shown that use of GDP-PI accurately measures the prices of LEC materials and, therefore, TFP, because it does not reflect price changes in the narrow range of inputs used by LECs. This significantly affects measured TFP, and it disguises a significant portion of the input price differential.

82. The record contains a materials price index created by AT&T based on a subset of categories of national input/output expenditures prepared by the U.S. Bureau of Labor Statistics (BLS) that is more narrowly focused on materials purchases of communications industries than the economy-wide GDP-PI. We have replicated the index using the same BLS data that AT&T used in an ex parte filing received on April 11, 1996.¹⁴⁶ AT&T's materials price index is a Tornquist index calculation, where the logarithmic percentage changes are replaced by arithmetic percentage changes. Because AT&T's materials price index is more narrowly focused on communications services than GDP-PI, we use AT&T's materials price index.

d. Weighting of Materials and Labor Indices

83. All the models placed in the record base the weight of the materials index in the final input index on materials expense. Since all the models determine materials expense as the residual expense left

¹⁴⁶ AT&T Ex Parte Letter of April 11, 1996.

after labor compensation and depreciation are subtracted from total operating expense, both the labor and the materials shares of total inputs are affected by the specification of labor and depreciation expense.

84. USTA notes that AT&T's materials input index weight is calculated residually on the basis of total operating expenses minus total labor compensation and the change in depreciation reserves. USTA claims that AT&T's treatment of both labor expense and materials expense is flawed, and that those calculations distort the weights placed on the materials and labor input indices. USTA further claims that distorting the weights placed on the materials and labor input indices results in distorting the capital input index as well.

85. First, USTA claims that AT&T erred in subtracting total labor compensation from total operating expense. USTA claims that the proper measure of current period labor expense is wages, salaries and benefits. According to USTA, total labor compensation includes labor costs that are capitalized rather than expensed in the year in which they are incurred. Each year a portion of previously capitalized labor expense enters the current year total operating expense as part of depreciation expense. USTA claims that total labor compensation results in some double counting of labor expense,¹⁴⁷ and thus improperly shifts weight from the materials expense index to the labor input index.

86. Second, USTA claims that AT&T improperly calculated materials expense because it used the change in depreciation reserves instead of recorded depreciation and amortization expense. The increase in depreciation reserves may be less than depreciation and amortization expense because plant retirements draw down the reserve. This issue is different from the depreciation rate issue discussed above. Here, the issue is not to determine the proper rate of depreciation, but to determine materials expense by subtracting the depreciation (and labor) expense components of operating expense from total operating expense. USTA claims that changes in depreciation reserves understate depreciation expense, and, thus, overstate materials expense and place too great a weight on the material input index.

¹⁴⁷ USTA 1997 Comments, Att. 6 at 17-18.

87. USTA claims that these errors result in an understatement of 0.2 percent in TFP for the period from 1988 to 1994, and an understatement of 0.3 percent for the period from 1989 to 1994.¹⁴⁸ USTA also admits, however, that these errors would have offsetting effects on the calculation of the input price differential in AT&T's model, and, consequently, no overall effect on an X-Factor that includes an input price differential.¹⁴⁹ In its 1997 reply, AT&T states that it has switched to using depreciation and amortization expense, rather than changes in depreciation reserves,¹⁵⁰ for this calculation.

88. Both USTA's and AT&T's models double count some labor costs by basing labor quantities on the number of employees. This double-counting occurs because capitalized labor expense is reflected in capital stock as well as labor. USTA has not solved this problem by basing labor expense on wages, salaries, and benefits rather than total compensation, because capitalized labor remains fully reflected in capital stock. Instead, USTA's approach merely changes the relative weights placed on the labor, materials, and capital input indices. We have decided in our staff analysis to weight the labor input index in our analysis on total compensation rather than wages, salaries, and benefits.

89. In summary, we base the weight placed on the materials input on Total Operating Expense, less total labor compensation, as AT&T recommends, and depreciation/amortization expense, as USTA recommends.

90. In the Price Cap Fourth Further Notice, we were "particularly concerned" about whether to adjust labor costs for other post-employment benefits (OPEBs) given that we had first permitted price cap LECs to make an exogenous cost increase to reflect these costs, and then later required those LECs to make an exogenous cost decrease.¹⁵¹

¹⁴⁸ USTA 1997 Comments, Att. 6 at 19-20.

¹⁴⁹ USTA 1997 Comments, Att. 6 at 20.

¹⁵⁰ AT&T 1997 Reply, App. G at 34-35. Upon review of AT&T's submitted data, however, it does not appear that it has in fact made this revision to its model.

¹⁵¹ Price Cap Fourth Further Notice, 10 FCC Rcd at 13667 (para. 52). OPEBs are post-employment benefits such as severance pay and other benefits for separated workers, and employee post-retirement liabilities other than pensions, such as

We decide that no special adjustment of the labor input index is needed to reflect our changing regulatory treatment of OPEBs. The only relevant OPEB issue for purposes of TFP is whether amortizing OPEB expenses over longer or shorter periods can have any effect on the labor index, and thus TFP. We find that it does not because LECs record OPEB costs in their books at their present value, regardless of the amortization period we require. As a result, recording OPEB costs now has no greater or lesser effect on the labor input index than recording those costs in the future.

5. Summary

91. Total factor productivity (TFP) is the relationship between the output of goods and services to inputs of basic factors of production -- capital, labor, and materials. A TFP study attempts to quantify this ratio of output to inputs and measure the improvement in the ratio over time. The following outlines the staff TFP analysis, which is presented in detail in Appendix D.

92. We measured the change in the quantity of output using the change in physical measures such as access lines, messages, and minutes. Output quantities are then converted to index numbers and combined using their relative shares of total revenues as weights.

93. For inputs, the quantity of labor is measured directly, using the reported number of employees. We create the labor quantity index by taking a ratio of number of employees in a year to the number of employees in the base year, 1985. We measure capital services as a constant proportion of the capital stock. Thus, the change in capital services is proportional to the change in the capital stock. We have no direct measure of the quantity of materials consumed in the production of any period's output. Instead, we calculate materials expense by subtracting from total operating expense the operating expenses attributable to labor, and depreciation and amortization expense. To

retirees' life insurance and medical and dental care benefits. Southwestern Bell Corporation, GTE Service Corporation, Notification of Intent to Adopt Statement of Financial Accounting Standards No. 106, Employers' Accounting for Post-retirement Benefits Other Than Pensions, 6 FCC Rcd 7560 (Com. Car. Bur. 1991) §FAS-106 Order; RAO Letter 22, 8 FCC Rcd 4111 (Com. Car. Bur., Accounting and Audits Div. 1993); LEC Price Cap Performance Review, 10 FCC Rcd at 9082-83 (para. 276), aff'd. Bell Atlantic v. FCC, 79 F.3d at 1204.

convert materials expense into a quantity, we deflate materials expense by a price index specifically created to measure changes in materials prices. To combine these inputs into a single index of inputs, we need to calculate weights (or factor shares) that represent the relative contributions of the inputs in the production process. We assume the contribution of each input is proportional to the payments to that factor of production. The weight for each factor is its share of total factor payments. For labor, this is total employee compensation. For materials, we use a number we have already calculated -- total material expense. The payment to capital is equal to gross return to capital, which is the difference between total revenue and the sum of materials and labor expense.

94. Estimating the change in total factor productivity allows us to develop an input price index that measures the change in the unit cost of purchasing basic resources. The labor and capital prices are transformed into indices, and the three input price indices are combined using the factor shares calculated above.

D. Other X-Factor Calculation Issues

1. Input Price Differential

95. **Background.** In the LEC Price Cap Performance Review, we noted that changes in a firm's costs of producing a unit of output are the product of both changes in the quantity of resources used, *i.e.*, changes in productivity, and changes in the prices paid for those resources, *i.e.*, changes in input prices.¹⁵² We tentatively concluded that the X-Factor should include both a measure of productivity growth and a measure of input price changes.¹⁵³ Specifically, we found that, as a theoretical matter, because LEC unit costs are also affected by the prices they pay for inputs, an input price differential should be included in the X-Factor.¹⁵⁴ In general, any TFP study generates an estimate of the change in input prices over the study period, in the price indices used

¹⁵² LEC Price Cap Performance Review, 10 FCC Rcd at 9033 (paras. 160-61) and 9213-40 (App. F). See also Price Cap Fourth Further Notice, 10 FCC Rcd at 13668 (para. 54).

¹⁵³ LEC Price Cap Performance Review, 10 FCC Rcd at 9033 (para. 160); Price Cap Fourth Further Notice, 10 FCC Rcd at 13668 (para. 54).

¹⁵⁴ LEC Price Cap Performance Review, 10 FCC Rcd at 9222 (App. F).

to calculate the input indices. "Input price differential" refers, in the present context, to the difference between the rate at which input prices change in the economy in general and the rate at which LEC input prices change. Thus, when USTA claims that the long-term input price differential is zero, it is saying that the prices LECs pay for the resources they use in producing telecommunications services change at about the general rate of inflation. An input price differential of 2 percent, on the other hand, would mean that the prices LECs pay for the resources they use rise more slowly than the general rate of inflation. A higher input price differential produces a higher X-Factor.

96. Based on data USTA supplied in its comments filed in this proceeding prior to the LEC Price Cap Performance Review, and in ex parte statements filed in January and February 1995, we tentatively concluded in the Price Cap Fourth Further Notice that the input price differential was about 2.7 percent for the period from 1984 to 1990.¹⁵⁵ We found that USTA's conclusion that the long-term input price differential is zero was theoretically unsound, and unsupported by USTA's data.¹⁵⁶ In the Price Cap Fourth Further Notice, we also sought comment on whether the input price differential should be based on a long-term trend as USTA suggested, or on a shorter period, such as the period used for the TFP analysis, as Ad Hoc suggested. We invited comment on the data that should be used to calculate the input price differential.¹⁵⁷

97. Discussion. USTA and other parties agree that changes in LEC input prices should be reflected in the X-Factor if productivity is measured using a TFP method, because TFP adjusts input and output prices to "real" or constant dollar terms to measure "real" productivity. USTA advocates a long-run analysis of input prices, and asserts that, in the long run, there is no statistically significant difference between LEC input price changes and economy-wide input price changes. Other parties contend the relevant period is roughly from 1984 to the present.

¹⁵⁵ LEC Price Cap Performance Review, 10 FCC Rcd at 9222 (App. F). In Appendix F, we referred to the study provided as Attachment 5 to USTA's 1994 comments as the "NERA Study," and the study provided in its February 1, 1995 ex parte statement as the "Christensen Study," in reference to the consultants hired by USTA to conduct those studies. In this Order, we will continue to refer to these studies as the NERA Study and the Christensen Study.

¹⁵⁶ LEC Price Cap Performance Review, 10 FCC Rcd at 9224 (App. F).

¹⁵⁷ Price Cap Fourth Further Notice, 10 FCC Rcd at 13668 (paras. 57-60).

AT&T estimates that the input price differential was 2.54 percent per year from 1985 to 1994, using BLS data rather than the data in the Christensen Study sponsored by USTA.¹⁵⁸ AT&T also estimates that the input price differential between 1985 and 1995 was 2.35 percent.¹⁵⁹ Ad Hoc claims that the input price differential from 1984 to 1993 is 2.1 percent based on USTA's data, or 3.4 percent based on USTA's data corrected for certain errors alleged by Ad Hoc.¹⁶⁰ Sprint compares its price indices for capital, labor, and materials to its economy-wide input price index, and finds that the five-year moving averages for the period from 1985 to 1993 range from 0.84 percent to 1.64 percent.¹⁶¹

98. On the basis of the record before us in this proceeding, we conclude, for the reasons discussed below, that short-term data should be used to select an input price differential for use in prescribing a TFP-based X-Factor. All the TFP models in the record include price indices for capital, labor, and materials, and the weights needed to calculate an average input price index. All parties used TFP models that determined an X-Factor by estimating productivity and input prices simultaneously, because both the inputs and outputs must be measured in real, or inflation-adjusted, terms. Therefore, any estimate of TFP includes an estimate of an input price differential. If we adopted a methodology that used one set of assumptions and data to measure LEC input prices for use in calculating TFP, and a different set for measuring the input price differential, the calculations would be inconsistent. We see no reason to calculate TFP using one set of data and assumptions, and then calculate the input price differential using a different set of data and assumptions. Therefore, we do not estimate the input price differential separately from TFP, and we will not make independent prescriptions of the productivity and input price components of the X-Factor. Instead, we will focus directly on selecting the appropriate combined X-Factor. Accordingly, in the table in Section III.E. below, we display X-Factor estimates which are combined TFP and input price differentials, rather than separate forecasts of TFP and input price differentials.

¹⁵⁸ AT&T Comments at 12-13 and App. A at 17-22.

¹⁵⁹ AT&T 1997 Reply, App. G at 34.

¹⁶⁰ Ad Hoc Reply, Att. at 12.

¹⁶¹ Sprint Reply, Att. A at 41-43.

99. The LECs make four arguments in favor of setting the input price differential equal to zero: (1) the input price differential should be based on long-term studies; (2) short-term studies do not show a positive input price differential, but rather a temporary effect of divestiture; (3) it is not reasonable to estimate input price changes on the basis of the price indices in TFP calculations; and (4) including an input price differential might make the X-Factor volatile in a moving average-based price cap plan. For the reasons discussed below, we find none of these arguments persuasive.

100. We give no weight to USTA's estimate of the long-term trend. Both the Christensen Study and the NERA Study submitted by USTA, and discussed in Appendix F of the LEC Price Cap Performance Review, base their conclusions on four different TFP studies, each covering different periods of time. Each of these studies was conducted using disparate and inconsistent techniques. For example, different methods of measuring materials input prices, and different depreciation rates, were used to develop capital input prices for different portions of the study period. In addition, the data in the Christensen Study could support a conclusion that the input price differential is either zero or 2.6 percent.¹⁶² Although the LECs focus their attention on the fact that zero is within the range of possible input price differentials supported by USTA's studies,¹⁶³ none adequately addresses the fact that the data support a wide range of other possible outcomes. Because neither the Christensen Study nor the NERA Study is based on a consistent set of data or methodology throughout the period covered by either study, we find that their conclusions about the long-term trend of LEC input prices are not supported.

101. We agree with the parties who argue that consistency requires us to use data from the same period to determine both TFP

¹⁶² LEC Price Cap Performance Review, 10 FCC Rcd at 9224-25 (App. F).

¹⁶³ USTA Comments at 26 and App. C at 3-6; US West Comments at 7, 16; Southwestern Bell Comments at 11; NYNEX Comments at 21; BellSouth Comments at 14-16; Bell Atlantic Comments at 11-12; Lincoln Comments at 4; Ameritech Comments at 4-5; GTE Comments at 11 and App. B, App. F; NYNEX Reply at 5; USTA Reply, Att. A at 23-25; Pacific Reply at 4. According to USTA, AT&T places too much emphasis on its estimate and not enough emphasis on the fact that 0 is within the 95 percent confidence interval. USTA Reply, Att. B at 17-19.

growth and input price differential.¹⁶⁴ Furthermore, our objective here is to prescribe an X-Factor that will set a reasonably aggressive productivity goal for LECs for the near future until completion of the next performance review. Given all the changes that have occurred in telecommunications during the 44 years covered by the long-term input price studies that have been placed on the record here,¹⁶⁵ we find that data from a recent, shorter period of time provide a more reliable basis for estimating input price trends for the near future than the longer term data.

102. Some incumbent LECs contend that any input price differential revealed by an analysis of the data from 1985 to 1994 is a temporary effect of divestiture. According to these commenters, the input price differential appears in 1984, returns to zero in 1989 or 1990, and is likely to continue to be zero in the future. USTA, on the other hand, claims that the input price differential is not related to divestiture at all, and that the input price differential started to increase in 1980 and began declining in 1990.¹⁶⁶ USTA also contends that the difference in input price differential in the Christensen Study before and after 1984 is a result of the different methodologies used to generate the pre- and post-1984 data series.¹⁶⁷ We conclude that the input price differential is not a temporary effect of divestiture. LEC input prices have grown at a different rate from input prices in the economy as a whole for all the years analyzed in our study. Furthermore, no party making this argument provides any theoretical argument to explain why the input price differential was exclusively a result of divestiture, and therefore could not ever recur. Therefore, we are not persuaded by this record that the observed LEC input price differential was merely a temporary effect of divestiture, or is unlikely to continue.

¹⁶⁴ Ad Hoc Comments, Att. at 43-45; Ad Hoc Reply at 3 and Att. at 11-13. See also TRA Reply at 3-4 (use of long-term data for input price differential hides the effects of divestiture.)

¹⁶⁵ USTA cites in particular a study in filed prior to our adoption of the LEC Price Cap Performance Review, analyzing input price changes from 1948 to 1992. USTA Comments at 26-27. See also USTA Reply, Att. A at 26-28.

¹⁶⁶ USTA Reply, App. B at 14-15.

¹⁶⁷ USTA Comments, Att. A at 46.

103. AT&T argues that LEC input prices for capital and materials in USTA's simplified TFP model are closely related to GDP-PI, and thus artificially reduce the input price differential.¹⁶⁸ USTA adopts GDP-PI as its materials input price index for LECs, and bases its capital input price indices for LECs on National Income and Product Account data. Thus, USTA's TFP study simply assumes away much of the difference between LEC input price growth and U.S. input price changes by basing most of its input price information on data directly related to GDP-PI and U.S. input price growth. Using GDP-PI to measure input prices is unreasonable because GDP-PI measures output prices, *i.e.*, the prices of final goods and services, rather than input prices, the prices of intermediate goods and services. Therefore, we base our analysis of the input price differential on the input price indices we use in our analysis of the record.

104. A number of LECs assert that the design of USTA's original TFP model precludes any derivation of a meaningful estimate of LEC input price changes. These parties argue further that the Commission erred in Appendix F of the LEC Price Cap Performance Review in concluding that the price indices in USTA's TFP study can be used to produce reliable results regarding the input price differential for our purposes.¹⁶⁹ Ad Hoc argues that the Commission's input price differential results are not unreliable simply because USTA did not intend its TFP study to be used to derive the input price differential.¹⁷⁰ We agree with Ad Hoc on this issue. The LECs have not explained why we should assume that the price indices used for their TFP calculations do not reflect their input prices for purposes of calculating the input price differential.

105. Several parties assert that the X-Factor should represent a prediction of the LECs' achievable future productivity growth, and that including the input price differential in the X-Factor would make it too volatile to have any predictive power, and could cause rate churn.¹⁷¹ As

¹⁶⁸ AT&T Reply, App. B at 25-28.

¹⁶⁹ Lincoln Comments at 4; Southwestern Bell Comments at 11; Southwestern Bell Reply at 11-13; USTA Reply at 12 n.4.

¹⁷⁰ Ad Hoc Reply at 13-14.

¹⁷¹ Pacific Comments at 3-6; Pacific Reply at 4; US West Comments at 16; Lincoln Comments at 4; NYNEX Comments at 22; NYNEX Reply at 6; USTA Reply, Att. A at 22-26.

we explain further in Section V. below, we have decided to adopt a fixed X-Factor, which will preclude any volatility in the input price differential from being reflected in the X-Factor. Finally, we reject Southwestern Bell's assertion that the past input price differential should not be relevant for setting a future X-Factor.¹⁷² Changes in input prices affect incumbent LECs' unit costs, and so should be reflected in the X-Factor. We have no more reliable basis for predicting future input price changes than past input price changes.

106. In the LEC Price Cap Performance Review, we defined the input price differential as the difference between the rate of change in LEC input prices and economy-wide input price changes, rather than the difference between LEC input prices and GDP-PI.¹⁷³ We estimate LEC input prices on the basis of the price indices we use to calculate TFP, and we have chosen to use the BLS Non-Farm Business Sector Input Price Index as our measure of economy-wide input price changes, as AT&T used.¹⁷⁴ We have chosen the BLS Non-Farm Business Sector Input Price Index for economy-wide input prices because this is the broadest index of the prices of non-farm input goods and services available. It is also produced in conjunction with, and is therefore consistent with, our measure of productivity growth for the economy as a whole. We did not choose GDP-PI because the input price differential measures the difference between LEC input prices and input prices in the economy in general, and GDP-PI is a measure of price changes for final goods and services. The most recent published data in these series is for 1994. We estimate the 1995 changes using the average of the five most recent years.

2. Adjustment to X-Factor for Interstate-Only Activity
 - a. Background

107. USTA's original TFP study was based on total company data. AT&T claimed that the LECs' interstate access services have grown faster than LEC output overall, so that interstate productivity growth was

¹⁷² Southwestern Bell Reply at 15.

¹⁷³ LEC Price Cap Performance Review, 10 FCC Rcd at 9215-16. See also Price Cap Fourth Further Notice, 10 FCC Rcd at 13668 (para. 54).

¹⁷⁴ AT&T Comments, App. B at 19.

greater than total company productivity growth. Thus, according to AT&T, reliance on total company data in measuring TFP tends to understate the LECs' interstate access productivity growth.¹⁷⁵ We noted that interstate and intrastate services are usually provided over common facilities, and questioned whether it would be possible to develop separate production functions for interstate and intrastate services.¹⁷⁶

108. In the Price Cap Fourth Further Notice, we invited comment on several issues related to this subject, including whether consideration of total company TFP data might exceed our jurisdiction. We also sought comment on whether there was any way to develop "economically meaningful" separate production functions for the purposes of calculating interstate TFP, or if not, whether there was any adjustment that could be made to total company TFP to account for any existing differences between interstate and intrastate productivity growth.¹⁷⁷ Finally, we asked whether basing the X-Factor on total company TFP would require us to revise our ARMIS or Form 492 reporting requirements.¹⁷⁸

b. Discussion

109. We stated in the LEC Price Cap Performance Review that we would consider making an adjustment to account for differences in interstate and intrastate productivity growth if including intrastate data created a "systematic downward bias" in the X-Factor.¹⁷⁹ We also stated that we would prefer to address any such bias "directly," rather than by attempting to construct an interstate factor based on regulatory

¹⁷⁵ See LEC Price Cap Performance Review, 10 FCC Rcd at 9012-13 (para. 114).

¹⁷⁶ See LEC Price Cap Performance Review, 10 FCC Rcd at 9032-33 (para. 159). The "production function" is the technological relationship between inputs and outputs. Id.

¹⁷⁷ Price Cap Fourth Further Notice, 10 FCC Rcd at 13669 (paras. 64-67).

¹⁷⁸ Price Cap Fourth Further Notice, 10 FCC Rcd at 13669-70 (para. 68).

¹⁷⁹ LEC Price Cap Performance Review, 10 FCC Rcd at 9033 (para. 159). We discussed a "systematic downward bias" in the LEC Price Cap Performance Review because in that context, IXCs argued that measuring TFP on a total company basis understated interstate productivity growth. If an incumbent price cap LEC were to claim that total company TFP overstated interstate productivity growth, we anticipate using the same analysis to determine whether there is any "systematic upward bias."

accounting and other regulatory requirements that may not fully reflect economic costs.¹⁸⁰

110. We find that the record before us does not allow us to quantify the extent, if any, to which interstate productivity growth may differ significantly from total company productivity growth. AT&T argues that interstate productivity growth is greater than intrastate growth because there are greater economies of scale for interstate services.¹⁸¹ CCTA assumes that interstate productivity growth is greater because some state public service commissions have retained rate-of-return regulation.¹⁸² On the other hand, BellSouth asserts that interstate services are more capital-intensive than intrastate services, and that capital inputs have grown faster than labor or materials inputs. On this basis, BellSouth infers that interstate productivity may have grown more slowly than intrastate productivity.¹⁸³ Neither CCTA nor BellSouth has provided any empirical data to substantiate either the effects they describe or their significance. AT&T and Ad Hoc calculate interstate TFP by measuring the growth in interstate outputs, but assume that interstate inputs grow at the same rate as intrastate inputs. USTA argues that it would be more reasonable to assume that interstate inputs grow at the same rate as interstate outputs. None of these parties, however, provides a factual or theoretical explanation as to why its assumptions might be correct. Accordingly, we find no basis in the record for making an adjustment to the X-Factor to account for any differences between interstate and total company productivity.

111. Arguing that interstate productivity growth is systematically greater than intrastate productivity growth, Ad Hoc and API assert that basing the X-Factor on total company TFP might give LECs a windfall unless the states also adopt regulations based on total company data.¹⁸⁴ Ad Hoc also asserts that we should require an interstate TFP adjustment because some LECs have advocated making some intrastate TFP

¹⁸⁰ LEC Price Cap Performance Review, 10 FCC Rcd at 9033 (para. 159).

¹⁸¹ AT&T Reply at 27, App. B at 29-34, App. C at 8-13.

¹⁸² CCTA Reply at 11-12.

¹⁸³ BellSouth Reply, Att. at 20-23.

¹⁸⁴ Ad Hoc Comments, Att. at 48-49; API Comments at 5.

adjustment before state public service commissions.¹⁸⁵ Unsupported claims of a potential LEC windfall do not by themselves convince us that there is any factual basis for concluding that there is a systematic difference between interstate and total company productivity. Ad Hoc's claims that some LECs have supported intrastate TFP adjustments in some state jurisdiction does not show that there is a nation-wide difference between interstate TFP and total company TFP significant enough to warrant making some adjustment to our LEC industry-wide X-Factor.

112. **Legal Considerations.** AT&T and others make various arguments that using total company data to calculate TFP violates Section 2(b) of the Communications Act or the requirements of Smith v. Illinois Bell.¹⁸⁶ Because we have determined above that the record does not demonstrate any systematic bias in using total company productivity growth, we need not reach this legal issue at this time.

- c. TFP Adjustment for Differences in Regulated and Nonregulated Productivity Growth

113. **Background.** We also solicited comment in the Price Cap Fourth Further Notice on whether we should measure TFP on any less-than-total-company basis other than interstate-only, such as the TFP for regulated services.¹⁸⁷ We also asked whether we should exclude the productivity growth associated with certain specific regulated services or groups of services. The example we used in the Price Cap Fourth Further Notice was video dialtone services. We noted that nonregulated services might not share joint and common costs with regulated services to the same extent as interstate and intrastate services.¹⁸⁸

114. **Discussion.** Ad Hoc claims that the initial investment required to begin providing certain nonregulated services or video services could

¹⁸⁵ Ad Hoc Reply, Att. at 10-11.

¹⁸⁶ Ad Hoc Comments at 6-7; AT&T Comments at 14-17; MCI Reply at 8; Ad Hoc Reply at 8-9; TRA Reply at 5-6; LDDS Reply at 4-5; AT&T Reply at 30-31, citing, e.g., Smith v. Illinois Bell Telephone Co., 282 U.S. 133 (1930) (Smith).

¹⁸⁷ Price Cap Fourth Further Notice, 10 FCC Rcd at 13670 (paras. 69-70).

¹⁸⁸ Price Cap Fourth Further Notice, 10 FCC Rcd at 13670 (paras. 69-70).

increase capital inputs, and thus decrease measured TFP growth.¹⁸⁹ If we adopted a moving-average methodology, Ad Hoc's assertion might warrant closer analysis. We are instead prescribing an X-Factor based on data from 1986 to 1995. We find that nonregulated investment during this time period was too small, relative to total regulated investment, to have a significant effect on our TFP calculations. We therefore make no adjustment to the X-Factor or to TFP to account for the effects of nonregulated activities.

115. In its 1997 reply, AT&T asserts that USTA has recognized the legitimacy of making a regulated/non-regulated adjustment by doing so in its TFP analysis.¹⁹⁰ AT&T does not specifically identify the adjustment that it maintains USTA has made to account for differences in regulated and non-regulated productivity, but it appears to be in USTA's miscellaneous services output index. As we discuss above, USTA's miscellaneous services output index contains several anomalous results, including negative growth in some years. As a result, we have excluded that output category completely from our output index.

d. Reporting

116. We sought comment on whether basing the X-Factor on total company TFP would require us to expand our ARMIS or Form 492 reporting requirements to collect total company data.¹⁹¹ Below, we decline to adopt a price cap plan in which LECs would be required to recalculate the X-Factor annually on the basis of a prescribed method. Instead, we prescribe an X-Factor that will remain in effect at least until the next performance review. Accordingly, we conclude that we need not expand our reporting requirements at this time.

¹⁸⁹ Ad Hoc Comments, Att. at 50-51.

¹⁹⁰ AT&T 1997 Reply, App. G at 4-5.

¹⁹¹ Price Cap Fourth Further Notice, 10 FCC Rcd at 13669-70 (paras. 68).

3. Effect of Universal Service and Other Subsidy Programs on LEC TFP

117. Background. In the Price Cap Fourth Further Notice, we noted that there were a number of universal service or other subsidy programs at both the federal and state levels, and asked to what extent such programs affect or should affect LECs' productivity calculations.¹⁹²

118. Discussion. A number of commenters argue that total company TFP captures the effects of any universal service fund or subsidy programs, and thus no special adjustments are needed.¹⁹³ BellSouth contends that changes in universal service funding requirements are treated exogenously, and supports continuing this treatment.¹⁹⁴ CCTA supports considering universal service fund revisions in the Universal Service Order proceeding rather than here.¹⁹⁵

119. We have no reason to believe that replacing the implicit subsidies in incumbent LECs' current rates with explicit subsidies, as required to meet the 1996 Act's universal service provisions, will affect productivity significantly. The implicit subsidies were designed to promote universal service, and have been generally successful.¹⁹⁶ We expect subscribership levels to remain high under our new universal service rules. Thus, there should not be any dramatic increases or decreases in incumbent LEC outputs, and so there should be little effect on TFP. Accordingly, we will not take any further action on this issue here.

¹⁹² Price Cap Fourth Further Notice, 10 FCC Rcd at 13670 (paras. 71-72).

¹⁹³ Southwestern Bell Comments at 15-16; GTE Comments at 25; USTA Comments at 31-32; US West Comments at 18.

¹⁹⁴ BellSouth Comments at 22.

¹⁹⁵ CCTA Reply at 21.

¹⁹⁶ See LEC Price Cap Performance Review, 10 FCC Rcd at 8988 (para. 62), citing Telephone Subscribership in the United States, FCC, Common Carrier Bureau, Industry Analysis Division (Nov. 1994).

4. Inclusion of Other Firms in Study

120. Background. In the first phase of this proceeding, Ad Hoc argued that basing the X-Factor on industry-wide moving average data might encourage excessive network investment, and thus might lead to "gold-plating" incentives similar to those created by rate-of-return regulation. Therefore, Ad Hoc recommended including data from other telecommunications service providers in the TFP calculations.¹⁹⁷ We invited comment on Ad Hoc's proposal, and requested parties to discuss whether the data necessary to perform an expanded TFP study would be available annually in a timely manner.¹⁹⁸

121. Discussion. Below, we decline to adopt a methodology for the X-Factor on an industry-wide moving average. Therefore, we conclude that there is no need at this time to include data from other industries to address the concern raised by Ad Hoc. At this time, we also need not address NYNEX's, GTE's, and US West's arguments against inclusion of such data.

5. Consumer Productivity Dividend

122. Background. In the LEC Price Cap Order, we added 0.5 percentage points to the X-Factor to ensure that the first benefits of the price cap plan are flowed through to access customers. We called this addition the consumer productivity dividend (CPD).¹⁹⁹ In the Price Cap Fourth Further Notice, we invited parties to discuss whether we should retain the CPD in the long-term price cap plan, in order to, for example, reflect anticipated productivity growth resulting from the elimination of sharing.²⁰⁰ We also sought comment on whether the CPD should remain at 0.5 percent or be set at some other value.²⁰¹

¹⁹⁷ See LEC Price Cap Performance Review, 10 FCC Rcd at 9017 (para. 124).

¹⁹⁸ Price Cap Fourth Further Notice, 10 FCC Rcd at 13671 (paras. 73-74).

¹⁹⁹ LEC Price Cap Order, 5 FCC Rcd at 6799 (para. 100). We had adopted a similar 0.5 percent consumer productivity dividend in our earlier Order adopting price cap regulation for AT&T. AT&T Price Cap Order, 4 FCC Rcd at 3001 (para. 248).

²⁰⁰ Price Cap Fourth Further Notice, 10 FCC Rcd at 13673 (para. 95).

²⁰¹ Price Cap Fourth Further Notice, 10 FCC Rcd at 13673 (paras. 94-95).

123. **Discussion.** Consistent with our practice in both AT&T and LEC price cap regulation, we retain a 0.5 percent Consumer Productivity Dividend in our revised price cap plan. We decide below to adopt a single fixed X-Factor in our revised price cap plan, based on LEC industry-wide data. The CPD will act as a mechanism to ensure that price cap LECs flow-through a reasonable portion of the benefits of productivity growth to ratepayers. The importance of this purpose in our revised price cap plan is enhanced because we are eliminating the current sharing requirements and we are not adopting a moving average method of updating the X-Factor.²⁰²

124. Parties arguing in favor of eliminating the CPD are not persuasive. Several incumbent LECs maintain that it is arbitrary and capricious to transfer any productivity gains to access customers. In a competitive market, however, competitors will continuously provide firms with incentives to lower their unit costs more quickly than they have in the past so that they can lower their prices and win customers from their competitors. By this mechanism, a competitive market passes cost reductions on to customers in the form of lower prices. By requiring incumbent LECs to transfer at least part of their productivity gains to access customers, the CPD tends to replicate the results of a competitive market. Therefore, we find that it is reasonable to use a CPD to require incumbent LECs to transfer some portion of their unit cost reductions to their customers. USTA asserts that the price cap plan properly balances shareholder and ratepayer interests without the CPD,²⁰³ but does not explain why we should not continue our established practice.

125. Some contend that the CPD was adopted because of uncertainty regarding the X-Factors in the original price cap plan, and our experience under price cap regulation should have alleviated this uncertainty. We disagree that the passage of time by itself has eliminated the need for a CPD. The CPD remains necessary to require LECs to transfer some portion to their unit cost reductions to their access customers. Also, the CPD was, in a sense, an expression of certainty that LECs would respond to the incentives provided by the price caps plan by becoming more productive, and that there would be productivity gains that could be shared between ratepayers and shareholders. The passage of time has not

²⁰² A moving average could result in flowing through productivity gains to access customers. LEC Price Cap Performance Review, 10 FCC Rcd at 9030 (para. 153).

²⁰³ USTA Reply at 26.

altered the need to strike this balance between ratepayer and shareholder interests.

126. BellSouth and GTE argue that there was no principled basis for selecting 0.5 percent as the CPD. We explained in the LEC Price Cap Order that setting the CPD at 0.5 percent would ensure that access customers share a portion of the productivity benefits of price cap regulation.²⁰⁴ Although GTE broadly asserts that including a 0.5 percent CPD would cause the X-Factor to be excessive, we believe that a 0.5 percent CPD, with the elimination of sharing, continues to be necessary to ensure that access customers receive benefits.

127. We are mindful that, while some incumbent LECs have achieved high earnings under price caps, others have not always done so. We therefore retain the low-end adjustment mechanism for LECs with substantially below-average earnings. The low-end adjustment mechanism permits incumbent price cap LECs with rates of return less than 10.25 percent to increase their PCIs to a level that would enable them to earn 10.25 percent.²⁰⁵

6. Effects of Access Reform

128. In the Access Reform Notice, we invited comment on the potential effects of access reform on TFP.²⁰⁶ Some parties argue that replacing the per-minute carrier common line charge with a per line charge will depress measured TFP because access lines have historically grown more slowly than access minutes.²⁰⁷ USTA argues that if either competition or regulatory action reduces the price-marginal cost margin on rapidly growing services, measured TFP will fall. USTA concedes it has no direct evidence of the expected magnitude of this effect and makes no specific prediction of the size of the reduction in TFP growth.²⁰⁸ USTA estimates, however, that its access reform proposal, holding everything else constant, would reduce measured TFP growth for the period from

²⁰⁴ LEC Price Cap Order, 5 FCC Rcd at 6796 (para. 74).

²⁰⁵ LEC Price Cap Order, 5 FCC Rcd at 6804 (paras. 147-49).

²⁰⁶ Access Reform Notice at para. 233.

²⁰⁷ US West 1997 Comments at 55; Aliant 1997 Comments at 68; USTA 1997 Reply at 40-41 and Att. 3 at 9-10.

²⁰⁸ USTA 1997 Comments, Att. 5 at 7-8.

1990 to 1995 by 0.4 percent by changing the revenue weights of per-line and per-minute common line services.²⁰⁹ USTA claims support for its assertion that measured TFP growth will be affected by restructuring the collection of common line costs from two articles from the literature of economics.²¹⁰ On the other hand, AT&T anticipates that access reform would increase productivity growth, because reducing rates to cost-based levels would stimulate demand.²¹¹

129. We find that USTA has not sufficiently considered the effect that moving prices towards marginal cost will have on LEC efficiency. Under our current access rate structure rules, before the revisions adopted in our companion Access Reform First Report and Order, incumbent LECs are often unable to offer access services at rates that reflect the manner they incur costs and therefore are faced with artificially depressed demand. The implicit cross-subsidies in our current access rate structure rules have resulted in increased demand for certain services and decreased demand for others. When demand for services is distorted in this fashion, incumbent LECs must provide those services at levels that do not enable them to minimize their per-unit costs. When prices reflect marginal costs, however, consumers increase their purchases of services previously priced above marginal cost, and reduce their purchases of services previously priced below marginal cost. The net result of such a change in rate structure will allow LECs to minimize the per-unit cost of producing their total output. Based on the current record, we find that access reform will have at most a very modest effect on the revenue weights used to aggregate output and that this effect will be offset at least in part by changes on the input side of the TFP equation as LECs adjust inputs to produce a more efficient mix of outputs. Thus, it would be speculative to attempt to adjust our TFP estimates now.

130. The articles cited by USTA are consistent with this analysis. They provide support only for the proposition that, if everything else is

²⁰⁹ USTA assumes that carrier common line charges are billed on a presubscribed line basis, and that the transport interconnection charge is collected on a bulk-billed basis. USTA 1997 Comments, Att. 5 at 8-9.

²¹⁰ USTA 1997 Comments, Att. 5 at 7 nn. 10, 11; citing Crandall and Galst, Productivity Growth in the U.S. Telecommunications Sector: The Impact of AT&T Divestiture (The Brookings Institution, February 1991) (Crandall and Galst); Fuss, Telecommunications Growth in Canadian Telecommunications Canadian J. Econ. (May 1993).

²¹¹ AT&T 1997 Reply at 35-36.

held constant, adjusting the weights of each category of LEC outputs for the margin between price and marginal cost reduces measured output, measured TFP, and TFP growth.²¹²

131. Some parties contend that measured TFP will decrease under competition because incumbent LEC output will fall as new entrants successfully compete for existing customers. USTA asserts that a one percent reduction in LEC output growth will reduce LEC TFP growth by 0.3 to 0.5 percent. We are not persuaded that we should reduce our baseline productivity estimates we are using here to set an X-Factor that will apply to all incumbent price cap LECs and all their access services. We are not deciding what, if any, changes to the X-Factor we should make with the lowering of barriers to competitive entry or the development of competition.²¹³

132. In summary, we find that the parties have not shown it reasonable to reduce the measured TFP growth of incumbent LECs in light of the overall effect of the rate restructuring adopted in the Access Reform First Report and Order.

E. Analysis and Prescription

133. Above, we have examined several individual issues regarding TFP calculation, determination of the input price differential, and other X-Factor calculation issues. On the basis of the record in this proceeding, we have determined the best available methods to perform each of the calculations necessary to conduct a TFP study, and we have developed a reasonable prediction of the future input price differential. We recognize that the results of any study are reliable only to the extent that the data used in the study is taken from a consistent series, and that the methods used in the study are internally consistent. We conclude that our staff analysis relies on consistent data sources and methods, and that our input price differential findings are based on consistent and reliable data.

134. For reasons discussed in Section V. below, we have decided not to adopt a moving average mechanism to update the X-Factor. In the Price Cap Fourth Further Notice, we sought comment on the best time period for

²¹² Crandall and Galst at 28-29.

²¹³ See Section IV.C., infra.

studies used to calculate a fixed X-Factor.²¹⁴ Ad Hoc contends that we should use all the data since 1984, arguing that the divestiture of the Bell System in 1984 creates a "break" in the data, and that comparing data from before and after that time could yield anomalous results.²¹⁵ AT&T also uses post-divestiture for its TFP study. USTA recommends basing the X-Factor on a five-year moving average, and includes post-1988 data in its TFP study. USTA also contends, however, that the relevant period for the input price differential is from 1948 to the present. No other party commented on this issue. As discussed below, we base our analysis on data from 1986 to 1995.

135. USTA criticizes AT&T's model because it includes data only from the Bell Operating Companies (BOCs), while USTA's model includes data from GTE, Sprint, SNET, and Lincoln.²¹⁶ USTA also finds, however, that including non-BOC data results in only a 0.1 percent difference in the X-Factor for the period from 1988 to 1994, and no difference from 1989 to 1994.²¹⁷ In our analysis of the record, we rely only on BOC data, as AT&T does.

136. Parties have presented a wide range of X-Factor recommendations in our two proceedings. On the basis of its model, USTA proposes X-Factors ranging from 2.7 to 3.1.²¹⁸ At the other extreme, AT&T and Ad Hoc propose X-Factors between 8.0 and 10.0, in part on the basis of adjusting TFP for interstate productivity.²¹⁹ As discussed above,²²⁰ MCI proposes an X-Factor of 8.5 percent based on a non-TFP methodology. Recently, a number of parties filing a joint ex parte statement have

²¹⁴ Price Cap Fourth Further Notice, 10 FCC Rcd at 13675 (paras. 104-06).

²¹⁵ Ad Hoc Reply, Att. at 25-26.

²¹⁶ USTA 1997 Comments, Att. 6 at 28-29.

²¹⁷ USTA 1997 Comments, Att. 6 at 29-30.

²¹⁸ See USTA 1997 Comments, Att. 5 at 1-4; USTA Comments, App. A at 30-32.

²¹⁹ Ad Hoc proposes 9.9 percent and AT&T proposes 8.5 percent. Ad Hoc Reply, Att. at 36; AT&T 1997 Reply, App. G at 32.

²²⁰ See Section III.B.1., supra.

advocated an X-Factor of at least 7.5 percent, based largely on MCI's and Ad Hoc's recommendations.²²¹

137. The table in this Section presents the yearly X-Factor estimates (TFP plus any input price differential) submitted by USTA and AT&T, and the results of our analysis of the best methods and data available in the record of this proceeding, as well as various multi-year averages of total company productivity derived from the AT&T model and our own analysis. In its model, Ad Hoc does not present comparable yearly estimates, but only average estimates. We find that, for the 1985-95 period, the average annual growth in TFP estimated by USTA's simplified TFP model are about 0.2 percent less than our estimates. Based on more recent periods, the differences are somewhat greater. As discussed above, however, USTA has not provided any reliable estimate of the input price differential. For that reason, we cannot give any weight to its X-Factor estimates. Also as discussed above, Ad Hoc's model relies heavily on methodologies USTA employed in its original TFP model reviewed in the LEC Price Cap Performance Review and discussed in the Price Cap Fourth Further Notice. Ad Hoc's adjustments to the USTA original model do not adequately address the problems we found with that model, so we also give no weight to Ad Hoc's X-Factor estimates. We also place no weight on the joint ex parte statement's recommendation, which relies, without further analysis, on the MCI, Ad Hoc, and AT&T interstate-only proposals.²²² Our analysis does incorporate a number of the methods advocated by AT&T, but AT&T's estimate of the X-Factor relies as well on methods that do not provide the best estimates of productivity from this record. Thus, we will accord some weight to AT&T's estimates of the X-Factor, but will rely primarily on our own analysis, which is a synthesis

²²¹ On April 16, 1997, the American Petroleum Institute, Consumer Federation of America, Consumers Union, International Communications Association, Michigan Consumer Federation, Oregon Citizens' Board, and the National Retail Federation filed a joint ex parte statement in CC Docket Nos. 96-45 and 96-262. Ex Parte Letter from Brian R. Moir, Counsel to the International Communication Association, to William F. Caton, Acting Secretary, FCC, April 16, 1997 (Joint Ex Parte Statement).

²²² The joint parties cite MCI's X-Factor proposal of an 8.5 percent X-Factor, Ad Hoc's proposal of 10 percent, and AT&T's interstate-only TFP proposal of 8.5 percent, and argue that the X-Factor should be at least 7.5 percent on the basis of these proposals. Joint Ex Parte Statement at 17-18. We explained in Sections III.B.1. and III.C.2., above, why we do not rely on MCI's and Ad Hoc's X-Factor calculations. In Section III.D.2., we conclude that we can place no weight on AT&T's interstate TFP adjustment. The Joint Ex Parte Statement relies on MCI's, Ad Hoc's, and AT&T's comments without providing any further analysis, and therefore provides no basis for reconsidering this conclusion.

of the most persuasive treatment of TFP suggested by the record. The results of our analysis are displayed in the table below.

SUMMARY OF X-FACTORS

YEAR	FCC	AT&T	USTA
1986	-0.5%	0.2%	N/A
1987	5.0%	4.1%	N/A
1988	5.0%	6.4%	N/A
1989	7.9%	8.8%	2.1%
1990	8.8%	11.0%	4.0%
1991	5.8%	6.0%	3.0%
1992	3.4%	4.1%	2.0%
1993	4.7%	6.0%	3.1%
1994	5.4%	5.9%	1.8%
1995	6.8%	9.4%	3.5%
Ave (86,95)	5.2%	6.2%	
Ave (87,95)	5.9%	6.9%	
Ave (88,95)	6.0%	7.2%	
Ave (89,95)	6.1%	7.3%	2.8%
Ave (90,95)	5.8%	7.1%	2.9%
Ave (91,95)	5.2%	6.3%	2.7%

138. The upper portion of the Table shows the year-by-year estimates of the X-Factor. The lower portion shows a series of averages of the annual X-Factor estimates derived from our analysis of the record and from the AT&T model. The first average includes all the years for which estimates were made. The next average excludes the oldest estimate. Each subsequent average drops the next oldest estimate until the average includes only the most recent five years, from 1991 to 1995. Taken as a whole, this series of averages gives the least weight to the oldest estimate, because that estimate only appears in the first average, and the most weight to the most recent five estimates, because these estimates appear in every average. We find that these averages, rather than the yearly estimates, provide the most reliable basis in the current record for

estimating incumbent LEC productivity targets (including input price differential) for the immediate future. The "trimming" of the averages yields a range of possible productivity outcomes based on progressively more current sets of yearly estimates.

139. Focusing on the staff estimates, we note that the middle four averages are closely grouped around 6.0 percent. The first and last averages are 5.2 percent. We conclude that it is reasonable to place less weight on these two averages. The first average is heavily influenced by the improbably low 1986 estimate of -0.5 percent. The estimate for 1986, the first period for which we have data, is improbably low in comparison to all the other estimates: the next lowest estimate is +3.4 percent and seven of the ten estimates are +5 percent or higher. The last average (1991-95) is the average most affected by the low 1992 estimate. The decline in the measured X-Factor in 1992 appears to be an artifact of a one-year jump in the measured productivity of the national economy as economic activity increased, rather than a change in the growth rate of LEC productivity or input prices. The measured TFP of the U.S. economy appears to be more sensitive to the business cycles than the measured TFP of LECs. Furthermore, we note that, although there are years in which incumbent LECs were able to achieve measured X-Factors that exceed 6 percent, there is no extended time period over which the measured X-Factor remained substantially above 6 percent. We also note that from 1993 onward there has been an upward trend in the X-Factor, with the 1995 estimate being 6.8 percent. The estimates provided by AT&T are somewhat higher than our analysis, but show the same pattern.

140. Based on this analysis, we conclude that a reasonable, challenging productivity offset for incumbent LECs lies within a range whose lower bound is 5.2 percent. If we were relying exclusively on our own analysis, we would conclude that the upper bound of our range of reasonableness is 6.1 percent. As a result of our reliance to some extent on AT&T's results, however, we have increased the upper bound of the range of reasonableness slightly, to 6.3 percent.

141. Because the averages listed above tend to show that the incumbent price cap LECs have fairly consistently achieved productivity growth near or at the upper end of the range of reasonableness, and because there appears to be a strong upward trend in productivity growth from 1992 to 1995, we determine that the most reasonable course at this time is to set the X-Factor in the upper portion of this range, 6.0 percent. AT&T's estimates reflecting total company productivity rather than

interstate productivity alone, which range from 6.2 to 7.3 percent, also suggest that we should prescribe an X-Factor near the upper bound of the range of reasonableness. As discussed elsewhere, in order to ensure that increased benefits from the increased productivity we expect from incumbent LECs flow through to price cap customers, we also adopt a CPD of 0.5 percent, bringing the overall X-Factor prescribed for use in price cap PCIs to 6.5 percent. We are confident that an X-Factor of 6.5 percent can be achieved by the incumbent price cap LEC industry, yet provides a substantial increase over our current price cap plan in the benefits flowed through to price caps customers.

142. We expect the price cap LEC industry to be able to meet this target, for several reasons. First, price cap regulation seeks to replicate the incentives of a competitive market, but it is clearly not a substitute for competition. As a result, measured LEC TFP may not measure the actual productivity growth that incumbent LECs can achieve, but rather reflects the productivity growth LECs were encouraged to achieve under our original and interim price cap plans. Under price cap regulation, LECs are required to reduce their prices only to the extent that their PCIs have been lowered by application of the price cap formulas, and are permitted to keep the rest of the cost reduction in the form of higher earnings. To the extent that a price cap LEC has not reduced its prices as much as it has reduced its costs under price cap regulation, and to the extent that lower prices would have led to demand stimulation, higher output growth, and the realization of additional scale economies, then measured LEC TFP underestimates the productive growth the price cap LECs could achieve with the right incentives. To the extent that LEC anticipated earnings would fall in the sharing range, LECs had less incentive than a firm operating under competition to realize all the possible productivity gains. It is not clear how great this underestimation is, given that not all price cap LECs set their prices so that their APIs are equal to their PCIs. On the other hand, many LECs were subject to sharing obligations under the original price cap plan.²²³ On balance, we believe that measured LEC TFP may somewhat understate achievable gains in TFP. A second reason that we believe that LECs can achieve our 6.5 percent X-Factor is due to the actions we are taking in our Access Reform First Report and Order, which

²²³ In the LEC Price Cap Performance Review, we found that, from 1991 to 1994, the cumulative effect of savings due to below-cap filings was \$1.14 billion, and the cumulative net effect of sharing obligations and low-end adjustments was \$152 million. LEC Price Cap Performance Review, 10 FCC Rcd at 8987 (para. 60).

should greatly stimulate usage. We expect this increase in usage to lead to more efficient use of the LEC network.

143. In summary, we retain our existing formula for adjusting price cap PCIs. We decline to adopt a PCI adjustment formula based on a direct approach, *i.e.*, a PCI formula excluding any economy-wide measure of inflation, because we have decided to prescribe an X-Factor at this time rather than adopt rules to calculate a new X-Factor each year and update the X-Factor using a five-year moving average. In addition, we find that the X-Factor should include LEC TFP and an input price differential. For the reasons discussed above, we find that TFP should be based on the Commission's prescribed depreciation rates. We have decided against adopting any interstate TFP adjustment, hedonic adjustment, or any adjustment based on the productivity growth of other industries. We also find that USTA has inadequately supported its contention that the input price differential is not significantly different from zero.

IV. PRICE CAP STRUCTURE ISSUES

A. Overview

144. We are today substantially revising the structure of our price cap plan to reflect the pro-competitive, deregulatory paradigm established by the 1996 Telecommunications Act as well as the enhanced methodologies and data available for estimating incumbent LEC productivity gains. By eliminating sharing, we are removing a major vestige of rate-of-return regulation and eliminating the strongest LEC incentives to shift costs between services.²²⁴ We also establish a structure conducive to the growth of competition and to progressive deregulation of incumbent LEC interstate access services as competition develops.²²⁵

²²⁴ This assumes of course that the X-Factor continues to be calculated on an industry-wide basis.

²²⁵ According to NYNEX, Congress identified price cap regulation as a mechanism to encourage infrastructure investment when it adopted the 1996 Act, and eliminating sharing would further encourage infrastructure investment. NYNEX Reply at 21, citing Section 706(a) of the Telecommunications Act of 1996, 47 U.S.C. § 706(a).

145. Based on the limited information then available, both the original and the interim LEC price cap plans included multiple X-Factors, ranging from 3.3 percent to 5.3 percent, many with sharing obligations that provided LECs in sharing zones with rate-of-return-like incentives. Today, as discussed above, we prescribe a 6.5 percent X-Factor based on a total factor productivity analysis of the impact that LEC productivity growth and the change in LEC input prices have had on LEC industry unit costs over a ten-year period. Both the methodology and the data used in this analysis more accurately reflect price cap carriers' ability to reduce per-unit costs than previous studies used to set the X-Factor.²²⁶ To ensure consumers share in all increases in LEC efficiency, and to provide efficiency-enhancing incentives to those LECs whose past performance has exceeded the industry average, we are adding a 0.5 percent CPD to the X-Factor.

146. In light of these changes, we here eliminate sharing as part of our overall strategy to devise a more deregulatory and efficiency-enhancing regulatory framework. The elimination of sharing removes a major vestige of rate-of-return regulation. Additionally, the elimination of sharing facilitates progressive deregulation as services become subject to competition.

B. Sharing Obligations

147. **Background.** In the LEC Price Cap Performance Review, we found that sharing blunts the efficiency incentives that we sought to create with price cap regulation.²²⁷ Therefore, we tentatively concluded that sharing should eventually be eliminated.²²⁸ We also noted in the LEC Price Cap Performance Review and the Price Cap Fourth Further Notice, however, that sharing served a number of purposes in the price cap structure we then adopted. One such purpose was a "backstop" function, which helped ensure that any errors in the X-Factor did not lead to unreasonably high rates. A second purpose was a "flow-through" function, which helped ensure that LEC reductions in unit costs were passed through to their customers. We also found that sharing served a

²²⁶ See LEC Price Cap Order, 5 FCC Rcd at 6885-6941 (App. C, App. D.); LEC Price Cap Performance Review, 10 FCC Rcd at 9159-95 (App. D).

²²⁷ LEC Price Cap Performance Review, 10 FCC Rcd at 9045-46 (paras. 187-89).

²²⁸ LEC Price Cap Performance Review, 10 FCC Rcd at 9049 (para. 197).

useful "matching" function in a price cap plan with two or more X-Factors by encouraging LECs to adopt an X-Factor that most closely matched their internally expected rate of productivity growth.²²⁹ In the Price Cap Fourth Further Notice, we proposed eliminating sharing if other mechanisms could be found to serve these functions, and we solicited comment on whether it might be possible to eliminate sharing from the price cap plan without replacing the three functions.²³⁰

148. Discussion. In the LEC Price Cap Performance Review, we established the goal of eliminating sharing completely from price cap regulation. For the various reasons set out below, we conclude that we can and should now adopt a price cap structure without sharing. As discussed in the LEC Price Cap Performance Review, sharing severely blunts the efficiency incentives of price cap regulation by reducing the rewards of LEC efforts and decisions. These reduced incentives, we argued, can be expected to generate lower LEC efficiency, which in turn would reduce the benefits of price caps to consumers.²³¹ The removal of sharing also removes a major vestige of rate-of-return regulation that created incentives to shift costs between services to evade sharing in the interstate jurisdiction. When a price cap LEC anticipates earnings will fall in the sharing range, every dollar of cost misallocated from services not subject to regulation decreases the LEC's interstate sharing obligation and increases recorded earnings on those other services.

149. We find that a price cap regulatory structure without sharing best serves the public interest now even though we have not so found in the past. We have selected an achievable but significantly more demanding X-Factor than we have in the past that will give customers their greatest assurance ever of real reductions in interstate access charges. We also believe that our X-Factor selection is a more reliable estimate of actual LEC productivity than in the past. In particular, we have based our previous X-Factors on a very indirect measure of productivity -- changes in output prices -- and used a very limited range of data. We are basing our X-Factor prescription on a detailed direct analysis of productivity that applies a well-developed

²²⁹ LEC Price Cap Performance Review, 10 FCC Rcd at 9047-49 (paras. 193-96). See also Price Cap Fourth Further Notice, 10 FCC Rcd at 13676-77 (paras. 113-15).

²³⁰ Price Cap Fourth Further Notice, 10 FCC Rcd at 13679 (para. 127).

²³¹ LEC Price Cap Performance Review, 10 FCC Rcd at 9045 (para. 187).

Total Factor Productivity methodology to publicly available data measuring ten years of incumbent LEC industry productivity. As a result, we find that sharing is no longer necessary to ensure that price cap customers benefit from price cap regulation, or to deal with uncertainty in selecting a reasonable X-Factor.

150. We also conclude that our new price cap structure better suits the advent of competition that lies at the heart of the 1996 Act. Subjecting incumbent LECs to a price cap structure that better replicates the discipline of a competitive marketplace is warranted as we move toward competition itself. Furthermore, we conclude that we should adopt a price cap structure that readily lends itself to the further regulatory changes we anticipate will be warranted as competition develops for access services in various geographic areas. Finally, we find that reducing our regulatory reliance on earnings calculations based on accounting data is essential to the transition to a competitive marketplace, where forward-looking costs are central to decisionmaking.

151. Several carriers advocated eliminating sharing, either without regard to the purposes of sharing listed in the Price Cap Fourth Further Notice, or because they expect increased competition to replace one or more of those functions.²³² Certain commenters in this proceeding have argued that the existence of sharing would unreasonably complicate the removal of some services from price cap regulation as those services become sufficiently competitive so as to no longer warrant regulation.²³³ We agree that sharing might be a serious impediment to deregulation. Therefore, our goal of eventual deregulation provides an additional reason to seek to eliminate sharing. Not only is sharing inconsistent with the general competitive paradigm that was established in the 1996 Act, but sharing might make it more difficult to deregulate services that become subject to substantial competition by creating an opportunity for LECs to misallocate costs from deregulated common carrier services to services that remain

²³² USTA Comments at 38-39; Southwestern Bell Comments at 29-31; Bell Atlantic Comments at 2-4, 6-7; GTE Comments at 39-40; Pacific Comments at 9; SNET Comments at 12-13; Ameritech Comments at 9; USTA Reply at 23 and Att. C at 19-21; NYNEX Reply at 19; Bell Atlantic Reply at 11.

²³³ NYNEX Comments at 10; NYNEX Reply at 20; USTA Comments at 39; Ameritech Comments at 9-10; GTE Comments at 40.

subject to sharing requirements. As more and more incumbent LEC services become subject to competitive pressures, the public interest detriments of the cross-subsidy incentives inherent in sharing become worse as the costs that can be misallocated to services that remain subject to sharing requirements increase. Without the elimination of sharing, it might become necessary to adopt new structural or nonstructural safeguards to prevent or limit these misallocations. Rather than consider adopting such administratively burdensome requirements, we conclude that eliminating sharing is the more reasonable course.

152. Finally, elimination of sharing reduces our reliance on, and thus the importance of, jurisdictionally separated embedded costs. The sharing obligation is triggered when a price cap carrier reports interstate earnings above a specified level. Reported earnings are calculated on the portion of embedded investment and expenses that are allocated to the interstate jurisdiction by Part 36, the jurisdictional separations manual. Interstate rate base and expense levels, and thus reported earnings, are also directly affected by accounting depreciation rates, which we prescribe for most incumbent price cap LECs. By contrast, in a competitive marketplace, decisions are governed by economic costs and economic depreciation rates. Reduced reliance on accounting costs thus facilitates our transition to the competitive paradigm of the 1996 Act.

153. Parties recommending that we continue to impose sharing obligations on price cap LECs do not make a persuasive case. MCI argues that sharing replicates a competitive market by permitting carriers to retain the benefits of increased productivity for a time, and then passing those benefits through to consumers.²³⁴ On the contrary, competition forces a firm to pass through its cost reductions when other competing firms also enjoy the same cost reductions. Thus, a firm is compelled to pass through a reduction only when the industry as a whole experiences the same reduction. An X-Factor without sharing replicates these incentives. A firm that is more efficient than its competitors in a competitive market has the option of not lowering its price and reaping higher margins on the units it sells at the prevailing market price. Sharing would eliminate such an option. Furthermore, as we found in the LEC Price Cap Performance Review and reaffirm here, unlike a competitive market, sharing severely blunts

²³⁴ MCI Comments at 20.

a firm's efficiency incentives.²³⁵ We also find that our new X-Factor prescription of 6.5 percent adequately ensures that access customers benefit from the efficiencies resulting from price cap regulation.

154. We also disagree with parties that argue that we must retain sharing to serve as either a backstop or a flow-through mechanism. The backstop function ensures that rates under the revised price cap plan do not become unreasonably high. The flow-through function ensures that ratepayers receive a reasonable portion of the productivity gains that incumbent LECs make pursuant to the incentives of price cap regulation. Both mechanisms were necessary in part because we were not certain that the productivity targets established by our X-Factors were sufficiently challenging. We conclude that, under the price cap plan we adopt today, the need for the beneficial functions served by sharing are outweighed by the benefits of eliminating sharing. First, we consider the X-Factor we adopt today, based on the TFP and input price differential calculations we discuss in Section III and Appendix D, to be a much more reliable measure of incumbent LEC potential productivity gains than the approach we used in the LEC Price Cap Order and the LEC Price Cap Performance Review. Therefore, we have substantially more confidence that the X-Factor we adopt in this Order will flow through a reasonable portion of LEC productivity gains to consumers. Second, our price cap plan retains the CPD. In light of our significantly increased productivity estimates, we find that the CPD serves an enhanced flow-through function by guaranteeing that access customers receive the first benefits of increased productivity under our no-sharing price cap plan.

155. For reasons discussed in the next section, we are adopting a price cap plan with one X-Factor, and therefore no longer need an alternative to fulfill the last purpose that sharing served under our previous price cap structure -- the matching function.

C. Number of X-Factors

156. Background. In the Price Cap Fourth Further Notice, we expressed concern that a price cap plan with one X-Factor might not adequately reflect legitimate differences in the economic conditions faced by each LEC, but that establishing an individual X-Factor for each LEC would not encourage LECs to improve their productivity.

²³⁵ LEC Price Cap Performance Review, 10 FCC Rcd at 9045-46 (para. 188).

Therefore, we invited comment on whether to establish one X-Factor or multiple X-Factors in a long-term price cap plan.²³⁶ In the Price Cap Second Further Notice, we asked for comment on the extent to which competition might affect productivity growth, and whether we should permit carriers to use different X-Factors in different parts of their service areas in which they face different levels of competition.²³⁷ We invited parties to discuss this issue in conjunction with the issues we raised in the Price Cap Fourth Further Notice.²³⁸

157. Discussion. In the LEC Price Cap Performance Review, we tentatively concluded that we should establish more than one X-Factor because we were concerned that a single X-Factor might not reflect the heterogeneity in the economic conditions faced by individual LECs, and because we had little experience with price cap regulation. Based on the additional information available to us now, however, we have less concern about the impact of heterogeneity on the X-Factor component of the PCI formula, and conclude that mechanisms other than a multiple X-Factor price cap plan with sharing as the matching mechanism will better serve the public interest. Based on our recent price cap experience, it is not so clear that LEC heterogeneity should be a major determinant of how we should structure our X-Factor component of the price cap formula. Widespread heterogeneity among LECs has not been manifested through X-Factor elections. Substantially all mandatory price cap LECs have, for some portion of the time under the interim plan, elected the highest X-Factor available under the interim plan.²³⁹ In addition, the studies undertaken in response to the Price Cap Fourth Further Notice make use of more post-divestiture data, including data from four years of price cap regulation, and are more sophisticated than the studies on which we relied in the LEC Price Cap Performance Review. The new studies provide us with more hard evidence regarding price cap LECs' ability to reduce per-unit costs. The analysis we have undertaken, as well as those placed in the record, allows us to conclude that the X-Factor target we set is attainable by

²³⁶ Price Cap Fourth Further Notice, 10 FCC Rcd at 13675-76 (para. 109).

²³⁷ Price Cap Second Further Notice, 11 FCC Rcd at 930-31 (paras. 159-62).

²³⁸ Price Cap Performance Review for Local Exchange Carriers, Order on Motion for Extension of Time, CC Docket No. 94-1, 11 FCC Rcd 1153 (Com.Car.Bur. 1995) First Extension of Time Order.

²³⁹ GTE has consistently selected the 4.0 percent X-Factor for certain study areas.

most if not all price cap carriers, including those price cap LECs with below-average earnings in a given year. If a particular LEC is unable to meet the 6.5 percent X-Factor target in a given year, the low-end adjustment mechanism prevents price cap regulation from becoming confiscatory. We conclude that the low-end adjustment mechanism is sufficient to address any heterogeneity that may exist among price cap LECs.

158. Furthermore, the record contains no convincing proposals that would allow us readily to identify any characteristics by which we could assign individual X-Factors to different price cap carriers, so that there could be multiple "no-sharing" X-Factors. Absent such a proposal, the only available approach is attaching differential sharing obligations to different X-Factors and allowing carriers to select from those options. This approach brings with it all the problems associated with sharing. We therefore conclude that a single X-Factor plan is likely to improve economic efficiency. Because our previous price cap rules included multiple X-Factors and different sharing requirements for each plan, LEC incentives differed according to the plan under which they were regulated. By eliminating sharing, all LECs will now face the same efficiency incentives, which eliminates any heterogeneity caused by our regulatory framework.

159. We also find that a single X-Factor plan will significantly simplify our rules.²⁴⁰ Importantly, the use of a single X-Factor eliminates the need to adopt rules to limit or prevent carriers regulated by price caps from "gaming the system," *i.e.*, preventing LECs from increasing their profits without improving their productivity growth by shifting between different X-Factor options. Finally, we note that a single X-Factor does not force all LECs to charge identical prices for access services, but only requires all price cap LEC rates to decline by the same percentage over time. Thus, heterogeneity in the price levels between LEC services remains embedded in our new price cap plan, as it was in our earlier plans.

160. We find that other aspects of our new price cap structure sufficiently address issues raised by heterogeneity among LECs. Our new X-Factor should deal adequately with situations in which incumbent LECs may have above-average opportunities for productivity enhancement. At the other end, we find, contrary to the arguments of

²⁴⁰ See Price Cap Fourth Further Notice, 10 FCC Rcd at 13678 (paras. 120-23).

Sprint and US West, that multiple X-Factors are not necessary to be fair to LECs with productivity growth less than the industry average²⁴¹ because the low-end adjustment mechanism provides adequate protection for those LECs. We also note that basing the X-Factor on industry average data is not inherently unreasonable. The rail cost adjustment factor (RCAF) established by the Interstate Commerce Commission (ICC) was based on the industry-average level of productivity growth in the rail carrier industry. The court found that the ICC's use of the industry average was reasonable. "It is not arbitrary, . . . for an industry-wide regulatory scheme to use industry-wide average cost data."²⁴²

161. A number of price cap LECs suggest that we permit LECs to use a lower X-Factor once they meet certain competitive criteria. NYNEX, for instance, recommends that we do so based on the first six items listed in the "competitive checklist" identified in the Price Cap Second Further Notice.²⁴³ NYNEX contends that we should permit a LEC to use an X-Factor of 75 percent of the baseline X-Factor if it has met the checklist criteria in 75 percent of its service area, and at least one competitor is operational in the region. NYNEX would permit a LEC to use an X-Factor of 60 percent of the baseline X-Factor if there is a "competitive presence" in areas representing 40 to 50 percent of the LEC's business access lines.²⁴⁴ SNET and Ameritech make similar

²⁴¹ Sprint Comments at 10; US West Reply at 13-14.

²⁴² Edison v. ICC, 969 F.2d at 1226, citing Permian Basin Area Rate Cases, 390 U.S. 747, 805-06 (1968); 1 Alfred E. Kahn, The Economics of Regulation 45-46 and n.62 (1970).

²⁴³ NYNEX Comments at 11-12, citing Price Cap Second Further Notice, 11 FCC Rcd at 906 (para. 108). (a) Competing providers of local switched telephone service have been authorized and have become operational; (b) local loops and switches have been unbundled; (c) intrastate expanded interconnection is available through tariff or contract; (d) service provider number portability is available; (e) compensation arrangements have been established for the LEC and its competitors to complete telephone calls originated on the other carrier's networks; and (f) competitors have access to directory assistance, 911, and other databases.

²⁴⁴ NYNEX Comments at 11.

proposals.²⁴⁵ Southwestern Bell argues that a competitive checklist should be the test to determine whether to remove services from price cap regulation rather than to permit a LEC to use a lower X-Factor.²⁴⁶ We plan to address these proposals in a subsequent Order in our Access Reform proceeding, where we will set out in detail our market-based approach to access reform.

162. Finally, we note that the issues raised by Lincoln and Cincinnati Bell related to optional incentive regulation for small and mid-sized LECs are beyond the scope of this proceeding.

V. UPDATING THE X-FACTOR

A. Background

163. In the LEC Price Cap Order, we established X-Factors that remained in effect for the initial four-year period of price cap regulation.²⁴⁷ In an ex parte statement filed on January 18, 1995, USTA proposed updating the X-Factor annually, based on a moving average of past productivity.²⁴⁸ We tentatively concluded in the LEC Price Cap Performance Review that there were a number of benefits to adopting a moving average X-Factor. This approach would eliminate the need to review and revise the X-Factor during periodic performance reviews, which consume substantial public and private resources. We also found that a moving average might allow us to reduce or eliminate sharing by flowing through unit cost savings to customers on a lagged basis.²⁴⁹

164. We invited comment on several issues related to this topic in the Price Cap Fourth Further Notice. We asked whether a moving average would be an adequate replacement for performance reviews,

²⁴⁵ SNET Comments at 6-9; Ameritech Comments at 10-12. In addition, Pacific argues that it has already removed barriers to entry in its region, and argues that it should be permitted to choose a lower X-Factor now rather than delaying while it goes through some certification process. Pacific Comments at 8-9.

²⁴⁶ Southwestern Bell Comments at 27-28.

²⁴⁷ LEC Price Cap Order, 5 FCC Rcd at 6835 (para. 394).

²⁴⁸ See LEC Price Cap Performance Review, 10 FCC Rcd at 9029-31 (paras. 150-54).

²⁴⁹ LEC Price Cap Performance Review, 7~~10~~ FCC Rcd at 9030 (para. 153).

and whether it would flow through unit cost reductions to consumers.²⁵⁰ We also noted that there was disagreement in the record in the first phase of this proceeding regarding whether basing the X-Factor on an industry-wide moving average would encourage productivity growth, or whether it was possible for an individual LEC to lower the X-Factor by limiting its productivity growth. We invited comment on this issue. We also noted that resolution of this issue might turn on the extent to which there are mergers between price cap LECs.²⁵¹ Finally, we solicited comment on the administrative burdens of updating the X-Factor annually, specifically asking whether it would be necessary or desirable to establish a procedure to true up data reported in prior periods. We also asked whether it would be reasonable or preferable to update the X-Factor less frequently than annually.²⁵²

B. Discussion

165. We have decided not to adopt a moving average at this time. First, adopting a moving average in lieu of periodic performance reviews would represent a commitment to base changes in the X-Factor on a mechanical formula driven solely by the LECs' historical productivity growth over the previous five years. We have based our X-Factor prescription here on all available reliable historical information and calculated a series of averages based on differing time periods in order to determine an estimate of a reasonable, demanding X-Factor. We have not limited ourselves to a simple average of the past five years. Second, it is not clear at this time that mechanical extrapolation of historical productivity growth will continue to be a stable predictor of productivity growth following the 1996 Act. As BellSouth and US West point out, competition in the market for access services is likely to grow in the future. Because it is difficult to predict with certainty how competition will develop under the 1996 Act, or whether our price cap plan will remain reasonable, it is unclear whether any moving average formula would continue to produce reasonable X-Factors as competition grows. Thus, although we are certain that we have based our X-Factor prescription on a reliable estimate of LEC productivity growth, and that our X-Factor captures a reasonable portion of underlying productivity gains, we are not confident that there is any

²⁵⁰ Price Cap Fourth Further Notice, 10 FCC Rcd at 13674 (para. 97).

²⁵¹ Price Cap Fourth Further Notice, 10 FCC Rcd at 13674 (para. 98).

²⁵² Price Cap Fourth Further Notice, 10~~7~~ FCC Rcd at 13674 (para. 99).

predetermined X-Factor calculation that will always produce reliable productivity growth estimates without further analysis, or that should be deemed presumptively correct indefinitely.

166. In the Price Cap Fourth Further Notice, we noted that we scheduled the first performance review to begin about three years after we adopted price cap regulation. We also sought comment on whether three years provides adequate data on which to base a performance review, or whether we should wait to develop more historical data on which to base the review.²⁵³ Contrary to BellSouth, we conclude that we should schedule the next performance review to provide certainty for the industry. We conclude that we should initiate the next performance review about two years from now. This will give us an opportunity to observe how competition affects the incumbent LECs' performance under the price cap plan, and to make any necessary adjustments before the price cap plan leads to unreasonably high or low rates.

167. Some commenters maintain that a moving average is useful for smoothing out TFP as measured on an annual basis.²⁵⁴ By adopting a fixed X-Factor based on a series of multi-year averages, we have smoothed out past volatility and ensured that any future yearly volatility in TFP will not affect the X-Factor. Southwestern Bell and BellSouth contend that a moving average replicates the effects of a competitive market, in that it permits carriers to retain productivity benefits for a short period of time, and then flows through those benefits to consumers.²⁵⁵ We find that a moving average-based X-Factor might replicate the effects of competition, but only if the moving average formula continually produces reasonable estimates of expected LEC productivity growth. As we explained above, we cannot conclude on the basis of this record that there is such a moving average formula. Bell Atlantic opposes performance reviews, arguing that as long as earnings are used to check the performance of price caps from time to time, the perverse incentives of rate-of-return regulation will not be eliminated completely.²⁵⁶ Bell Atlantic argues that this blunts efficiency

²⁵³ Price Cap Fourth Further Notice, 10 FCC Rcd at 13675 (para. 107).

²⁵⁴ Bell Atlantic Comments at 9-10; Ameritech Comments at 6; GTE Comments at 28-31.

²⁵⁵ Southwestern Bell Comments at 21-22; BellSouth Reply, Att. at 41-42.

²⁵⁶ Bell Atlantic Comments, Kahn Aff. at 9-10.

incentives, and tends to shift the risk of investment from shareholders to ratepayers.²⁵⁷ We share Bell Atlantic's concern about eliminating the perverse incentives of rate-of-return regulation, but do not agree that holding a performance review will significantly affect the beneficial incentives that should flow from the pure price cap regime we are here adopting. We have eliminated sharing requirements based on LEC earnings, and we have declined, in the Access Reform First Report and Order, many parties' suggestions that we reinitialize access rates based on LECs' individual rates of return. In addition, we plan to focus in our next performance review on ensuring, to the extent possible, that we do not substantially undermine each price cap incumbent LEC's incentives to improve its efficiency. For instance, we would plan to make adjustments based on demonstrated industry-wide performance or other generic factors, rather than adjustments that are tied to a particular price cap incumbent LEC's interstate earnings.²⁵⁸

VI. COMMON LINE ISSUES

A. Common Line Formula

168. Common lines are the local subscriber "loops" linking the customer's telephone to the local exchange office. Although common line costs are non-traffic sensitive, the original Part 69 access charge rules require that a portion of the cost is recovered through per minute rates. After recovery of a portion of common line costs through flat rates charged to end users, referred to as end user common line (EUCL) charges or subscriber line charges (SLCs), the remaining common line costs are recovered by carrier common line (CCL) charges that are assessed on IXCs and other access customers based on minutes of use.²⁵⁹

169. Because common line costs are non-traffic sensitive, growth in demand leads to a reduction in average per-minute common line costs. Therefore, in the LEC Price Cap Order, we established a PCI

²⁵⁷ Bell Atlantic, Kahn Aff. at 10-12.

²⁵⁸ See also Section VIII.A., infra.

²⁵⁹ Price Cap Fourth Further Notice, 10 FCC Rcd at 13680 (para. 130), citing LEC Price Cap Order, 5 FCC Rcd at 6793 (paras. 56-57).

formula for the common line basket that differed from the PCI formula we established for the other three baskets, to ensure that carrier common line charges declined as common line demand increased.²⁶⁰ Specifically, we added a term, "g/2," to the common line PCI formula, to represent half the growth in demand per line in the prior year.²⁶¹ This was because we originally concluded that both LECs and IXCs have the ability to influence common line growth, and that both LECs and IXCs should benefit from increases in demand.²⁶² In the Price Cap Fourth Further Notice, we noted that using an X-Factor based on TFP in the common line formula might tend to double-count demand growth. We therefore sought comment on whether reliance on TFP would warrant eliminating g/2 from the common line formula.²⁶³ We also sought comment generally on revising the existing balanced 50-50 common line PCI formula, in the event we decided to retain a separate formula.²⁶⁴

170. In the Access Reform First Report and Order, we adopt for price cap incumbent LECs a common line rate structure that will recover almost all common line costs through flat charges on subscribers and on IXCs. LECs will phase out the per-minute CCL over a period of one to three years. We also decide to apply to the common line basket the formula that we use for the traffic-sensitive and trunking baskets as soon as the per-minute CCL charge has been phased out.²⁶⁵ Thus, any double-counting that results from our adoption of a TFP-based X-Factor will be short-lived. Furthermore, we decide in the Access Reform First Report and Order that eliminating g/2 prior to the elimination of per-minute CCL charges might create

²⁶⁰ LEC Price Cap Order, 5 FCC Rcd at 6795 (paras. 71-73).

²⁶¹ LEC Price Cap Order, 5 FCC Rcd at 6795 (para. 73). The Commission did not adopt a common line formula based on an average of the per-line and per-minute approaches, because in some circumstances this would have produced the anomalous result of CCL rates increasing in response to increases in demand. Id. at 6795 (paras. 71-73). The mathematics of the common line formula are explained in detail in Appendix E of the LEC Price Cap Order, 5 FCC Rcd at 6942-44.

²⁶² LEC Price Cap Order, 5 FCC Rcd at 6795 (paras. 68-70).

²⁶³ Price Cap Fourth Further Notice, 10 FCC Rcd at 13680 (paras. 134-35).

²⁶⁴ Price Cap Fourth Further Notice, 10 FCC Rcd at 13680-81 (para. 136).

²⁶⁵ Access Reform First Report and Order, Section III.A.4.

unnecessary rate churn. Accordingly, we will not address common line formula issues further in this Order.

B. Reliance on Forecasted Data

171. **Background.** For price cap companies and other large incumbent LECs, CCL rates are calculated using forecasts of the amounts that will be recovered from SLCs. In the Price Cap Fourth Further Notice, we sought comment on whether it would be more accurate to base CCL rates on historical (previous year) rather than projected data for SLC revenues.²⁶⁶

172. **Discussion.** Southwestern Bell and MCI support using forecasted data,²⁶⁷ while US West and USTA support using historical data.²⁶⁸ We have decided to continue to rely on forecasted EUCL data in developing CCL rates. In our companion Access Reform First Report and Order, we revise our current common line rate structure rules, which now require LECs to recover most of their non-traffic-sensitive loop costs through traffic-sensitive loop rates, to reflect more closely the manner in which costs are incurred. Therefore, we have substantially revised our common line rate structure rules to reduce per-minute CCL charges, and have adopted rules to phase out CCL charges within the next two or three years. We see no need to make other substantial revisions to the CCL charge calculation method, such as switching from historical to forecasted data, when these charges will be phased out within a relatively short time.

VII. EXOGENOUS COST ISSUES

173. **Background.** The Commission has determined that certain costs incurred by LECs that are caused by administrative, legislative, or judicial requirements beyond their control, and not otherwise reflected in the PCI, should result in an adjustment to the PCI to ensure that the price cap formula does not lead to unreasonably high or unreasonably low rates.²⁶⁹ Our rules currently list eight cost changes that may be

²⁶⁶ Price Cap Fourth Further Notice, 10 FCC Rcd at 13681 (para. 137).

²⁶⁷ Southwestern Bell Comments at 37-38; MCI Comments at 23-24.

²⁶⁸ US West Comments at 26-27; USTA Comments at 45-46.

²⁶⁹ Price Cap Fourth Further Notice, 10 FCC Rcd at 13681 (para. 138), citing LEC Price Cap Order, 5 FCC Rcd at 6807.

afforded exogenous treatment under the appropriate conditions.²⁷⁰ In the Price Cap Fourth Further Notice, we noted that many if not all of the cost changes currently treated exogenously would be reflected in a moving average TFP-based X-Factor. We sought comment on whether it was possible to fashion an X-Factor that would incorporate all the cost changes listed as exogenous in our rules, and if not, which exogenous cost changes would remain outside the X-Factor calculation.²⁷¹ Because we have decided against adopting a moving average at this time, this issue is moot, and we will not discuss the comments filed in response to this issue.

174. In its pleadings filed in the LEC Price Cap Performance Review, MCI suggested limiting exogenous cost treatment to Commission-ordered changes that result in shifting costs between the interstate and intrastate jurisdictions, or between regulated and non-regulated accounts.²⁷² We also invited comment on MCI's suggestion in the Price Cap Fourth Further Notice.²⁷³

175. Discussion. We have decided not to adopt MCI's recommendation. We adopted the exogenous cost mechanism to ensure that the price cap formula does not lead to unreasonably high or unreasonably low rates.²⁷⁴ Because of this, we have never strictly limited exogenous cost treatment to the cost changes listed in our rules. Rather, we have retained the discretion to consider extending exogenous cost treatment to "other extraordinary cost changes that the Commission shall permit or require."²⁷⁵ Adopting MCI's proposal would

²⁷⁰ Section 61.45(d)(1) of the Commission's Rules, 47 C.F.R. § 61.45(d)(1). In addition to these rules, exogenous treatment for cost changes resulting from revisions in the Uniform System of Accounts (USOA) or Generally Accepted Accounting Principles (GAAP) is not permitted unless those revisions result in an economic cost change for the LEC. LEC Price Cap Performance Review, 10 FCC Rcd at 9089-90 (paras. 292-94).

²⁷¹ Price Cap Fourth Further Notice, 10 FCC Rcd at 13681 (paras. 138-40).

²⁷² See LEC Price Cap Performance Review, 10 FCC Rcd at 9087 (para. 287).

²⁷³ Price Cap Fourth Further Notice, 10 FCC Rcd at 13681 (para. 141).

²⁷⁴ See LEC Price Cap Order, 5 FCC Rcd at 6807 (para. 166).

²⁷⁵ See Section 61.45(d)(1)(vi) of the Commission's Rules, 47 C.F.R. § 61.45(d)(1)(vi).

eliminate this discretion. In a future Order in this Access Reform proceeding, we will be developing a market-based approach to regulating access rate levels as competition develops. We will also separately address issues related to embedded cost recovery in a competitive environment. In light of these ongoing proceedings, in which we will both work within and go beyond our current price cap regime, we do not find it advisable at this time to limit the flexibility we have allowed within our price cap plan to deal with unusual circumstances.²⁷⁶

176. According to Frontier, it is inconsistent to require exogenous treatment of cost decreases such as expired reserve deficiency amortizations, while denying exogenous cost treatment of cost increases such as changes in the treatment of OPEB costs. Frontier argues further that neither of those cost changes affects the LEC's discounted cash flow.²⁷⁷ We conclude that the expiration of reserve deficiency amortizations is distinguishable from the change in the treatment of OPEB costs for purposes of exogenous cost determinations. The reserve deficiency amortizations had begun under rate-or-return regulation, and were embedded in the initial price cap indices that had taken effect on January 1, 1991. To ensure that ratepayers under price cap regulation would not be required permanently to bear these temporary rate increases, we directed LECs to make downward exogenous cost adjustments to their price cap indices upon the expiration of those reserve deficiency amortizations.²⁷⁸ Given that we had granted a temporary rate increase under our rate-of-return regime, failing to end that rate increase would have given LECs an unintended and undeserved windfall. Thus, our action to decrease rates is simply the second half of an action that began when we approved a temporary rate increase. For reasons we explained in the LEC Price Cap Performance Review, we found that the change in OPEB

²⁷⁶ In reaching this conclusion, we do not interpret MCI's argument as implying that rates never change in competitive markets, as US West suggests. We understand MCI to mean that firms in competitive markets cannot change their rates unilaterally, but rather change their rates only in response to market forces. Accordingly, we find that it would not be reasonable to interpret MCI's proposal in this manner.

²⁷⁷ Frontier Comments at 11-12.

²⁷⁸ See LEC Price Cap Order, 5 FCC Rcd at 6808 (para. 173); LEC Price Cap Reconsideration Order, 6 FCC Rcd at 2673-74 (paras. 78-80). See also Access Reform First Report and Order, Section IV.C.2.

accounting no longer warranted the price cap equivalent of a rate-of-return amortization, and that it was no longer necessary to use the exogenous cost mechanism of price cap regulation to permit that temporary rate increase to continue.²⁷⁹

VIII. OTHER ISSUES

A. Application of the New Price Cap Formula to Incumbent LEC PCIs

177. In the LEC Price Cap Performance Review, we required the incumbent LEC price cap industry to adjust its PCIs in the 1995 annual access tariff filings, so that the PCIs would be at the levels they would have been at if the minimum X-Factor had been 4.0 percent since 1991. The Commission based its decision to do so on further evidence showing that one of the productivity studies upon which it had developed the original X-Factor had included anomalous data from 1984 that had resulted in an understatement of the LEC industry's historical productivity growth.²⁸⁰ The Commission stressed that, under price caps, "LECs were supposed to become more efficient if they wished to exceed the earnings they would have been permitted under rate of return regulation, [and] [r]atepayers were to benefit from rates reduced to the level that would provide this challenge."²⁸¹ Although it did not order a reduction "based solely on the observation that LECs have experienced high earnings under price caps,"²⁸² the Commission noted that its underestimation of LEC productivity meant that "[s]ome portion of the LECs' increased earnings," which were high, was "obtained without any productivity improvements."²⁸³ We found that such a result was counter to the balance between ratepayer and shareholder interests that had been intended under price caps, and we concluded that a prospective downward adjustment to the price cap indices was necessary to prevent the effects of the erroneously low productivity

²⁷⁹ LEC Price Cap Performance Review, 10 FCC Rcd at 9095-96 (paras. 307-08). The court held that our treatment of OPEB costs was reasonable. Bell Atlantic v. FCC, 79 F.3d at 1204.

²⁸⁰ LEC Price Cap Performance Review, 10 FCC Rcd at 9053-54 (paras. 208-209).

²⁸¹ LEC Price Cap Performance Review, 10 FCC Rcd at 9070 (para. 246).

²⁸² LEC Price Cap Performance Review, 10 FCC Rcd at 9069 (para. 245).

²⁸³ LEC Price Cap Performance Review, 10 FCC Rcd at 9070 (para. 246).

factor from being permanently embedded in the indices.²⁸⁴ The court of appeals upheld our adjustment on judicial review in Bell Atlantic v. FCC.²⁸⁵

178. At the time the we made this prospective adjustment in the LEC Price Cap Performance Review, we also expressly and repeatedly indicated that the revised X-Factor employed to make that adjustment was an interim number.²⁸⁶ We stated that we intended to complete our performance review inquiry into the appropriate non-interim productivity number "expeditiously."²⁸⁷ Our action in this Order prescribing a new 6.5 percent X-Factor essentially constitutes the completion of our 1995 performance review with respect to the appropriate X-Factor. As described above, we conclude that the TFP methodology that we have now developed is a more accurate method of measuring productivity performance than we have previously used and demonstrates that the interim X-Factor that we adopted in 1995 understates LEC industry productivity growth.

179. Similar to our action in the LEC Price Cap Performance Review, we here conclude that allowing all of the past two years of understated productivity to become permanently ingrained in LEC PCIs would not strike the proper balance between stockholder and ratepayer interests. At the same time we wish to limit harm to LEC productivity incentives that could result from the perception that our regulatory policies unnecessarily lack constancy. In this regard, our repeated emphasis that the X-Factor adopted in the LEC Price Cap Performance Review was "interim" should reasonably have put carriers on notice that another adjustment of the type we had adopted in that order would be possible -- perhaps beginning with the 1995 tariff year, the first year

²⁸⁴ LEC Price Cap Performance Review, 10 FCC Rcd at 9069-70 (paras. 245-46).

²⁸⁵ Bell Atlantic v. FCC, 79 F.3d 1195 (D.C. Cir. 1996). See also, Administrators of the Tulane Educational Fund v. Shalala, 987 F.2d 790, 797 (D.C. Cir. 1993), cert. denied, 114 S.Ct. 740 (1994) (upholding Medicare "price cap" adjustment designed to avoid "permanently ingraining misclassified and nonallowable costs in future reimbursements to health care providers").

²⁸⁶ See LEC Price Cap Performance Review, 10 FCC Rcd at 9050 (para. 198), 9054 (para. 211), 9055 (paras. 213-14), 9058-59 (paras. 223-24) (emphasizing "interim" nature of revised plan).

²⁸⁷ LEC Price Cap Performance Review, 10 FCC Rcd at 9050 (para. 198).

under the interim X-Factor. On the other hand, we anticipated the interim period to be of shorter duration. The longer period of reliance on the interim price cap plan has prompted a longer period of relative uncertainty than intended.²⁸⁸ We conclude that an adjustment to the incumbent LECs' PCIs would reasonably balance ratepayer interests with our incentive-based regulatory policies in these circumstances. Accordingly, we require each price cap LEC to adjust its PCIs, effective July 1, 1997, to the levels for the 1997-98 tariff year that would have been in effect had we adopted the 6.5 percent X-Factor in time to become effective with the LECs' 1996 annual tariff filings. This adjustment would have no effect on revenues and earnings for the 1996-97 tariff year -- that is, like the adjustment upheld by the court in Bell Atlantic, the adjustment we require in this Order has no retroactive effect. This adjustment is also a more moderate approach than either of the specific reinitialization options for which we sought comment in the Access Reform Notice.²⁸⁹

180. To achieve the benefits of which they are capable, price cap regulation should not replicate rate-of-return regulation. Therefore, in the next performance review, we would plan to focus on ensuring, to the extent possible, that any adjustments to our rules would not substantially undermine each price cap incumbent LEC's incentives to improve its efficiency, particularly if similar adjustments may be made in other future performance reviews. For instance, we would prefer to make adjustments based on demonstrated industry-wide performance or other generic factors, rather than adjustments that are tied to a particular price cap incumbent LEC's interstate earnings.

181. Adjustments based on industry-wide performance or similar factors would not destroy each price cap incumbent LEC's incentives to improve its efficiency, as would an approach of re-setting each incumbent LEC's interstate prices to earn a pre-determined rate of return, an approach we reject today in the Access Reform First Report and Order.²⁹⁰ Rather, such an "industry-wide" approach would set up a

²⁸⁸ We had intended to complete action to replace the interim X-Factor before the 1996 annual access tariff filings, but were unable to meet that internal timetable as a result of the demands required to meet numerous statutory deadlines established in the 1996 Act.

²⁸⁹ Access Reform Notice at paras. 223-30.

²⁹⁰ Access Reform First Report and Order, Section IV.B.2.c.

relative performance/reward system, in which each price cap incumbent LEC would have incentives to strive to outperform the rest of the industry. Because no price cap incumbent LEC is very large relative to the industry as a whole, none determines industry-wide averages by its own actions. Consequently, each price cap incumbent LEC would have strong incentives to improve its efficiency even if adjustments to the X-Factor or other price cap rules based on industry-wide performance were imminently expected.

B. Video Dialtone Basket

182. In September 1995, the Commission adopted an Order requiring price cap carriers to establish a separate price cap basket for video dialtone services.²⁹¹ We also decided that costs and revenues from video dialtone services should be excluded from the calculation of a LEC's sharing obligations until the costs for those services exceed de minimis levels.²⁹² We sought comment on how to define "de minimis" for these purposes.²⁹³ The 1996 Act, however, cancelled all Commission actions taken in the video dialtone docket. Instead, LECs are now permitted to participate in video markets as cable operators, through provision of common carrier video services, or as operators of non-common carrier "open video systems."²⁹⁴ Therefore, we hereby terminate the video dialtone portion of this proceeding we initiated in the Price Cap Third Further Notice.

²⁹¹ Price Cap Performance Review for Local Exchange Carriers, Third Further Notice of Proposed Rulemaking, CC Docket No. 94-1, 10 FCC Rcd 11098, 11101 (para. 15) (1995) (Price Cap Third Further Notice). Video dialtone service consists of: (1) a basic transmission service available on a non-discriminatory basis to multiple video programmers and a means by which customers of video programmers can obtain access to any or all video programming offered over the transmission platform; and (2) optional enhanced and other non-common carrier products and services related to video dialtone. Price Cap Third Further Notice, 10 FCC Rcd at 11098-99 (para. 2).

²⁹² Price Cap Third Further Notice, 10 FCC Rcd at 11105 (para. 35).

²⁹³ Third Further Notice, 10 FCC Rcd at 11106 (paras. 39-42).

²⁹⁴ 1996 Act, 47 U.S.C. § 653. See Implementation of Section 302 of the Telecommunications Act of 1996, CS Docket No. 96-46, 11 FCC Rcd 14639 (1996).

C. Miscellaneous Issues

183. NCTA and MFS recommend "promoting competition" rather than investing the time and resources necessary to complete this rulemaking.²⁹⁵ As explained in Section II.C. of this Order, our decisions here play a critical role in restructuring regulation to match a developing competitive marketplace. This Order joins recently adopted pro-competitive, deregulatory rules implementing Section 251 and related provisions of the 1996 Act, and is interrelated with the Access Reform First Report and Order. Thus, conforming our price cap regulations to the paradigm of the 1996 Act has not precluded us in any way from "promoting competition." Furthermore, until the telecommunications market can become competitive enough to warrant removing all services from price cap regulation, it is important that the price cap plan replicate as nearly as possible the incentives of a competitive market.

184. AT&T asserts that service quality has declined while the LECs have increased their productivity in the past, and recommends reflecting service quality changes in TFP calculations.²⁹⁶ BellSouth argues that AT&T's assertion is inconsistent with the Commission's conclusion in the LEC Price Cap Performance Review that service quality has not declined significantly,²⁹⁷ and that it would be unreasonable to assume that LECs would permit service quality to decline when competition is beginning to develop.²⁹⁸ In the LEC Price Cap Performance Review, we addressed this issue and found that there were no significant changes in service quality since we adopted price caps.²⁹⁹ Nothing in this record convinces us to alter this conclusion.

²⁹⁵ NCTA Reply at 4; MFS Reply at 1-3. Similarly, ICA suggests that "promoting competition" and then conducting performance reviews to determine which services to remove from price cap regulation would be less administratively burdensome than reviewing moving average X-Factor calculations. ICA Comments at 9.

²⁹⁶ AT&T Comments at 24 and App. A at 63-65; AT&T Reply at 34-35.

²⁹⁷ BellSouth Reply at 12-13, citing LEC Price Cap Performance Review, 10 FCC Rcd at 9121 (para. 365).

²⁹⁸ BellSouth Reply, Att. at 31-35.

²⁹⁹ LEC Price Cap Performance Review, 10 FCC Rcd at 8988 (para. 62), 9121 (para. 365).

Therefore, we conclude that TFP adjustments for service quality are not necessary at this time.³⁰⁰

185. ICA advocates requiring access customers to flow through to those customers' end users the reductions in the access charges they pay attributable to PCI reductions.³⁰¹ We have determined that there are no longer any dominant carriers in the market for interexchange services,³⁰² and that long-distance carriers have been passing through access charge reductions in the past.³⁰³ We see nothing to indicate that market forces will not compel IXCs to flow through access charge reductions. We note that at least one IXC has committed to flow through to its long distance consumers all access charge reductions resulting from the access charge-related decisions we adopt today.³⁰⁴

186. Cincinnati Bell claims that the X-Factors in the interim plan are too high for small and mid-sized LECs.³⁰⁵ Cincinnati Bell also complains that prohibiting LECs electing price caps to ever revert to rate-of-return regulation discourages some small and mid-sized LECs from adopting price caps, and recommends requiring only a four-year commitment.³⁰⁶ Issues related to incentive regulation for small and mid-sized LECs are beyond the scope of this proceeding.

187. Some LECs argue that the passage of the 1996 Act necessitates resolution of the issues on which we sought comment in

³⁰⁰ We will soon be releasing an Order addressing price cap LEC service quality issues. See Policy and Rules Concerning Rates for Dominant Carriers and Amendment of Part 61 of the Commission's Rules to Require Quality of Service Standards in Local Exchange Carrier Tariffs, Memorandum Opinion and Order, CC Docket No. 87-313, FCC No. 97-168 (adopted May 14, 1997).

³⁰¹ ICA Comments at 9.

³⁰² Motion of AT&T Corp. to be Reclassified as a Non-Dominant Carrier, Order, 11 FCC Rcd 3271 (1995).

³⁰³ See LEC Price Cap Performance Review, 10 FCC Rcd at 8987 (para. 61).

³⁰⁴ We also note that AT&T has made specific commitments to reduce its basic schedule rates, which are often used by low-volume customers. See Ex Parte Letter from Gerald M. Lowrie, Senior Vice President, AT&T, to Reed E. Hundt, Chairman, FCC, May 3, 1997.

³⁰⁵ Cincinnati Bell Comments at 7.

³⁰⁶ Cincinnati Bell Comments at 8.

the Price Cap Second Further Notice.³⁰⁷ We have invited further comment on several Price Cap Second Further Notice issues in the Access Reform Notice, and plan to resolve the issues in a subsequent Order in the Access Reform proceeding.

188. Bell Atlantic asserts that high capacity access services are now competitive enough to remove from price cap regulation.³⁰⁸ Bell Atlantic also recommends eliminating the new services test.³⁰⁹ USTA and Ameritech maintain that, since AT&T has been found to be non-dominant, services in the interexchange basket should be removed from price cap regulation.³¹⁰ Pacific maintains that LECs should be permitted more common line pricing flexibility.³¹¹ NCTA assert that the price cap plan does not adequately protect against cross-subsidization.³¹² We sought comment on the new services test, pricing flexibility, and extending streamlined or non-dominant treatment to LECs in the Price Cap Second Further Notice and the Access Reform Notice, and we will address those issues in subsequent Orders in the Access Reform proceeding.

189. CCTA asserts that a moving average TFP-based X-Factor might give LECs the ability to manipulate costs, and thus might lead to cross-subsidization. CCTA therefore recommends adopting cost allocation rules for cable services.³¹³ Because we are not adopting a moving average-based X-Factor at this time, we need not determine whether any cost allocation rules for cable services are necessary.

³⁰⁷ Ameritech Reply at 7; BellSouth Reply at 6; Southwestern Bell Reply at 3-5.

³⁰⁸ Bell Atlantic Comments at 17-18. Bell Atlantic also includes with its comments an affidavit of Alfred Kahn, pointing out the pernicious effects of continuing to regulate a service after it has become competitive. See Bell Atlantic Comments, Kahn Aff.

³⁰⁹ Bell Atlantic Comments at 19.

³¹⁰ USTA Comments at 47; Ameritech Reply at 7 n.12.

³¹¹ Pacific Reply at 14-15.

³¹² NCTA Reply at 2.

³¹³ CCTA Reply at 22-28. See also NCTA Reply, Att. A at 15.

190. On February 23, 1996, Ad Hoc filed a motion alleging that USTA had not provided sufficient information to enable other parties to review USTA's economic studies. Ad Hoc requested us either to compel USTA to provide the information, or to place no weight on USTA's study, as we stated we would do in the Price Cap Fourth Further Notice.³¹⁴ USTA asserted that it did provide Ad Hoc with all the data reasonably necessary to review its study. We did not rely on the parts of USTA's study that Ad Hoc claimed were not adequately supported on the public record. Therefore, we dismiss Ad Hoc's motion.

IX. PROCEDURAL ISSUES

A. Tariff Filing Requirements

191. We hereby direct price cap LECs to file tariffs making adjustments to their rates to reflect the revisions to the price cap plan we adopt in this Order. Any carriers making only rate reductions must file their tariff revisions no later than June 25, 1997, to take effect July 1, 1997. Other LECs must file their tariff revisions no later than June 17, 1997. We also direct price cap LECs to file revised tariff review plans (TRPs) containing adjustments to their PCIs, APIs, and SBIs no later than June 2, 1997.

B. Final Regulatory Flexibility Act Certification

192. In the Price Cap Fourth Further Notice, we certified that the Regulatory Flexibility Act (RFA)³¹⁵ did not apply to this rulemaking proceeding because none of the rule amendments under consideration would have a significant economic impact on a substantial number of small entities.³¹⁶ Carriers subject to price cap regulation for local exchange access affected by the rule amendments adopted in this

³¹⁴ See Price Cap Fourth Further Notice, 10 FCC Rcd at 13662 (para. 15).

³¹⁵ See 5 U.S.C. § 601 *et seq.* The RFA was amended by the Contract With America Advancement Act of 1996, Pub.L. No. 104-121, 110 Stat. 847 (1996) (CWAAA). Title II of the CWAAA is the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA).

³¹⁶ Price Cap Fourth Further Notice, 10 FCC Rcd at 13682 (para. 149); see also 5 U.S.C. § 601(3).

Fourth Report and Order and Second Report and Order are generally large corporations or the affiliates of such corporations. No party commented specifically in response to the analysis in our certification.

193. In passing the 1996 Act, Congress sought to establish "a pro-competitive, de-regulatory national policy framework" for the United States telecommunications industry.³¹⁷ These fundamental changes in the structure and dynamics of the telecommunications industry wrought by the 1996 Act now necessitate that the Commission review its existing access charge regulations to ensure that they are consistent and compatible with the 1996 Act's comprehensive changes. The rule revisions we adopt based on the record developed in the Price Cap Fourth Further Notice and the Access Reform Notice will facilitate the de-regulatory policy established in the 1996 Act. In particular, our elimination of sharing obligations removes a major impediment to deregulating individual interstate access services at the time competitive conditions warrant.

194. The rules we adopt in this Fourth Report and Order and Second Report and Order are applicable only to LECs subject to price cap regulation. Currently, 13 incumbent LECs are subject to price cap regulation. We tentatively concluded in the Price Cap Fourth Further Notice that the price cap LECs are not "small business concerns" because they are generally large corporations or affiliates of such corporations.³¹⁸ We hereby affirm this analysis.

195. The Commission will send a copy of this final certification, along with this Fourth Report and Order and Second Report and Order, in a report to Congress pursuant to the Small Business Regulatory Enforcement Fairness Act of 1996, 5 U.S.C. § 801(a)(1)(A), and to the Chief Counsel for Advocacy of the Small Business Administration, 5 U.S.C. § 605(b). A copy of this certification will also be published in the Federal Register.³¹⁹

³¹⁷ Telecommunications Act of 1996, Pub.L.No. 104-104, 110 Stat. 56 (1996) to be codified at 47 U.S.C. §§ 151 et seq.

³¹⁸ Price Cap Fourth Further Notice, 10 FCC Rcd at 13682 (para. 149).

³¹⁹ Id.

X. ORDERING CLAUSES

196. Accordingly, IT IS ORDERED, pursuant to authority contained in Sections 4(i), 4(j), 201-205, 303(r), and 403 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 154(j), 201-205, 303(r), 403, and Section 553 of Title 5, United States Code, that Part 61 of the Commission's Rules, 47 C.F.R. Part 61, IS AMENDED as set forth in Appendix C.

197. IT IS FURTHER ORDERED that the provisions in this Order will be effective June 17, 1997. We find good cause under 5 U.S.C. § 553(d)(3) to make the rules effective less than thirty days after publication, because the local exchange carriers subject to price cap regulation must file tariffs by June 17, in order for them to be effective on July 1, 1997, as required by Section 69.3 of the Commission's rules, 47 C.F.R. § 69.3. In addition, to ensure that the local exchange carriers subject to price cap regulation have actual notice of these rules immediately following their release, we are serving those entities by overnight mail.

198. IT IS FURTHER ORDERED that local exchange carriers subject to price cap regulation SHALL FILE tariffs and revised tariff review plans in accordance with the requirements set forth above. These requirements are subject to review by the Office of Management and Budget, and will be effective upon that approval.

199. IT IS FURTHER ORDERED that the motion filed by Ad Hoc Telecommunications Users Committee on February 23, 1996, IS DISMISSED.

COMMISSION

FEDERAL COMMUNICATIONS

**William F. Caton
Acting Secretary**

APPENDIX A

I. Comments filed January 16, 1996

1. **Ad Hoc Telecommunications Users Committee (Ad Hoc)**
2. **American Petroleum Institute (API)**
3. **The Ameritech Operating Companies (Ameritech)**
4. **AT&T Corporation (AT&T)**
5. **The Bell Atlantic Telephone Companies (Bell Atlantic)**
6. **The BellSouth Telephone Companies (BellSouth)**
7. **Cincinnati Bell Telephone Company (Cincinnati Bell)**
8. **Frontier Corporation (Frontier)**
9. **General Services Administration (GSA)**
10. **GTE Service Corporation (GTE)**
11. **International Communications Association (ICA)**
12. **Lincoln Telephone and Telegraph Company (Lincoln)**
13. **MCI Telecommunications Corp. (MCI)**
14. **The NYNEX Telephone Companies (NYNEX)**
15. **Pacific Bell and Nevada Bell (Pacific)**
16. **Southwestern Bell Telephone Company (Southwestern Bell)**
17. **Southern New England Telephone Company (SNET)**
18. **Sprint Corporation (Sprint)**
19. **Time Warner Communications Holdings, Inc. (Time Warner)**
20. **Telecommunications Resellers Association (TRA)**
21. **United States Telephone Association (USTA)**
22. **US West Communications, Inc. (US West)**

II. Replies filed March 1, 1996

1. **Ad Hoc**
2. **Ameritech**
3. **API**
4. **AT&T**
5. **Bell Atlantic**
6. **BellSouth**
7. **Cincinnati Bell**
8. **California Cable Television Association (CCTA)**
9. **Frontier**
10. **GSA**
11. **GTE**

12. LDDS WorldCom (LDDS)
13. Lincoln³²⁰
14. MCI
15. MFS Communications Company (MFS)
16. National Cable Television Association (NCTA)
17. NYNEX
18. Pacific
19. Sprint
20. Southwestern Bell
21. TRA
22. USTA
23. US West

III. Comments filed January 29, 1997, and Replies filed February 14, 1997

These comments and replies are listed in Appendix A of our companion Access Reform First Report and Order.

³²⁰ Subsequent to the filing of this reply, Lincoln changed its name to Aliant Communications Co. For the purposes of this Order, we refer to Lincoln's 1997 pleadings as "Aliant 1997 Comments" or "Aliant 1997 Reply."

APPENDIX B

PLEADING SUMMARIES

III. X-FACTOR CALCULATION ISSUES

B. X-Factor Approaches

I. Methods for Estimating the X-Factor

a. TFP

1. USTA asserts that both Ad Hoc and AT&T also base their recommendations on a TFP method.¹ MCI notes that the TFP methods proposed by Ad Hoc, AT&T, and USTA result in different X-Factor recommendations, and argues that TFP calculations are inexact and potentially controversial.² USTA alleges that MCI does not oppose a TFP-based X-Factor in general, but only USTA's application of TFP.³ Frontier contends that both USTA's and AT&T's X-Factor recommendations seem extreme.⁴ Cincinnati Bell asserts that the data collection required for TFP calculations might be burdensome, and might discourage small and mid-sized LECs from adopting price cap regulation.⁵ GTE argues that TFP is a "robust" measure of productivity because it produces results comparable to the TFP results reached by Ad Hoc and AT&T.⁶

¹ USTA Reply at 6.

² MCI Reply at 8-9. See also API Reply at 2 (any price cap plan should ensure consider benefit and be reasonably simple and verifiable).

³ USTA Reply at 6.

⁴ Frontier Reply at 1 n.2.

⁵ Cincinnati Bell Reply at 5-6.

⁶ GTE Reply at 6-7. Ad Hoc and AT&T propose higher X-Factors than USTA because they advocate including an input price differential and making an adjustment for any differences in interstate and intrastate productivity growth. These issues are discussed further below.

b. Historical Revenue Approach

2. Several parties oppose the Historical Revenue Approach because it creates the perverse incentives created by rate-of-return regulation.⁷ Lincoln and NYNEX oppose the Historical Revenue Approach because its incorporation of Part 36 and 69 rules makes the model administratively burdensome.⁸ NYNEX also contends that accounting-based rules are a poor measure of a firm's economic performance.⁹

3. GSA supports the Historical Revenue Approach because it believes that it incorporates both TFP growth and the input price differential, although it does not identify either of these separately.¹⁰ GSA argues that this approach is simpler than either AT&T's or USTA's TFP approach.¹¹ GSA denies that the Historical Revenue Approach recreates the incentives of rate-of-return regulation, at least when updated on a moving average basis.¹² TRA supports this approach because it would produce an X-Factor that would give LECs the strongest incentive to lower rates.¹³

c. Historical Price Approach

⁷ USTA Comments at 8-10 and App. C at 23-29; US West Comments at 19; NYNEX Comments at 24-25; GTE Comments at 31-33; Southwestern Bell Comments at 18-19; BellSouth Comments at 24-26; Bell Atlantic Comments at 15-16; NYNEX Reply at 17; USTA Reply at 21.

⁸ Lincoln Comments at 10; NYNEX Reply at 17.

⁹ NYNEX Reply at 18.

¹⁰ GSA Comments at 3-4.

¹¹ GSA Reply at 8. Although it does not support TFP, GSA states it would prefer AT&T's model over USTA's model because it includes an input price differential and an interstate TFP adjustment. Id. at 7.

¹² GSA Reply at 8.

¹³ TRA Comments at 6-7.

4. A number of commenters maintain that the Historical Price Approach is inferior to TFP because it is not a direct measure of productivity.¹⁴ Some parties argue that this approach is not reliable because of discontinuities in the available time series.¹⁵ GTE and Southwestern Bell also criticize this approach as too sensitive to the 1984 data point.¹⁶ USTA maintains that, in theory, productivity growth can be measured using changes in output and input prices or in output and input quantities. USTA also argues that the Commission's results are not accurate because they are based on Part 36 and 69 accounting rules, and not based on total company data.¹⁷ NYNEX argues that this method does not lend itself to updating through a moving average.¹⁸

5. BellSouth and Lincoln oppose the Historical Price Approach because its incorporation of Part 36 and 69 rules makes it administratively burdensome.¹⁹ Nevertheless, if the Commission were to adopt a fixed X-Factor rather than one based on a moving average, BellSouth would support using the Spavins-Lande long-term study that was included in the Historical Price Approach.²⁰ ICA argues that the Historical Price Approach would be less administratively burdensome than USTA's original TFP model because it does not rely on non-publicly available data to the same extent as USTA's original TFP calculation.²¹

d. Other X-Factor Methods

¹⁴ USTA Comments at 10 and App. C at 30-31; NYNEX Comments at 25; GTE Comments at 33-34; Southwestern Bell Comments at 19; Bell Atlantic Comments at 16-17.

¹⁵ NYNEX Comments at 25; USTA Comments at 11; GTE Comments at 34-35. See also US West Comments at 19 (adequate data for this approach is not publicly available).

¹⁶ Southwestern Bell Comments at 20; GTE Comments at 35 n.64.

¹⁷ USTA Comments, App. C at 29-32.

¹⁸ NYNEX Comments at 25.

¹⁹ BellSouth Comments at 27; Lincoln Comments at 10.

²⁰ BellSouth Comments at 32. BellSouth maintains that the Spavins-Lande method would result in an X-Factor of 2.1 percent if based on data from 1929 to 1993, and 2.4 percent if based only on post-divestiture data. Id.

²¹ ICA Comments at 5-9.

6. NYNEX and USTA oppose adoption of the current interim price cap plan as the long term plan, in part because it imposes sharing obligations on some LECs.²² US West suggests extending the interim plan for one or two years, so that the Commission can consider US West's long-term proposal discussed below, and consider the effect of the Telecommunications Act of 1996 on the price cap plan.²³ NYNEX and USTA maintain that the combined Historical Price/Historical Revenue approach would create the same disincentives for productivity growth as the Historical Revenue approach as proposed by AT&T.²⁴ Frontier supported this approach in its comments on a "preliminary" basis.²⁵ USTA asserts that an econometric estimation of productivity growth would not pass through gains resulting from economies of scale, and argues that any econometric model sophisticated enough to be economically meaningful would not be relatively simple.²⁶

7. US West suggests freezing the PCIs at their current levels as a means of simplifying the price cap plan.²⁷ US West argues that growing competition will be adequate to protect consumers' interests, and that a more rigorous price cap plan might distort competition, or force prices low enough to deter entry.²⁸ US West asserts that AT&T supported a similar plan in 1990.²⁹ AT&T replies that US West's assumptions regarding competition are unsupported and speculative.³⁰ AT&T and GSA also oppose US West's plan because it would in effect reduce the X-Factor to be

²² NYNEX Comments at 27; USTA Comments at 6.

²³ US West Comments at 3-5; US West Reply at 9-10. See also NYNEX Reply at 28.

²⁴ NYNEX Comments at 26; USTA Comments at 11-12.

²⁵ Frontier Comments at 3 n.3.

²⁶ USTA Comments at 6-8. See also NYNEX Comments at 27.

²⁷ US West Comments at 3-5; US West Reply 4-5.

²⁸ US West Comments at 5; US West Reply at 6-9.

²⁹ US West Comments at 5 n.8, citing LEC Price Cap Order, 5 FCC Rcd at 6796 (para. 80).

³⁰ AT&T Reply at 63-64.

equal to GDP-PI.³¹ Pacific attaches to its reply a California PUC opinion, in which the California PUC did freeze the PCIs in its jurisdiction for three years. Specifically, the California PUC found that, while the record before it was not sufficient to project the level and speed of competition growth in its jurisdiction,³² that growth is likely to be sufficient to restrain prices enough to warrant setting the X-Factor equal to GDP-PI.³³ CCTA discounts the California PUC's conclusions as based on speculative and anecdotal evidence, and observes that the California Administrative Law Judge (ALJ) reached different conclusions.³⁴

8. US West also suggests retaining the interim plan until the 1997 annual access filings are due, to give the Commission adequate time to consider its proposal.³⁵ BellSouth recommends retaining the interim plan for another year, to permit the Commission to focus on rulemakings mandated by the 1996 Act.³⁶ CCTA recommends delaying any major changes to the price cap plan until we can see how the 1996 Act affects productivity growth.³⁷

9. Based on calculating the anticipated rate of return that would have made it advantageous for a LEC to choose the 5.3 percent X-Factor rather than 4.0 percent, and the implicit X-Factor that would have produced that rate of return, MCI concludes that the LECs electing 5.3 percent anticipated an implicit X-Factor of at least 8.54 percent.³⁸ MCI also asserts that the break-even point under the original price cap plan, without sharing, was 11 percent, so MCI recommends setting the X-Factor between 8.5 percent and 11 percent.³⁹ Similarly, Ad Hoc asserts that the

³¹ AT&T Reply at 64-65; GSA Reply at 7.

³² California PUC Opinion at 42.

³³ California PUC Opinion at 46, 51-52, 66-69.

³⁴ CCTA Reply at 10-11.

³⁵ US West Comments at 9-10.

³⁶ BellSouth Reply at 5-6.

³⁷ CCTA Reply at 18-19.

³⁸ MCI Reply at 9-11.

³⁹ MCI Reply at 11-14.

break-even point in the interim plan between 4.0 percent and 5.3 percent is an anticipated rate of return of between 13.24 percent and 13.42 percent.⁴⁰ Many LECs reply that their X-Factor selection does not reflect expected productivity growth, but rather an aversion to sharing.⁴¹ On the other hand, Sprint claims that an X-Factor of 9.9 percent in the original price cap plan would have lowered the LECs' rates of return to 4.07 percent.⁴²

2. Direct Approach

10. GTE argues that the Commission included an economy-wide inflation measure such as GDP-PI in the original price cap formula because there was no industry-specific inflation measure available at the time.⁴³ GTE also recommends removing GDP-PI from the price cap formula and basing the PCI on the difference between changes in LEC input prices and changes in TFP growth.⁴⁴ Ameritech, Sprint, and Lincoln make similar proposals.⁴⁵ Sprint and GTE claim that this approach simplifies the PCI formula, and eliminating the economy-wide terms from the PCI formula eliminates sources of potential inaccuracy in measuring productivity growth or input price changes.⁴⁶ Sprint and Ad Hoc also argue that eliminating economy-wide data from the PCI formula would eliminate problems that could result from delays in reporting BLS statistics.⁴⁷ Sprint argues that any general measure of inflation will not reflect accurately the price changes in a specific industry, and estimates that using GDP-PI in the original price cap formula, without an explicit

⁴⁰ Ad Hoc Reply, Att. at 27-28.

⁴¹ Lincoln Reply at 6-7; Bell Atlantic Reply at 10-11; NYNEX Reply at 12; Pacific Reply at 3-4.

⁴² Sprint Reply at 17.

⁴³ GTE Comments at 6, citing LEC Price Cap Order, 5 FCC Rcd at 6792-93.

⁴⁴ GTE Comments at 6-9 and App. A. Alternatively, GTE would support retaining GDP-PI and setting the X-Factor equal to the difference between economy-wide TFP growth and LEC TFP growth. GTE asserts that this formula is equivalent to its proposal, because it assumes that the long-run TFP input price differential is 0. GTE Comments at 10 and App. C; GTE Reply at 20-21.

⁴⁵ Ameritech Comments at 4-6; Ameritech Reply at 2; Sprint Comments at 5-9; Lincoln Comments at 7.

⁴⁶ Sprint Comments at 8; Sprint Reply at 3-7; GTE Reply at 18-20.

⁴⁷ Sprint Comments at 8-9; Ad Hoc Comments, Att. at 45.

input price differential, created an upward bias of about 1.5 percent per year.⁴⁸ Sprint also denies that GDP-PI is in fact an "economy-wide" measure of inflation, because inter-industry transactions are excluded. Sprint contends that sales to final demand, measured by GDP, represents only one third of the economy.⁴⁹ Ameritech and Sprint note that a direct approach is consistent with the TFP method employed by the ICC.⁵⁰

11. Bell Atlantic opposes this approach, because it would incorporate an input price differential. Bell Atlantic opposes the input price differential for reasons discussed below.⁵¹ AT&T argues that the Direct Approach would eliminate only non-controversial terms in the formula which can be based on publicly available data, and so does not in fact simplify the PCI formula.⁵² According to BellSouth, if we adopt this approach, we should also adopt a five-year moving average.⁵³ Ad Hoc would support this approach only if an objective method to measure LEC-specific input price changes could be developed.⁵⁴ Sprint discusses a means to develop a LEC-specific price index in detail.⁵⁵

12. Sprint recommends requiring LECs to reduce their PCIs by either 1.1 percent or 2.1 percent. Sprint would retain sharing requirements for LECs selecting 1.1 percent.⁵⁶ Sprint contends that, based on inflation levels from 1991 to 1994, the 1.1 percent adjustment would be

⁴⁸ Sprint Reply, Att. A at 4-7, 13-16.

⁴⁹ Sprint Reply, Att. A at 24-27.

⁵⁰ Ameritech Comments at 4-6; Sprint Reply, Att. A at 7, 10-12.

⁵¹ Bell Atlantic Comments at 17.

⁵² AT&T Reply at 61-63.

⁵³ BellSouth Comments at 16-17.

⁵⁴ Ad Hoc Comments, Att. at 45-46.

⁵⁵ Sprint Reply, Att. A at 17-23.

⁵⁶ Sprint Reply at 23.

approximately equal to a 4.5 percent X-Factor.⁵⁷ Sprint argues that this would represent expected total company productivity growth.⁵⁸ Sprint would base its no-sharing option of 2.1 percent on a 0.5 adjustment for the differences between interstate and intrastate productivity growth, and a consumer productivity dividend of 0.5 percent, that would be reduced by .125 percent in each of the following four years.⁵⁹

C. TFP Calculation Issues

2. TFP Models Placed in Current Record

a. USTA's Simplified TFP

13. USTA maintains that its simplified TFP model provides the best possible balance of providing LECs incentives to improve their efficiency and maintaining just and reasonable rates.⁶⁰ Pacific cites a recent California Public Utilities Commission (California PUC) opinion finding that TFP lies between 1.8 percent and 2.6 percent, and concluding that the TFP study conducted by USTA's consultant in this proceeding was more persuasive than other studies projecting productivity growth over 5 percent.⁶¹

14. NCTA and CCTA question whether LECs will have difficulty maintaining their historical levels of productivity, given that Pacific claimed that the infrastructure improvements it made in anticipation of providing video dialtone services would result in efficiency gains in

⁵⁷ Sprint Reply at 23-24. Sprint also estimates that LEC TFP grew at about 3.85 percent from 1985 to 1991. The five-year moving average economy-wide TFP growth ranged from 0.0 percent to 0.38 percent from 1984 to 1993. Sprint Reply, Att. A at 43-44.

⁵⁸ Sprint Reply at 24.

⁵⁹ Sprint Reply at 24-25.

⁶⁰ USTA Comments at 4-6.

⁶¹ Pacific Reply at 2-3, 14-16, citing Investigation on the Commission's Own Motion Into the Second Triennial Review of the Operations and Safeguards of the Incentive-Based Regulatory Framework for Local Exchange Carriers, I.95-05-047, Decision 95-12-052 (Dec. 20, 1995) (California PUC Opinion). Pacific attaches a copy of the California PUC Opinion to its reply.

telephone service provision.⁶² CCTA also theorizes that the LECs' productivity growth might have been depressed from 1990 to 1994, while the LECs faced sharing requirements under the original price cap plan, and while some LECs were investing in video dialtone technology.⁶³ Some parties argue that, since most price cap LECs elected the 5.3 percent X-Factor in the interim plan, the Simplified TFP model does not adequately measure the LECs' expected future productivity growth when it produces an X-Factor of 3 percent.⁶⁴

15. USTA also claims that its TFP method is comparable to that used by the Bureau of Labor Statistics (BLS).⁶⁵ Several LECs support using USTA's simplified TFP model.⁶⁶ USTA and other parties assert that USTA has improved its model by relying on publicly available data.⁶⁷ MCI argues that USTA has not eliminated all the non-publicly available data from its method, noting that USTA refers to unpublished data for its economic stock adjustment factors, and depreciation rates from Jorgenson, in its TFP Review Plan.⁶⁸

b. AT&T's Performance Based Model

⁶² NCTA Reply at 5-6; CCTA Reply at 3-4.

⁶³ CCTA Reply at 12-14.

⁶⁴ LDDS Comments at 3-4; Ad Hoc Reply at 2 and Att. at 39; MCI Reply at 5-6; NCTA Reply at 6; API Reply at 1-2. We discuss more specific criticisms of the Simplified TFP Model below.

⁶⁵ USTA Comments at 33-34.

⁶⁶ NYNEX Comments at 12-18, and Apps. A, B, and C; Southwestern Bell Comments at 1-3, 5-6, 17-18; BellSouth Comments at 24; Bell Atlantic Comments at 8-9; Pacific Comments at 1-2; SNET Comments at 2; Ameritech Comments at 3-4; NYNEX Reply at 3-5. See also US West Comments at 6-7; US West Reply at 10-12 (supporting USTA's proposal as an alternative to its own proposal).

⁶⁷ USTA Comments at 3-4; BellSouth Comments at 9; Southwestern Bell Comments at 3-5; USTA Reply at 7; Bell Atlantic Reply at 2; NYNEX Reply at 4-5; GTE Reply at 4-6.

⁶⁸ MCI Reply at 6-7, citing USTA Comments, Att. B at Chart MISC1, rows 500-620. See also TRA Reply at 4-5; Ad Hoc Reply, Att. at 41-43.

16. Southwestern Bell and US West criticize this approach because it relies on accounting measures rather than "economic" measures.⁶⁹ Some LECs contend that an X-Factor as high as AT&T suggests would be confiscatory.⁷⁰ BellSouth asserts that AT&T's suggested X-Factor is inconsistent with the 5.54 percent it suggested on the basis of the Historical Revenue Model, which AT&T argued would have been adequate to limit the industry average rate of return to 11.25 percent.⁷¹

c. Ad Hoc's TFP Approach

17. Sprint claims that the X-Factor suggested by Ad Hoc overstates interstate productivity, and that using that X-Factor in the original price cap plan would have lowered the LECs' rates of return to 4.07 percent.⁷²

3. Output Index Issues

a. Mathematical Construction of Output Indices

18. In its simplified TFP model, USTA uses a Tornquist method to develop output quantity indices.⁷³ USTA uses an approximation of a chain-linked Paasche method to develop output price indices.⁷⁴ To calculate output quantities, USTA deflates booked revenues by its approximated Paasche Price Indices. USTA contends that a chain-weighted Paasche Price Index would be theoretically superior to a traditional fixed-weight Laspeyres and fixed-weight Paasche Price Indices.⁷⁵ USTA also provides a mathematical formula purporting to show that there is little percentage difference in the price index derived from its approximated Paasche Index and a true chain-linked Paasche price index.⁷⁶

⁶⁹ Southwestern Bell Reply at 9-11; US West Reply at 12-13.

⁷⁰ Pacific Reply at 3. See also Sprint Reply at 17 (AT&T's X-Factor in original price cap plan would have reduced the LECs' average rate of return to 5.69 percent.)

⁷¹ BellSouth Reply at 7-8.

⁷² Sprint Reply at 17.

⁷³ USTA Comments at 14-15.

⁷⁴ USTA Comments at 14-15.

⁷⁵ USTA Comments, Att. A at 5.

⁷⁶ USTA Comments, Att. A at 36-39. **B-10**

19. AT&T favors using the Fisher Ideal Index to construct the output indices, rather than the Tornquist Index used by USTA. AT&T argues that, unlike the Tornquist Index method used in USTA's model, the Fisher Ideal Index can accommodate the introduction or withdrawal of services during the period covered by the index. AT&T also claims that the Fisher Ideal Index gives the same result for TFP growth whether the computations are constructed from price indices or from quantity indices.⁷⁷ AT&T measures output directly, based on minutes of interstate access, number of end user access lines and special access lines as reported in ARMIS. AT&T asserts that this direct measurement of output results in more accurate output measures than deflating revenues as it asserts USTA does.⁷⁸

20. BellSouth argues that BLS currently uses a Tornquist index, and that in any case, it is unlikely that any of the highly aggregated service categories would ever move to zero.⁷⁹ Some parties assert that the choice of index construction method has little effect on TFP results.⁸⁰ USTA also contends that the Tornquist Index has been more widely used in productivity research than the Fisher Ideal Index.⁸¹ Sprint asserts that AT&T overstates interstate output by 1.6 percent, because it divides traffic-sensitive revenue requirement by number of lines rather than number of minutes of use.⁸² Sprint also asserts that AT&T overstates intrastate output by 0.9 percent by omitting intraLATA usage in calculating state toll output.⁸³ Sprint contends that USTA's measurement of common line output is inconsistent, because it measures carrier common line usage in minutes and end user common line usage in number of access lines.⁸⁴ Ad Hoc also advocates developing output quantity

⁷⁷ AT&T Comments, App. B at 5-6.

⁷⁸ AT&T Comments, Att. A at 72-73.

⁷⁹ BellSouth Reply, Att. at 30-31. See also USTA Reply, Att. A at 8-9.

⁸⁰ USTA Reply, Att. A at 8-9; Southwestern Bell Reply at 11; Bell Atlantic Reply, Att. I at 14.

⁸¹ USTA Reply, Att. A at 8-9.

⁸² Sprint Reply at 8-9.

⁸³ Sprint Reply at 8-9.

⁸⁴ Sprint Comments at 10.

indices directly based on number of lines and minutes of use.⁸⁵ USTA asserts that its and AT&T's output measurement are the same except for special access, and that measuring special access output in terms of number of lines is too simplistic.⁸⁶

b. Number of Output Categories

21. USTA establishes seven output price and quantity indices, based on aggregations of revenue categories in ARMIS 43-02.⁸⁷ USTA contends that it is not possible to develop more disaggregated output categories using publicly available data.⁸⁸ US West support USTA's output categorization.⁸⁹ GTE argues that indices should be disaggregated only to the point where the services within each index have roughly the same growth rates.⁹⁰ AT&T includes only three output indices, because its model is designed to measure interstate productivity growth rather than total company TFP as USTA's model measures.⁹¹

22. USTA claims that AT&T excludes the services in USTA's miscellaneous services category, and that this overestimates TFP by 0.4 percent from 1988-94, and 0.5 percent from 1989-94.⁹²

c. Weighting of Output Categories

⁸⁵ Ad Hoc Comments, Att. at 17-18; Ad Hoc Reply at 5 and Att. at 26. Ad Hoc also criticizes the output indexes in USTA's original TFP model. Ad Hoc Comments, Att. at 17. Because USTA has adopted a different method to develop output indexes, we will not consider Ad Hoc's comments on this issue here.

⁸⁶ USTA Reply, Att. A at 9-12.

⁸⁷ These output categories are local service, long distance service, interstate end user access, interstate switched access, interstate special access, intrastate access, and miscellaneous. USTA Comments at 15.

⁸⁸ USTA Comments at 15.

⁸⁹ US West Comments at 11.

⁹⁰ GTE Comments at 15-16.

⁹¹ The interstate or total company TFP issue is discussed below.

⁹² USTA 1997 Comments, Att. 6 at 8.

23. AT&T recommends weighting the output indexes on a marginal cost basis, arguing that revenue weights will not approximate more economically meaningful marginal cost weights until competition has developed further.⁹³ BellSouth asserts that AT&T improperly assumes that fully distributed costs can be used as a surrogate for long-run marginal costs, and so in effect assumes that the LECs can achieve no economies of scale.⁹⁴ GTE replies that cost-based weights for output categories might tend to recreate the incentives of rate-of-return regulation.⁹⁵ Some parties assert that developing cost-based weights for output indexes would be difficult and contentious.⁹⁶ USTA and US West contend that revenue-weighting creates a more ambitious benchmark for LECs, because they believe cost-based weights place more emphasis on the output categories with slower growth.⁹⁷ US West claims that booked revenues are a reasonable and publicly available substitute for billed revenues.⁹⁸ USTA contends that, unless we use revenue weights for the output indexes, LECs increasing their productivity will not be rewarded with increases in revenue.⁹⁹

4. Input Index Issues

a. Capital

(2) Capital Stock

24. USTA's simplified TFP model measures capital stock with the perpetual inventory model it used in its original model. Specifically, USTA states that it established a benchmark value of capital based on 1984 plant and equipment using replacement values and USTA's economic depreciation rates.¹⁰⁰ To incorporate the effects of depreciation into the

⁹³ AT&T Comments at 23-24 and App. A at 60-63; AT&T Reply at 34.

⁹⁴ BellSouth Reply, Att. at 29-30.

⁹⁵ GTE Reply at 7-9.

⁹⁶ USTA Comments at 16; BellSouth Comments at 10-11; USTA Reply, Att. A at 12-13; Bell Atlantic Reply, Att. 1 at 13.

⁹⁷ USTA Comments at 16; US West Comments at 12.

⁹⁸ US West Comments at 11.

⁹⁹ USTA Reply, Att. B at 25-27.

¹⁰⁰ USTA Comments at 20-21 and App. A at 15-16.

benchmark capital value, USTA adjusts its benchmark capital stock by an economic stock adjustment factor, which is the ratio of economic value to book value, derived by dividing the U.S. BEA replacement cost measures by the BEA quantity of capital stock measures.¹⁰¹ USTA states that capital stock should be based on replacement costs rather than original costs, because original costs measurements are based on depreciation assumptions that differ from economic depreciation.¹⁰² AT&T bases its capital stock on net book value.¹⁰³

25. USTA states that it replaced its TPIs, based on proprietary data, with asset price indices currently published by BEA. USTA asserts that the use of BEA asset price indices in place of TPIs has virtually no effect on LEC TFP.¹⁰⁴ Ad Hoc and Lincoln also support using BLS or BEA data in place of TPIs.¹⁰⁵ US West and GTE support the perpetual inventory method used in USTA's model, and claim that BLS also employs this method.¹⁰⁶ Ad Hoc does not oppose USTA's perpetual inventory method itself, only the data on which USTA relied in its original TFP study.¹⁰⁷ AT&T also supports the perpetual inventory method.¹⁰⁸

26. USTA and GTE maintain that the basing depreciation costs on six asset categories is reasonable, observing that BEA also uses broad asset classifications to measure depreciation.¹⁰⁹ These commenters also assert that it would be very time-consuming or impossible to gather the data necessary to calculate depreciation rates for 30 capital accounts.¹¹⁰

¹⁰¹ USTA Comments at 21 and App. A at 16.

¹⁰² USTA Comments at 21.

¹⁰³ AT&T Comments, App. A at 70-71.

¹⁰⁴ USTA Comments at 21-22.

¹⁰⁵ Ad Hoc Comments, Att. at 25-26, 42-43; Lincoln Comments at 3-4.

¹⁰⁶ US West Comments at 14; GTE Comments at 18-19.

¹⁰⁷ Ad Hoc Comments, Att. at 27.

¹⁰⁸ AT&T Comments, App. B at 12.

¹⁰⁹ USTA Comments at 20; GTE Comments at 18.

¹¹⁰ USTA Comments at 20; GTE Comments at 18.

(3) Adjustments to Capital Stock

27. Ad Hoc and AT&T criticize Jorgenson's "economic" depreciation analysis on which USTA relied in its original TFP study, as well as its simplified study. Ad Hoc and AT&T state that Jorgenson's analysis was based on a 1981 article by Hulten and Wykoff, which in turn was based on data ending in 1971, and examined depreciation on business assets for the economy as a whole rather than on telecommunications equipment specifically.¹¹¹ Ad Hoc notes that the depreciation study on which USTA relied estimated the depreciation rates for broad groups of asset classes which combined telecommunications equipment with other kinds of equipment, based on averages of those asset classes.¹¹² Ad Hoc also notes that the depreciation rates in this study are lower than either the prescribed depreciation rates or the rates advocated by LECs in depreciation represervation proceedings, and argues that underestimating depreciation artificially reduces TFP growth and the X-Factor.¹¹³ Sprint alleges that USTA's depreciation rates overweight capital input prices.¹¹⁴ NYNEX responds that USTA's depreciation study is sound, because it avoids creating "asymmetry" between the measurement of LEC capital inputs and economy-wide capital inputs.¹¹⁵ USTA and Bell Atlantic assert that USTA adopted only the depreciation method developed in the 1981 article, and substituted the most recent BEA data on equipment lifetimes to develop depreciation rates.¹¹⁶

28. Some commenters argue that the depreciation rates should be those prescribed by the Commission.¹¹⁷ Ad Hoc maintains that the Commission's prescribed depreciation rates are designed to reflect the

¹¹¹ Ad Hoc Comments, Att. at 20-21; Ad Hoc Reply, Att. at 33; AT&T Comments at 22, App. A at 47-49, App. B at 9; AT&T Reply at 32-34. But see AT&T Reply, App. B at 48-49 ("hyperbolic decay model" used by BLS inferior to "geometric decay model" used by Jorgenson).

¹¹² Ad Hoc Comments, Att. at 21-22.

¹¹³ Ad Hoc Comments, Att. at 23.

¹¹⁴ Sprint Comments at 9.

¹¹⁵ NYNEX Reply at 10-11.

¹¹⁶ USTA Reply, Att. A at 19-20; Bell Atlantic Reply, Att. 1 at 11-12.

¹¹⁷ MCI Comments at 18-19; Ad Hoc Comments, Att. at 20; AT&T Comments at 22; Ad Hoc Reply at 5.

actual rate of plant retirement.¹¹⁸ MCI asserts that the Commission's prescribed depreciation rates in fact adequately reflect the economic life of the LECs' plant and equipment.¹¹⁹ MCI also includes a study of depreciation rates to support its conclusions.¹²⁰ In particular, MCI notes that depreciation reserve deficiencies are not excessively high at this time.¹²¹

29. Several commenters claim that MCI's depreciation study assumes what it purports to prove, that the Commission's prescribed depreciation lives are not unreasonably long.¹²² US West asserts that the amount of reserve deficiency is not indicative of whether depreciation lives are reasonable.¹²³ US West also asserts that MCI proposes updating depreciation rates only every four years, and that this is inconsistent with the current simplified depreciation prescription process.¹²⁴ USTA asserts that MCI underestimates the current depreciation reserve deficits.¹²⁵ Specifically, according to USTA, several LECs have stopped using FASB 71, and this resulted in almost \$39 billion in additional depreciation reserve deficiencies for the seven BOCs, GTE, Frontier, and SNET.¹²⁶

30. USTA argues that the Commission's prescribed depreciation rates are not "economic" depreciation rates, because they are based on the past history of LEC net salvage rates, retirements, and remaining lives,

¹¹⁸ Ad Hoc Comments, Att. at 22-23.

¹¹⁹ MCI Comments at 18-19; MCI Reply at 7.

¹²⁰ MCI Comments, App. A.

¹²¹ See, e.g., MCI Comments, App. A at 1-4. See also NCTA Reply at 7-8.

¹²² USTA Reply, Att. D at 12; Southwestern Bell Reply at 15-16 and App. A at 1-2; US West Reply at 27-28; NYNEX Reply at 11.

¹²³ US West Reply at 23-24.

¹²⁴ US West Reply at 25.

¹²⁵ USTA Reply, Att. C at 18-19, Att. D at 13.

¹²⁶ USTA Reply, Att. D at 6-8.

rather than the economic obsolescence of capital.¹²⁷ Southwestern Bell maintains that LECs need to depreciate their plant and equipment now so that they can modernize their networks to provide more sophisticated services.¹²⁸ Southwestern Bell also denies that it advocates accelerated depreciation to get current ratepayers to finance future deployment of newer plant.¹²⁹ On the other hand, USTA asserts that current customers have always had to finance future technological improvements.¹³⁰ Some parties argue that depreciation prescriptions are relevant only in enforcing rate-of-return regulations or calculating sharing obligations.¹³¹ GTE claims that Jorgenson assisted BEA with updating its depreciation lifetimes.¹³² Some commenters also argue that it is not fair to require LECs to use longer depreciation lives than IXC's or cable companies are permitted to use for the same or similar plant and equipment.¹³³ US West alleges that the Commission's depreciation rates are longer than those reported by the LECs to the Securities and Exchange Commission (SEC).¹³⁴ Pacific argues that, since the price cap rules prohibit carriers from passing

¹²⁷ USTA Comments at 18-19; USTA Reply, Att. D at 2-6. See also US West Comments at 13-14; GTE Comments at 17; BellSouth Comments at 13-14; Southwestern Bell Comments at 9 and App. A at 24; USTA Reply, Att. C at 17-18; Bell Atlantic Reply, Att. 1 at 7; NYNEX Reply at 18; US West Reply at 25, 27; GTE Reply at 10. Southwestern Bell also cites a number of revisions to the prescribed depreciation rates that made the rates inconsistent with "economic" depreciation rates Southwestern Bell Comments at 9-10, citing, e.g., Amortization of Depreciation Reserve Imbalances of Local Exchange Carriers, CC Docket No. 87-447, 3 FCC Rcd 984, 986-88 (paras. 17-25) (1988); Amendment of Part 31 (Uniform System of Accounts for Class A and Class B Telephone Companies) so as to permit depreciable property to be placed in groups comprised of units with expected equal life for depreciation under the straight-line method, Docket No. 20188, 83 F.C.C.2d 267 (1980).

¹²⁸ Southwestern Bell Reply at 6-7.

¹²⁹ Southwestern Bell Reply at 7-8. See also Bell Atlantic Reply, Att. 1 at 12 (asserting that even BEA lifetimes might not be fast enough to reflect economic obsolescence completely).

¹³⁰ USTA Reply, Att. D at 13-14.

¹³¹ USTA Reply at 17-18; GTE Reply at 11-12; Pacific Reply at 13-14.

¹³² GTE Comments at 17.

¹³³ NYNEX Comments at 18-19; GTE Reply at 10-11; Southwestern Bell Reply at 4-6; Ameritech Reply at 3-4; USTA Reply, Att. D at 8-11.

¹³⁴ US West Reply at 24-25.

depreciation rate changes to ratepayers, the Commission has no reason to base the X-Factor on prescribed depreciation rates.¹³⁵

31. Some parties note that, under the 1996 Act, the Commission is no longer required to prescribe depreciation rates, and so should not mandate prescribed depreciation rates in TFP measurement.¹³⁶ MCI replies that, regardless of whether the Commission continues to prescribe depreciation rates, it will probably continue to retain some oversight over depreciation rates.¹³⁷

(4) Hedonic Adjustments

32. AT&T and Ad Hoc argue that technological developments since the early 1980s have made it possible for LECs to increase their productivity growth substantially, and that some of this productivity growth might not be captured completely by examining changes in the prices or quantities of capital inputs.¹³⁸ Ad Hoc maintains that GDP-PI does not make adjustments for changes in quality.¹³⁹ Ad Hoc states that the Commission should either adopt a price deflator other than GDP-PI that would take these technological improvements into account explicitly, or adopt an input price adjustment and retain the consumer productivity dividend.¹⁴⁰ Ad Hoc makes no recommendation at this time as to how to adjust for technological improvements, but asserts that, if this adjustment was a 10 percent annual decrease in the price indices for the input categories which include computers, then this would increase the X-Factor

¹³⁵ Pacific Reply at 13-14.

¹³⁶ Ameritech Reply at 4; GTE Reply at 11-12, citing 1996 Act. See also USTA Comments at 20.

¹³⁷ MCI Reply at 7.

¹³⁸ Ad Hoc Comments at 26-27 and Att. at 36-42; AT&T Comments, App. A at 51-58; AT&T Reply at 34; Ad Hoc Reply, Att. at 27.

¹³⁹ Ad Hoc Comments, Att. at 29.

¹⁴⁰ Ad Hoc Comments, Att. at 42.

by about 0.4 percent.¹⁴¹ (Indices reflecting the effects of technology changes are called "hedonic" indices.)

33. Several commenters argue that AT&T and Ad Hoc have not adequately justified the level of their recommended hedonic adjustments.¹⁴² Lincoln also asserts that, by using deflated revenues to measure outputs and inputs, USTA's model captures the majority of hedonic effects.¹⁴³ Some commenters also contend that it would be unreasonable to make hedonic adjustments to LEC input data without making such adjustments to the economy-wide input data.¹⁴⁴ Lincoln and BellSouth contend that calculating accurate hedonic adjustments would require complicated and potentially controversial econometric models.¹⁴⁵ BellSouth and Bell Atlantic maintain that AT&T's hedonic adjustment to the capital input results in an offsetting adjustment to its input price differential, and so has no overall effect.¹⁴⁶ On the other hand, CCTA supports making some hedonic adjustment.¹⁴⁷

(5) The Flow of Capital Services

34. USTA and US West assert that it is standard practice to impute capital services from capital stock rather than capital consumption, and that it would be unreasonable to equate capital services provided with loss of capital efficiency, as they claim the Commission did.¹⁴⁸ USTA

¹⁴¹ Ad Hoc Comments, Att. at 57-58. In its reply, Ad Hoc claimed that a 10 percent hedonic adjustment would increase the X-Factor by 1.0 when based on data from 1990 to 1994, or 1.1 percent when based on 1989 to 1993, or from 1989 to 1994. Ad Hoc Reply at 4 and Att. at 36-37.

¹⁴² USTA Reply, Att. A at 17-18; Southwestern Bell Reply at 14; GTE Reply at 12-13; Sprint Reply at 9; NYNEX Reply at 16; BellSouth Reply, Att. at 12.

¹⁴³ Lincoln Reply at 12 and Att. B.

¹⁴⁴ USTA Reply at 12 and Att. A at 18; BellSouth Reply, Att. at 6-9; Southwestern Bell Reply at 15; NYNEX Reply at 16; Lincoln Reply at 12-13.

¹⁴⁵ Lincoln Reply at 12-13; BellSouth Reply, Att. at 12-13.

¹⁴⁶ BellSouth Reply, Att. at 10-11; Bell Atlantic Reply, Att. 1 at 9-10. See also Sprint Reply at 9 (in a direct approach using only LEC-specific data, any hedonic adjustment would affect input prices and TFP equally, and so would be superfluous).

¹⁴⁷ CCTA Reply at 15-16, 17-18.

¹⁴⁸ USTA Comments at 22-23 and App. A at 21; US West Comments at 14.

analogizes telecommunications to a light bulb. According to USTA, a light bulb provides light at the same level of efficiency regardless of its age, until the bulb burns out.¹⁴⁹ AT&T also claims that imputing the flow of capital services to be proportional to the aggregate stock is consistent with economic theory. AT&T claims further that capital consumption is a cost of capital rather than a measure of capital input, and so should not be used as a measure of capital input.¹⁵⁰

(6) Implicit Rental Price

35. USTA asserts that its implicit rental price is based on a well-accepted theory of capital and can be updated on a timely basis.¹⁵¹ US West and GTE support USTA's method of developing implicit rental prices.¹⁵² GTE also contends, however, that the implicit rental price introduces volatility to input prices.¹⁵³ USTA and US West suggest using a three-year moving average for the implicit rental price.¹⁵⁴

36. For purposes of calculating the implicit rental price in its simplified TFP method, USTA bases the cost of capital on the implicit cost of capital embedded in National Income and Product Account data, claiming that this is the closest approximation of the opportunity cost of capital that can be based on publicly available data.¹⁵⁵ USTA also asserts that its revised cost of capital includes both debt and equity costs, and so is an improvement over the cost of capital in its original TFP Model.¹⁵⁶ US West argues that the National Income and Product Accounts treat LEC

¹⁴⁹ USTA Comments, Att. A at 21.

¹⁵⁰ AT&T Comments, App. B at 13.

¹⁵¹ USTA Comments at 23.

¹⁵² US West Comments at 14-15; GTE Comments at 19-20.

¹⁵³ GTE Comments at 20.

¹⁵⁴ USTA Comments at 23; US West Comments at 14-15.

¹⁵⁵ USTA Comments at 16-17.

¹⁵⁶ USTA Reply at 8. See also USTA Comments at 17. A number of parties criticize USTA's original TFP study because it used Moody's Public Utility Bond yields to determine the cost of capital, which incorrectly excludes the cost of equity. Ad Hoc, App. at 18; AT&T Comments at 18-19 and App. A at 45-47; USTA Comments at 17; Southwestern Bell Comments at 7 n.12.

cost of capital and the economy-wide cost of capital symmetrically.¹⁵⁷ Ad Hoc argues that an economy-wide measure of the cost of capital is not appropriate for LECs because the general economy is more competitive than the LEC industry is currently.¹⁵⁸ GTE agrees that the cost of capital should include both debt and equity costs, but would support basing the cost of capital on either Moody's Utility Bond yields or National Account data.¹⁵⁹ In its comments, Ad Hoc suggests adjusting Moody's Bond yields to reflect the fact that taxes apply only to returns on equity, not interest paid on debt, although it supports AT&T's cost of capital measure in its reply.¹⁶⁰

37. AT&T maintains that USTA's original model assumed a fixed cost of capital, and then adjusted capital stock to a cost-minimizing level. AT&T and Ad Hoc also assert that this treatment does not measure the actual level of capital input.¹⁶¹ Therefore, rather than relying on any implicit rental price calculation, AT&T bases the weight placed on its capital input index relative to labor and materials on the price cap LECs' actual earnings. Specifically, AT&T bases the weight of the labor input index on total compensation, the weight of the materials input index on a materials price index, discussed further below, and the weight of the capital input index on total revenues minus the sum of total labor compensation and materials expense. According to AT&T, USTA's approach in effect allocates a fixed amount of revenue to capital, and this results in a guaranteed return on capital regardless of performance. AT&T argues this creates the same incentives as rate-of-return regulation.¹⁶² Ad Hoc asserts that USTA's cost of capital measurement results in understating the input price differential.¹⁶³ AT&T's model treats the LECs' actual returns as an input cost that must be attributed to capital, labor,

¹⁵⁷ US West Comments at 12-13.

¹⁵⁸ Ad Hoc Reply at 4-5 and Att. at 29-32.

¹⁵⁹ GTE Comments at 16.

¹⁶⁰ Ad Hoc Comments, Att. at 19.

¹⁶¹ AT&T Comments at 19-20 and App. A at 31-45; AT&T Reply at 32; Ad Hoc Reply, Att. at 28-29.

¹⁶² AT&T Comments at 20-22.

¹⁶³ Ad Hoc Reply, Att. at 30.

and material.¹⁶⁴ AT&T measures the cost of capital as equal to the amount by which total revenues exceed total costs.¹⁶⁵ AT&T asserts that its method of calculating the cost of capital is closer to BLS's method than USTA's method is.¹⁶⁶ Ad Hoc supports AT&T's method of basing the weights assigned to the three input indices on earnings.¹⁶⁷ Sprint alleges that USTA's definition of capital costs results in overweighting capital input prices.¹⁶⁸ Sprint maintains that USTA's opportunity cost of capital is not reasonable, because most telecommunications capital assets cannot be sold outside the telecommunications industry, and so USTA's treatment overstates the weight given to the capital input index relative to the labor and materials indices.¹⁶⁹

38. USTA and a number of LECs assert that AT&T's weighting of the capital input index replicates the incentives of rate-of-return regulation, because it results in limiting carriers to a particular rate of return.¹⁷⁰ USTA also claims that AT&T's cost of capital fluctuates with things such as changes in demand or booking the costs of an early retirement program, and asserts that it is unreasonable to permit this fluctuation in the cost of capital.¹⁷¹ USTA maintains that it is inappropriate to use total revenue to estimate cost of capital in industries with non-constant returns to scale.¹⁷² USTA and Bell Atlantic contend that AT&T uses the book value of capital, while the replacement value of capital is more economically meaningful.¹⁷³ USTA and NYNEX reply that it is reasonable to assume that firms in the telephone industry adjust capital inputs to cost-

¹⁶⁴ AT&T Comments at 20-22 and Att. A at 31-47.

¹⁶⁵ AT&T Comments at 21.

¹⁶⁶ AT&T Reply, App. B at 48.

¹⁶⁷ Ad Hoc Reply, Att. at 27-28.

¹⁶⁸ Sprint Comments at 9.

¹⁶⁹ Sprint Reply, Att. A at 30.

¹⁷⁰ USTA Reply at 20-21; Att. A at 17, Att. C at 4-6; NYNEX Reply at 15-16; BellSouth Reply, Att. at 23-29; GTE Reply at 9-10; Bell Atlantic Reply at 3; Southwestern Bell Reply at 10.

¹⁷¹ USTA Reply, Att. B. at 8-9, 11-12.

¹⁷² USTA Reply, Att. A at 16.

¹⁷³ USTA Reply, Att. A at 20-21, Att. B at 6-7, 9-11, Att. C at 14-15; Bell Atlantic Reply, Att. 1 at 6-7.

minimizing levels.¹⁷⁴ USTA also asserts that it is difficult to estimate the weight to assign to an input when it is not being used at its cost-minimizing level, and that this should not be used unless there is a strong indication that inputs are not being used at an optimal level in a particular industry.¹⁷⁵ Finally, USTA contends that AT&T's model contains several careless mistakes.¹⁷⁶

39. MCI and TRA argue that the Commission has determined that the LECs' cost of capital is 11.25 percent, and the LECs should be required to continue to use this cost of capital until the Commission revises its determination.¹⁷⁷ TRA also argues that relying on the cost of capital determined by the Commission would be less administratively burdensome than trying to recalculate the cost of capital in every annual access filing.¹⁷⁸ Some LECs oppose adopting the prescribed rate of return as the cost of capital because it tends to tie the price cap plan to rate-of-return regulation.¹⁷⁹ Southwestern Bell argues that the prescribed rate of return was not consistent over time.¹⁸⁰ US West argues that a rate-of-return represcription proceeding is administratively burdensome.¹⁸¹ Ad Hoc and US West observe that, because the Commission does not represcribe the rate of return annually, it may not be an accurate measure of the cost of capital every year.¹⁸² US West observes that BEA does

¹⁷⁴ USTA Reply, Att. C at 16; NYNEX Reply at 10.

¹⁷⁵ USTA Reply, Att. A at 15-16.

¹⁷⁶ USTA Reply, Att. B at 12-13.

¹⁷⁷ MCI Comments at 17-18; TRA Reply at 5. MCI also claims that, if the Commission were to conduct a represcription proceeding, it would find that the cost of capital has fallen to 9.54 percent. MCI Comments at 18 n.29.

¹⁷⁸ TRA Reply at 5.

¹⁷⁹ US West Comments at 13; GTE Comments at 16-17; BellSouth Comments at 13.

¹⁸⁰ Southwestern Bell Comments at 7. Southwestern Bell also asserts that some parties in earlier phases of this proceeding did not use a consistent approach when comparing the LECs' cost of capital with the costs of capital in other industries. Southwestern Bell Comments at 7-8.

¹⁸¹ US West Comments at 13. See also USTA Comments at 18.

¹⁸² US West Comments at 13; Ad Hoc Comments, Att. at 19.

update its cost of capital annually.¹⁸³ BellSouth and USTA deny that the prescribed rate of return is the "opportunity cost" of debt and equity, and claim that USTA's use of the National Income and Product Accounts results in a closer approximation.¹⁸⁴ On the other hand, Bell Atlantic asserts that the Commission's prescribed rate of return is an "economic" rate of return rather than an "accounting" rate of return, because it is based on cash flows and market values.¹⁸⁵

40. AT&T claims that USTA appears to use average tax rates in its implicit rental price, and that this is less reasonable than using estimated marginal tax rates, as AT&T claims BLS uses.¹⁸⁶ Bell Atlantic alleges that AT&T's tax treatment of debt and equity implicitly assumes that the pre-tax cost of debt is equal to the post-tax cost of equity.¹⁸⁷ USTA asserts that it bases taxes on the tax expenses reported in Form M, and that its method adequately accounts for the differences between the tax treatment of debt and equity.¹⁸⁸ Sprint claims that the implicit rental price analysis used by USTA was developed to assist in tax analysis at the firm or division level, and argues that pre-tax capital consumption provides a more accurate measure of productivity. Sprint also claims that USTA distorts the value of capital relative to labor and materials by treating those two inputs as before taxes.¹⁸⁹

41. USTA opposes AT&T's method of equating total cost and total revenue. USTA maintains that this improperly assumes that LECs always earn no more than their opportunity cost of capital.¹⁹⁰ USTA also maintains that by assuming that cost equals revenue, AT&T's model

¹⁸³ US West Comments at 13.

¹⁸⁴ BellSouth Comments at 12; BellSouth Reply, Att. at 25-26; USTA Comments at 17-18; citing Barbeau, Grimm, Phillips and Selzer, Railroad Cost Structure Revisited, 28 Transportation Research Forum 237 (1987); USTA Reply, Att. B at 4-5.

¹⁸⁵ Bell Atlantic Reply at 10.

¹⁸⁶ AT&T Reply, App. B at 49.

¹⁸⁷ Bell Atlantic Reply, Att. 1 at 7-8.

¹⁸⁸ USTA Reply, Att. A at 13-15.

¹⁸⁹ Sprint Reply, Att. A at 29-32.

¹⁹⁰ USTA 1997 Comments, Att. 6 at 5-6.

measures past changes in prices rather than past changes in productivity.¹⁹¹ USTA claims that AT&T's measure of the cost of capital overstates the X-Factor by 1.7 percent from 1988-94, and 2.2 percent from 1989-94.¹⁹²

b. Labor

42. USTA asserts that creating more disaggregated labor indices would complicate the TFP calculations without improving their accuracy.¹⁹³ USTA also contends that management and non-management hours are not publicly available data, and so replaces USTA's two labor indices in its original TFP study with one index, number of employees as reported in ARMIS.¹⁹⁴ USTA observes that creating only one labor index moots the issue of how to weight two or more categories.¹⁹⁵ Finally, USTA maintains that the simplified TFP method captures the effects of "outsourcing" in the materials index.¹⁹⁶

43. Sprint contends that USTA improperly compares LEC-specific labor-cost growth with BLS data for the economy-wide costs of labor. According to Sprint, it would be more appropriate to compare the economy-wide BLS data with BLS data for labor costs in the transportation and public utilities industries. Sprint argues that USTA has incorrectly concluded that the LECs' labor costs have grown more quickly than for the economy as a whole, when in fact those labor costs have grown more slowly than for the economy as a whole.¹⁹⁷

44. Ad Hoc claims that USTA's treatment of OPEB accounting changes and voluntary early retirement programs should be amortized over some period, to avoid overstating the actual growth of labor inputs,

¹⁹¹ USTA 1997 Comments, Att. 6 at 6-7.

¹⁹² USTA 1997 Comments, Att. 6 at 7.

¹⁹³ USTA Comments at 23. See also GTE Comments at 20-21; US West Comments at 15.

¹⁹⁴ USTA Comments at 23-24. See also GTE Comments at 20; US West Comments at 15.

¹⁹⁵ USTA Comments at 24.

¹⁹⁶ USTA Comments at 24.

¹⁹⁷ Sprint Reply, Att. A at 37-41.

and thus understating TFP growth.¹⁹⁸ GTE replies that Ad Hoc's determining which labor inputs were incurred prudently or imprudently would treat labor inputs inconsistently with other inputs.¹⁹⁹ USTA and GTE claim that booking costs associated with OPEBs and voluntary retirement programs is consistent with GAAP and RAO Letter 24.²⁰⁰ According to Lincoln, if LECs are not permitted to claim OPEB costs as an exogenous cost, they should be permitted to include OPEB costs in their labor input costs.²⁰¹ Lincoln contends that it would be unreasonable to exclude the costs associated with voluntary retirement programs while including the efficiencies gained by reducing the number of employees.²⁰² USTA asserts that any further amortization would not change the amount of labor inputs, but would simply smooth the data. USTA contends that smoothing is not necessary in this case.²⁰³ According to Lincoln, the X-Factor will not be based on expected future levels of inputs, so one-time costs should not skew the results.²⁰⁴

c. Materials

45. USTA and some LECs argue that creating disaggregated materials indices would be a very complicated task, that there are no publicly available data on which to base such indices, and assert that GDP-PI is a reasonable proxy for materials prices.²⁰⁵ Sprint and AT&T deny that GDP-PI is an accurate surrogate for LEC materials input

¹⁹⁸ Ad Hoc Comments, Att. at 28. See also Sprint Reply at 9-10.

¹⁹⁹ GTE Reply at 14. See also Lincoln Reply at 11 (determining whether to include or exclude any given input cost might make TFP calculations unnecessarily complex).

²⁰⁰ USTA Reply at 18-19; GTE Reply at 13-14, citing RAO Letter 24, 9 FCC Rcd 1676 (Com. Car. Bur., Accounting and Audits Div., 1994).

²⁰¹ Lincoln Reply at 10-11.

²⁰² Lincoln Reply at 11-12.

²⁰³ USTA Reply at 18-19.

²⁰⁴ Lincoln Reply at 11.

²⁰⁵ USTA Comments at 25; US West Comments at 16; GTE Comments at 21.

prices.²⁰⁶ Sprint provides data showing that the inputs used most by LECs are not the same as those reflected the most in GDP-PI, and that using GDP-PI for materials prices grossly overstates the change in material input prices experienced in telecommunications.²⁰⁷

46. AT&T developed a LEC-specific materials input price index based on BLS interindustry accounts for the goods and services it believes are purchased by LECs.²⁰⁸ USTA replies that AT&T's materials index is based on complex and unverified calculations, and is based only on transactions between telecommunications firms and other firms.²⁰⁹

47. USTA claims that AT&T's materials price index includes data from IXC purchases, and purchases of radio and television broadcasters, and so is not a good proxy for purchases made by LECs.²¹⁰ USTA claims that this overestimates the X-Factor by 0.4 percent from 1988-94, and 0.9 percent from 1989-94.²¹¹ AT&T admits that its materials price index is not perfect, but claims that it is much better than USTA's use of GDP-PI.²¹²

d. Weighting of Materials and Labor Indices

48. USTA claims that AT&T improperly calculates materials expense because it used the change in depreciation reserves instead of actual recorded depreciation and amortization expense, and total compensation instead of wage, salary, and benefit expense. USTA claims that materials expense is underestimated because total compensation includes labor costs capitalized in the construction of new facilities that are not included in total operating expense. USTA claims that changes in depreciation reserves understates depreciation expense and thus causes an overstatement of materials expense. USTA claims that labor expense is

²⁰⁶ Sprint Reply at 10; AT&T Reply, App. B at 48.

²⁰⁷ Sprint Reply, Att. A at 32-36. See also Ad Hoc Comments, Att. at 29.

²⁰⁸ AT&T Comments, App. A at 18-19.

²⁰⁹ USTA Reply at 20 and Att. A at 21-22.

²¹⁰ USTA 1997 Comments, Att. 6 at 20-23.

²¹¹ USTA 1997 Comments, Att. 6 at 20-23.

²¹² AT&T Reply in CC Docket No. 96-262, App. G at 30.

overstated by total compensation. USTA maintains further that misstating labor and materials expenses results in misstating the weight placed on the capital input index, because capital is weighted residually by subtracting the weights placed on labor and materials from total revenues. USTA claims that these alleged errors in AT&T's model are offsetting, and so have no effect on the X-Factor in AT&T's model. USTA claims further that these errors result in an understatement of 0.2 percent in TFP for the period from 1988 to 1994, and an understatement of 0.3 percent for the period from 1989 to 1994.²¹³ In its 1997 reply, AT&T states that it has switched to depreciation and amortization expense, rather than using change in depreciation reserves as it had previously.²¹⁴

D. Other X-Factor Calculation Issues

1. Input Price Differential

49. Several parties support including the short-term input price differential.²¹⁵ Ad Hoc argues that rates in competition would reflect only short-term input price differential rather than the general inflation rate, and so the input price differential information preceding divestiture is not relevant.²¹⁶ According to Ad Hoc and other parties, the local exchange industry is much more capital intensive than the economy as a whole. Ad Hoc also maintains that USTA's data indicates that labor input prices have grown more rapidly than capital input prices from 1984 to 1992, and concludes from this that LEC input prices must have grown more slowly than economy-wide input prices.²¹⁷

50. AT&T calculated the input price differential for the period from 1985 to 1994, using BLS statistics rather than relying on data from

²¹³ USTA 1997 Comments, Att. 6 at 17-20.

²¹⁴ AT&T 1997 Reply, App. G at 34-35.

²¹⁵ US West Comments at 7; AT&T Comments at 11-12 and App. A at 6-17; AT&T Reply at 8-11 and App. B at 15-19; US West Reply at 13; GSA Reply at 5-7; NCTA Reply at 7-8; CCTA Reply at 15-16.

²¹⁶ Ad Hoc Comments, Att. at 30-34; Ad Hoc Reply, Att. at 12-13.

²¹⁷ Ad Hoc Comments, Att. at 34-35; Ad Hoc Reply, Att. at 16-17. See also GSA Reply at 6; AT&T Reply, App. B at 7-8; CCTA Reply at 16-17.

Christensen's study as the Commission did, and found it to be 2.54 percent.²¹⁸ Ad Hoc contends that the input price differential for the period from 1984 to 1993 is 2.1 percent based on USTA's data, or 3.4 percent based on USTA's data corrected for certain errors alleged by Ad Hoc.²¹⁹ Ad Hoc contends that USTA's conclusions are based on improper use of dummy variables.²²⁰ BellSouth alleges that AT&T improperly compares input price levels rather than growth in input prices.²²¹ BellSouth and Bell Atlantic assert that AT&T's hedonic adjustment results in overstating capital input growth, which in turn understates capital input price increases, and so artificially inflates the input price differential.²²² According to Bell Atlantic, adjusting for the effects of AT&T's hedonic adjustment reduces its input price differential from 2.54 percent to 0.91 percent.²²³ USTA asserts that 2.54 percent is not statistically significant.²²⁴ When Sprint compared its price indexes for capital, labor, and materials to its economy-wide input price index, it found that the five-year moving averages for the period from 1985 to 1993 ranged from 1.64 percent to 0.84 percent.²²⁵

51. Most of the LECs argue that the long-run input price differential is not statistically different from zero.²²⁶ According to USTA, AT&T places

²¹⁸ AT&T Comments at 12-13 and App. A at 17-22.

²¹⁹ Ad Hoc Reply, Att. at 12.

²²⁰ Ad Hoc Reply, Att. at 18-25.

²²¹ BellSouth Reply, Att. at 13-14.

²²² BellSouth Reply, Att. at 8-9; Bell Atlantic Reply, Att. 1 at 8-9. See also Ad Hoc Reply, Att. at 18.

²²³ Bell Atlantic Reply, Att. 1 at 10-11. See also USTA Reply, Att. B at 22-23 (removing effects of hedonic adjustment results in input price differential of 0.28 percent).

²²⁴ USTA Reply, Att. B at 23-24.

²²⁵ Sprint Reply, Att. A at 41-43.

²²⁶ USTA Comments at 26 and App. C at 3-6; US West Comments at 7, 16; Southwestern Bell Comments at 11; NYNEX Comments at 21; BellSouth Comments at 14-16; Bell Atlantic Comments at 11-12; Lincoln Comments at 4; Ameritech Comments at 4-5; GTE Comments at 11 and App. B, App. F; NYNEX Reply at 5; USTA Reply, Att. A at 23-25; Pacific Reply at 4, citing California PUC Opinion at 68-69. USTA contends that the model it presented to the California PUC contained some

too much emphasis on the point estimate of 2.2 percent, and not enough emphasis on the fact that zero is within the 95 percent confidence interval.²²⁷ USTA also asserts that AT&T's and Ad Hoc's results stem from differences in the method by which certain data series are collected, rather than any real long-term input price differential.²²⁸ USTA claims that the Commission did not place adequate weight on a February 1995 ex parte statement, which purports to show that there has been very little difference between LEC input price changes and economy-wide input price changes from 1948 to 1992.²²⁹ Some parties allege that the Commission committed methodological errors in Appendix F of the LEC Price Cap Performance Review.²³⁰ AT&T argues that USTA's LEC input prices for capital and materials are closely related to GDP-PI, and so artificially reduces the input price differential.²³¹ AT&T alleges that there are discrepancies between USTA's data and the data it used for the period from 1949 to 1984, and questions whether USTA did in fact take its input price data from BLS.²³² AT&T also alleges that USTA has improperly used total private sector data for the period from 1985 to 1993, rather than total private non-farm sector data.²³³ AT&T claims that the Commission did consider the data in USTA's February 1995 ex parte statement.²³⁴ AT&T replies that USTA's criticism of the data used by the Commission in Appendix F is irrelevant, because the Commission focused on the post-1984 period, and found a statistically significant input price differential using both sets of data relied on by USTA.²³⁵

revisions, but these revisions were only updating the model, and they had minor effects on the results of the model. USTA Reply, Att. A at 28-31.

²²⁷ USTA Reply, Att. B at 17-19.

²²⁸ USTA Reply at 11-13.

²²⁹ USTA Comments at 26-27. See also USTA Reply, Att. A at 26-28.

²³⁰ USTA Comments at 26 and App. C at 10-14; GTE Comments at 11-14; Southwestern Bell Comments at 12; Pacific Comments at 6.

²³¹ AT&T Reply, App. B at 25-28.

²³² AT&T Reply at 19-20 and App. B at 8-13.

²³³ AT&T Reply, App. B at 11-13.

²³⁴ AT&T Reply at 12-16.

²³⁵ AT&T Reply, App. B at 14-15. See also Ad Hoc Reply, Att. at 14-15.

52. A number of LECs assert that the input price differential was a temporary effect of divestiture, and lasted only from 1984 to 1989.²³⁶ AT&T disagrees.²³⁷ AT&T alleges that the data Bell Atlantic used to support this point are not the same as the data used in USTA's study, and that the regression analyses Bell Atlantic conducted cannot be interpreted to support the proposition that the input price differential was a temporary effect of divestiture.²³⁸ Ad Hoc argues that divestiture was a major change in the industry, and that it is unreasonable to assume that such a change would result in merely a temporary change.²³⁹ In its reply, USTA claims that the input price differential is not related to divestiture at all, and that the input price differential started to increase in 1980 and began declining in 1990.²⁴⁰ Ad Hoc also maintains that it is inconsistent for USTA to focus on TFP growth only since 1984, but to focus on long-term input price differences.²⁴¹ USTA and Bell Atlantic reply that only use of long-term input price differential data can provide an accurate picture of LEC input price trends.²⁴²

53. Some parties assert that USTA's study was not designed to measure input price differential, and so the Commission's use of USTA's study in Appendix F did not produce reliable results.²⁴³ Ad Hoc denies that the Commission's results are not reliable simply because USTA did not intend its study to be used to derive the input price differential.²⁴⁴

²³⁶ USTA Comments at 26 and App. C at 6-10; BellSouth Comments at 14-16; Bell Atlantic Comments at 12-13 and Att. 2; Lincoln Comments at 4-7 and Att. A; Bell Atlantic Reply at 4-5 and Att. 1 at 1-2.

²³⁷ AT&T Reply at 20-21.

²³⁸ AT&T Reply, App. B at 20-25.

²³⁹ Ad Hoc Reply, Att. at 13.

²⁴⁰ USTA Reply, App. B at 14-15.

²⁴¹ Ad Hoc Comments, Att. at 43-45; Ad Hoc Reply at 3 and Att. at 11-13. See also TRA Reply at 3-4 (use of long-term data for input price differential hides the effects of divestiture.)

²⁴² USTA Reply at 10-11 and Att. A at 22-26; Bell Atlantic Reply at 4.

²⁴³ Lincoln Comments at 4; Southwestern Bell Comments at 11; Southwestern Bell Reply at 11-13; USTA Reply at 12 n.4.

²⁴⁴ Ad Hoc Reply at 13-14.

54. Several parties assert that the X-Factor should represent a prediction of the LECs' achievable future productivity growth, and that including the input price differential in the X-Factor would make it too volatile to have any predictive power, and could cause rate churn.²⁴⁵ AT&T contends that the Commission considered whether volatility in input prices was so great that the input price differential was not statistically different from zero, and found this argument unsupported by the data in the record.²⁴⁶ Some LECs assert that AT&T improperly assumes that they are asserting that changes in GDP-PI are identical to changes in LEC input prices. These commenters agree that the two are not identical, but argue that the differences balance out over the long run.²⁴⁷ US West and GSA would not oppose using a five-year moving average for the input price differential.²⁴⁸ USTA replies that using a moving average for the input price differential would not cause it to be significantly different from zero.²⁴⁹

55. US West and GSA note that the input price differential tends to pass through unit cost reductions.²⁵⁰ Pacific argues that including the input price differential for this reason is inappropriate.²⁵¹ GTE contends that including the input price differential adds a term to the PCI formula, thus complicating the formula.²⁵²

2. Adjustment to X-Factor for Interstate-Only Activity

²⁴⁵ Pacific Comments at 3-6; Pacific Reply at 4; US West Comments at 16; Lincoln Comments at 4; NYNEX Comments at 22; NYNEX Reply at 6; USTA Reply, Att. A at 22-26. See also Southwestern Bell Reply at 15 (past input price differential should not be relevant for setting future X-Factor).

²⁴⁶ AT&T Reply at 16-18.

²⁴⁷ USTA Reply at 9 and Att B at 16-17, 19-21; Bell Atlantic Reply, Att. 1 at 5-6; GTE Reply at 21-22; BellSouth Reply, Att. at 15.

²⁴⁸ US West Comments at 16; GSA Reply at 6.

²⁴⁹ USTA Reply, Att. at 21.

²⁵⁰ US West Comments at 7; US West Reply at 13; GSA Reply at 5-7.

²⁵¹ Pacific Comments at 6.

²⁵² GTE Comments at 14-15.

b. Discussion

56. **Legal Considerations.** AT&T argues that basing interstate rates on total company TFP calculations would exceed our jurisdiction under Section 2(b) of the Communications Act, 47 U.S.C. § 152(b).²⁵³ AT&T and other parties also contend that Smith and its progeny requires carriers to make some reasonable allocation of its property between the interstate and intrastate jurisdictions, regardless of whether the Commission is employing rate-of-return regulation.²⁵⁴ AT&T argues that the difficulty in distinguishing interstate from intrastate productivity growth does not justify adopting an inaccurate X-Factor method.²⁵⁵ TRA and Ad Hoc assert that the inability of measuring interstate TFP growth is cause to reject TFP as a method for calculating the X-Factor.²⁵⁶

57. USTA contends that the Commission in the First Report and Order considered and rejected arguments that basing the X-Factor on total company TFP might exceed the Commission's jurisdiction.²⁵⁷ USTA and other parties also assert that relying in part on intrastate data in regulating interstate rates does not mean that the Commission is attempting to regulate intrastate rates, and so such reliance does not violate Smith.²⁵⁸ BellSouth claims that use of total company TFP does not exceed the Commission's jurisdiction because TFP is merely one component in the PCI formula. TFP by itself does not determine whether any particular tariff rate is just and reasonable, according to BellSouth.²⁵⁹ A number of commenters reply that Smith requires only that the Commission limit its regulations to interstate services, not that it is

²⁵³ AT&T Comments at 14-15.

²⁵⁴ Ad Hoc Comments at 6-7; AT&T Comments at 15-17; MCI Reply at 8; Ad Hoc Reply at 8-9; TRA Reply at 5-6; LDDS Reply at 4-5; AT&T Reply at 30-31, citing, e.g., Smith v. Illinois Bell Telephone Co., 282 U.S. 133 (1930) (Smith).

²⁵⁵ AT&T Reply at 26-27, 29. See also API Reply at 4, 7-9.

²⁵⁶ TRA Comments at 3-6; Ad Hoc Reply, Att. at 11.

²⁵⁷ USTA Comments at 29.

²⁵⁸ USTA Comments at 29-30. See also Sprint Reply at 13-14; US West Reply at 29-33; Bell Atlantic Reply at 8, citing NARUC v. FCC, 737 F.2d at 1112.

²⁵⁹ BellSouth Comments at 18-19.

precluded from considering total company data.²⁶⁰ USTA maintains that Smith limits only state jurisdictions, and has no effect on Federal agencies.²⁶¹ USTA and Southwestern Bell argue that AT&T's interpretation of Smith would have precluded the Commission from including GNP-PI in the original price cap formula.²⁶² GTE and Sprint note that the Commission has historically examined total company data when determining the LECs' cost of capital for prescribing the rate of return for interstate services.²⁶³

58. Systematic Downward Bias. Some parties argue that interstate productivity has grown faster than total company productivity, and so basing TFP on total company data would tend to create downward bias in productivity growth measurements.²⁶⁴ AT&T asserts that this difference results in part in a difference in labor inputs required to provide interstate and intrastate services.²⁶⁵ AT&T also contends that the LECs' interstate services have a higher markup than their intrastate services, and so make a greater contribution to productivity growth.²⁶⁶ CCTA argues that intrastate productivity growth is likely to be less than interstate productivity growth because some states employ rate-of-return regulations or impose sharing obligations, both of which tend to blunt efficiency incentives.²⁶⁷ Sprint suggests basing such an adjustment on marginal or incremental costs.²⁶⁸ BellSouth asserts that capital inputs have grown faster than labor or materials inputs. According to BellSouth, if interstate services are more capital-intensive than intrastate services, then AT&T's

²⁶⁰ NYNEX Reply at 8-9; Sprint Reply at 13-14; Pacific Reply at 12-13.

²⁶¹ USTA Reply at 15-16, citing MCI v. FCC, 750 F.2d at 141.

²⁶² USTA Reply at 16-17; Southwestern Bell Reply at 10.

²⁶³ GTE Reply at 32; Sprint Reply at 14.

²⁶⁴ TRA Comments at 3-6; Ad Hoc Comments, Att. at 46-48; API Comments at 4-5; AT&T Comments at 13-14, 17; NCTA Reply at 7-8; TRA Reply at 3; API Reply at 3-6; LDDS Reply at 5; Ad Hoc Reply, Att. at 6-7; MCI Reply at 8; GSA Reply at 4-5; AT&T Reply at 21-26, and App. C at 3-5. See also NYNEX Comments at 20-21 (although interstate TFP may not be economically meaningful, higher interstate output growth may warrant some TFP adjustment).

²⁶⁵ AT&T Reply at 24 and App. C at 7.

²⁶⁶ AT&T Reply, App. C at 6-7. See also NYNEX Reply at 9.

²⁶⁷ CCTA Reply at 11-12.

²⁶⁸ Sprint Reply at 17-18.

assumption that interstate and intrastate input growth are equal would tend to overestimate interstate input growth.²⁶⁹

59. Ad Hoc and API argue that basing the X-Factor on total company TFP might give LECs a windfall unless the states also adopt regulations based on total company data.²⁷⁰ BellSouth contends that the Commission and state regulatory authorities have never coordinated their ratemaking methods before, and adopting a TFP-based X-Factor would not require such coordination now.²⁷¹

60. Various commenters maintain that there is no economically meaningful way to develop separate interstate and intrastate production functions, or to allocate joint and common costs between the interstate and intrastate jurisdictions.²⁷² AT&T and Ad Hoc argue that it is possible to develop an interstate TFP measurement, by developing an interstate output index based on interstate services, and assuming that interstate inputs and intrastate inputs grow at the same rate.²⁷³ Ad Hoc argues that, because separations rules require a relatively constant share of total investment and expenses, approximately 25 percent, to be allocated to the interstate jurisdiction, it is reasonable to assume that interstate and intrastate input growth are equal for purposes of calculating an interstate TFP adjustment.²⁷⁴ API asserts that USTA has not employed economically

²⁶⁹ BellSouth Reply, Att. at 20-23.

²⁷⁰ Ad Hoc Comments, Att. at 48-49; API Comments at 5.

²⁷¹ BellSouth Comments at 19-20. See also USTA Comments at 30.

²⁷² USTA Comments at 27-29 and App. C at 14-17; GTE Comments at 21-22; Bell Atlantic Comments at 13-14; BellSouth Comments at 17-18; Lincoln Comments at 9-10; NYNEX Comments at 18-19; Southwestern Bell Comments at 12-14; US West Comments at 7, 17; Pacific Reply at 10-12; GTE Reply at 29-30; US West Reply at 28-29; Bell Atlantic Reply at 6-7 and Att. 1 at 3-4; BellSouth Reply, Att. at 15-16.

²⁷³ AT&T Comments, App. A at 23-27; AT&T Reply at 26-28, App. B at 34-43, App. C at 11; Ad Hoc Comments, Att. at 49-50; Ad Hoc Reply at 3, 8-9, Att. at 8-11. See also API Comments at 6.

²⁷⁴ Ad Hoc Comments, Att. at 49-50; Ad Hoc Reply at 3, 8-9, Att. at 8. According to Ad Hoc, the investment allocation to the interstate jurisdiction has fluctuated between 25.10 percent and 25.48 percent from 1991 to 1994, and expenses between 23.70 percent and 24.35 percent over this period. Ad Hoc Comments, Att. at 50.

meaningful data to develop its intrastate output indexes.²⁷⁵ Ad Hoc alleges that some LECs have calculated intrastate TFP measures in proceedings before state public service commissions.²⁷⁶

61. In their replies, several commenters assert that there is no basis for assuming that interstate input growth and intrastate input growth are equal.²⁷⁷ According to USTA, if it were possible to separately measure interstate and intrastate productivity growth, faster growth in interstate outputs might have resulted in faster growth in interstate inputs, so that there might not be any difference between interstate and intrastate TFP growth.²⁷⁸

c. TFP Adjustment for Differences in Regulated and Nonregulated Productivity Growth

62. USTA asserts that, to the extent that Part 64 rules identify non-regulated costs that are not joint or common with regulated costs, it is possible to develop a separate production function for non-regulated services.²⁷⁹ USTA and Southwestern Bell also claim that any allocation of joint and common regulated and non-regulated costs is inherently arbitrary.²⁸⁰ According to BellSouth, basing the X-Factor on the industry-wide average, and employing a five-year moving average, would make it difficult for a LEC to benefit from strategic activities such as investing in unprofitable unregulated business activities.²⁸¹ Ad Hoc claims that the initial investment required to begin providing certain nonregulated services or video services could increase capital inputs, and thus decrease measured TFP growth.²⁸²

²⁷⁵ API Reply at 6-7, citing USTA Comments at 14.

²⁷⁶ Ad Hoc Reply, Att. at 10-11.

²⁷⁷ USTA Reply at 13-14; Lincoln Reply at 9; Bell Atlantic Reply at 7 and Att. 1 at 4-5; Southwestern Bell Reply at 10; US West Reply at 29 and Att. A at 5-7; GTE Reply at 30-32; NYNEX Reply at 7-8; BellSouth Reply, Att. at 16-20.

²⁷⁸ USTA Comments, App. C at 20-21.

²⁷⁹ USTA Comments, App. C at 21-22. See also Southwestern Bell Comments at 14-15.

²⁸⁰ Southwestern Bell Comments at 15; USTA Comments, App. C at 22.

²⁸¹ BellSouth Comments at 21-22.

²⁸² Ad Hoc Comments, Att. at 50-51.

d. Reporting

63. BellSouth opposes expanding reporting requirements to include total company data. BellSouth argues that the reporting requirements need not be any more extensive than the TFP Review Plan attached to USTA's comments.²⁸³ In general, Southwestern Bell recommends eliminating reporting requirements, which it contends are relevant only for rate-of-return regulation or sharing.²⁸⁴

3. Effect of Universal Service and Other Subsidy Programs on LEC TFP

64. A number of commenters argue that total company TFP captures the effects of any universal service fund or subsidy programs, and so no special adjustments are needed.²⁸⁵ BellSouth contends that changes in universal service fund requirements are treated exogenously, and supports continuing this treatment.²⁸⁶ CCTA notes the 1996 Act mandates universal service fund revisions, and asserts that the Commission is considering universal service fund issues in another proceeding.²⁸⁷

4. Inclusion of Other Firms in Study

65. Ad Hoc and API recommend including data from other industries in the TFP calculations, to limit LECs' ability to adjust their productivity to influence the X-Factor.²⁸⁸ API also argues that LECs are not yet subject to meaningful competition, and including data from more competitive industries would cause the X-Factor to replicate a competitive market better.²⁸⁹

²⁸³ BellSouth Comments at 20, citing USTA Comments, App. B.

²⁸⁴ Southwestern Bell Comments at 32-33. See also USTA Comments at 30-31; Ameritech Reply at 6.

²⁸⁵ Southwestern Bell Comments at 15-16; GTE Comments at 25; USTA Comments at 31-32; US West Comments at 18.

²⁸⁶ BellSouth Comments at 22.

²⁸⁷ CCTA Reply at 21, citing 1996 Act, Section 254.

²⁸⁸ Ad Hoc Comments, Att. at 52; API Comments at 7-8.

²⁸⁹ API Comments at 6-7.

66. Other parties argue that it would be difficult at best for a LEC acting by itself to manipulate its productivity growth to influence the industry average TFP.²⁹⁰ Other commenters argue that including non-LEC data in the TFP calculation would make the X-Factor a less accurate measure of LEC productivity growth.²⁹¹ NYNEX opposes collecting non-LEC data because it would be administratively burdensome.²⁹² GTE argues that including other industries would be inconsistent with the Commission's treatment of AT&T's X-Factor, and with ICC precedent.²⁹³ Because it might be difficult to collect data from other industries, API recommends resolving any other issues regarding the calculation of the X-Factor in a way that results in the highest possible X-Factor.²⁹⁴

5. Consumer Productivity Dividend

67. AT&T argues that both its and USTA's models rely in part on data from periods preceding the adoption of price caps, and argues that the CPD is still necessary to encourage productivity growth higher than that under rate-of-return regulation.²⁹⁵ USTA and GTE assert that retaining the CPD to capture part of any additional productivity growth that might result from eliminating sharing would be arbitrary.²⁹⁶ USTA also alleges that the CPD simply forces prices down rather than increasing efficiency incentives.²⁹⁷ In addition, GTE and BellSouth claim that there was no principled basis on which to select 0.5 percent as the CPD.²⁹⁸

²⁹⁰ BellSouth Comments at 22-23; Frontier Comments at 5 n.7.

²⁹¹ US West Comments at 18; GTE Comments at 23-24.

²⁹² NYNEX Reply at 11-12. See also Southwestern Bell Comments at 16-17; Ad Hoc Comments, Att. at 52 (do not oppose including other firms in the TFP calculation, but do not believe adequate data are available).

²⁹³ GTE Comments at 23.

²⁹⁴ API Comments at 8-9.

²⁹⁵ AT&T Comments at 35-36; AT&T Reply at 41. See also MCI Comments at 7 (consumer productivity dividend necessary to help drive rates to economic costs).

²⁹⁶ USTA Comments at 13; GTE Reply at 34-35.

²⁹⁷ USTA Comments at 13-14. See also USTA Reply at 4-6; Frontier Reply at 4.

²⁹⁸ GTE Comments at 35-36; BellSouth Reply, Att. at 39.

68. Several parties assert that the CPD was adopted originally because of uncertainty regarding whether the X-Factors in the original price cap plan would transfer a sufficient portion of the benefits of lower unit costs to customers, or to ensure that productivity growth under price caps exceeds growth under rate-of-return regulation. These commenters maintain that the CPD in the original price cap plan has served its intended purpose, and that it is no longer necessary.²⁹⁹ Ameritech expects increased competition in the future to obviate the need for a CPD.³⁰⁰ USTA argues that the price cap plan properly balances shareholder and ratepayer interests without the CPD.³⁰¹ Other parties argue that the simplified TFP method of calculating the X-Factor proposed by USTA, together with a moving average, would transfer all productivity gains to consumers, and so eliminates the need for the CPD.³⁰² Ad Hoc denies that basing the X-Factor on a moving average would be an effective substitute for the CPD.³⁰³

69. GTE does not expect LECs to be able to achieve productivity growth 0.5 percent higher than historical levels.³⁰⁴ AT&T argues that the LECs have installed new technology in recent years, and expect the LECs to discover more efficient uses for that technology as time goes on.³⁰⁵

²⁹⁹ USTA Comments at 12-14 and App. C at 33; GTE Comments at 36; Bell Atlantic Comments at 13; NYNEX Comments at 27-28; USTA Reply at 25; Bell Atlantic Reply at 5-6; GTE Reply at 33; Frontier Reply at 3-4; NYNEX Reply at 14; Frontier Comments at 7, citing Policy and Rules Concerning Rates For Dominant Carriers, Further Notice of Proposed Rulemaking, CC Docket No. 87-313, 3 FCC Rcd 3195, 3407-08 (para. 386) (1988).

³⁰⁰ Ameritech Reply at 4.

³⁰¹ USTA Reply at 26.

³⁰² USTA Comments at 13; US West Comments at 19-20; Bell Atlantic Comments at 13; Ameritech Comments at 8; BellSouth Comments at 28, Att. 1, Att. 2; Southwestern Bell Comments at 20-21; NYNEX Comments at 28; USTA Reply at 25-26; NYNEX Reply at 14-15; Bell Atlantic Reply at 6; BellSouth Reply, Att. at 38-39.

³⁰³ Ad Hoc Reply, Att. at 40.

³⁰⁴ GTE Comments at 36-37; GTE Reply at 33-34.

³⁰⁵ AT&T Comments at 35-36; AT&T Reply at 42.

AT&T also replies that the CPD is a realistic estimate of additional productivity growth that LECs should be expected to be able to achieve.³⁰⁶

6. Effects of Access Reform

70. According to USTA, productivity estimates based on historical studies overstate the productivity potential of price-cap LECs under competition.³⁰⁷ According to USTA, as incumbent LECs lose customers to competition, their output will decline, and as a result their measured productivity will decline. Therefore, USTA recommends basing the X-Factor on a five-year moving average of the TFP, so that reductions in productivity resulting from competition would be reflected in the X-Factor.³⁰⁸ USTA claims that the TFP differential (TFP of LECs minus TFP for US economy as whole) is 2.7 percent, and will decrease by 0.4 percentage points each year if the Commission adopts USTA's recommendations for restructuring the CCL charge and the TIC.³⁰⁹ Most incumbent LECs support USTA.³¹⁰ BA/NYNEX argues that productivity growth will decrease as a result of competition unleashed by the 1996 Act, and so basing the X-Factor on a five-year moving average TFP would likely overstate future achievable productivity.³¹¹ Alternatively, BA/NYNEX argues that we could rely on a fixed TFP-based X-Factor for a short period of time, until Bell competition will enable us to deregulate incumbent LECs completely.³¹² GTE and SNET contend that growth in competition and recovering more costs through flat rather than usage sensitive rates, will likely depress measured TFP growth.³¹³

³⁰⁶ AT&T Reply at 42-43.

³⁰⁷ USTA 1997 Comments at 19.

³⁰⁸ USTA 1997 Comments at 20.

³⁰⁹ USTA 1997 Comments at 21. See also USTA 1997 Reply at 41-42; US West 1997 Comments at 46-49; SWBT 1997 Reply at 37.

³¹⁰ BA/NYNEX 1997 Comments at 58-60; BellSouth 1997 Comments at 50 n.93; SNET 1997 Comments at 28-30; US West 1997 Comments at 46-49; Aliant 1997 Reply at 3-4; BellSouth 1997 Reply at 41-42; SNET 1997 Reply at 24-25.

³¹¹ BA/NYNEX 1997 Comments at 59. See also US West 1997 Comments at 46.

³¹² BA/NYNEX 1997 Comments at 59; BA/NYNEX 1997 Reply at 29-30.

³¹³ GTE 1997 Comments at 57-58; SNET 1997 Reply at 25-26.

71. AT&T notes that it recommended at least 8.8 percent in its pleadings filed in response to the Price Cap Fourth Further Notice.³¹⁴ Several commenters recommend setting the X-Factor at 9.9 percent, on the basis of the pleadings of the CARE Coalition filed in response to the Price Cap Fourth Further Notice.³¹⁵ Ad Hoc also recommends increasing the X-Factor for the reasons it explained in its comments in the Price Cap Fourth Further Notice.³¹⁶ MCI also supports increasing the X-Factor to 9.9 percent, but only for five years, after which MCI argues that the X-Factor should be based on TFP.³¹⁷ A number of price cap LECs maintain that the X-Factors recommended by AT&T and MCI greatly exceed their actual productivity growth under price cap regulation.³¹⁸ USTA has identified several purported computational and methodological errors in AT&T's, MCI's, and Ad Hoc's X-Factor proposals in its pleadings filed in response to the Price Cap Fourth Further Notice.³¹⁹ Ad Hoc recommends making any fundamental changes to price cap regulation in the price cap proceeding, and focusing on access reform in this proceeding.³²⁰ According to GTE, AT&T and Ad Hoc maintain that incumbent LECs' interstate productivity is greater than their intrastate productivity, and included in their X-Factor recommendations an interstate TFP adjustment to account for this alleged difference in productivity. GTE further opposes any interstate TFP adjustment, because there incumbent LECs provide interstate and intrastate services using the same network, and so it would

³¹⁴ AT&T 1997 Comments at 70. In its reply, AT&T increases its X-Factor recommendation to 9.0 percent, on the bases of updated data. AT&T 1997 Reply at 35 and Att. G.

³¹⁵ API 1997 Comments at 27-28; ICA 1997 Comments at 4; WorldCom 1997 Comments at 91; API 1997 Reply at 18.

³¹⁶ Ad Hoc 1997 Comments at 70; Ad Hoc 1997 Reply at 7-14. Ad Hoc also replies that its Price Cap Fourth Further Notice pleadings discredited USTA's X-Factor studies. Ad Hoc 1997 Reply at 9-14.

³¹⁷ MCI 1997 Comments at 25.

³¹⁸ BellSouth 1997 Comments at 50; BA/NYNEX 1997 Reply at 27-29; SWBT 1997 Reply at 37-39; Aliant 1997 Reply at 3.

³¹⁹ USTA 1997 Reply at 42-44. See also BA/NYNEX 1997 Reply at 30-31.

³²⁰ Ad Hoc 1997 Reply at 7-8.

make no economic sense to assume that interstate productivity is greater than intrastate productivity.³²¹

72. PacTel and Aliant propose setting the X-Factor equal to GDP-PI.³²² Sprint argues that the Commission should discontinue the use of the current productivity factor for all baskets except common line, once all access charges have been reduced to geographically deaveraged TELRIC levels.³²³ AT&T anticipates that access reform would increase productivity growth, because reducing rates to cost-based levels would stimulate demand.³²⁴

IV. PRICE CAP STRUCTURE ISSUES

B. Sharing Obligations

1. Flow-Through Mechanism

73. Several parties maintain that a moving average ensures that all reductions in unit costs are eventually passed through to access customers.³²⁵ Ad Hoc emphasizes that it is important to include some flow-through mechanism in the price cap plan, and recommends either sharing, the consumer productivity dividend (CPD), or both.³²⁶ Ad Hoc and AT&T maintain that the five-year moving average with a two-year lag would flow through productivity improvements more slowly than the a competitive market would.³²⁷

74. SNET argues that competition has become strong enough to act as a pass-through mechanism.³²⁸ GSA disagrees, and supports retaining sharing until competition is sufficiently developed to warrant removing

³²¹ GTE 1997 Reply at 27-28.

³²² PacTel 1997 Comments at 41-42; Aliant 1997 Comments at 8.

³²³ Sprint 1997 Comments at 53.

³²⁴ AT&T 1997 Reply at 35-36.

³²⁵ USTA Comments at 40; Southwestern Bell Comments at 22; Ameritech Comments at 7; USTA Reply at 23-24; BellSouth Reply, Att. at 38-41; NYNEX Reply at 13, 19; GTE Reply at 38; Bell Atlantic Reply at 12.

³²⁶ Ad Hoc Comments, Att. at 62-64; Ad Hoc Reply, Att. at 40.

³²⁷ Ad Hoc Comments, Att. at 66-68; AT&T Reply at 50-52.

³²⁸ SNET Comments at 13.

price cap constraints.³²⁹ BellSouth asserts that the Commission has placed excessive emphasis on unit costs. BellSouth also maintains that competition has driven some rates to efficient levels, regardless of unit costs, and that we should not attempt to recapture past productivity gains.³³⁰ Ameritech opposes requiring LECs to pay a "premium" in the form of a higher X-Factor for the elimination of sharing, and alleges that any "premium" would be unreasonable given that competition is likely to increase in reaction to the 1996 Act.³³¹

2. Backstop Mechanism

75. Some parties maintain that, unless we can be certain that the X-Factor is accurate, we should retain a backstop mechanism.³³² AT&T argues that we should retain sharing as a backstop mechanism until we gain experience with a TFP-based X-Factor.³³³ Ad Hoc argues that, without sharing, there is no way to determine whether access rates are just and reasonable or excessive when compared with the LECs' cost of capital.³³⁴ MCI and Ad Hoc assert that some backstop mechanism is necessary in the long-term plan because they believe X-Factors have been set too low in the past.³³⁵ ICA argues that firms in competitive markets use earnings to measure their performance, and so LECs have no basis for opposing an earnings-based backstop mechanism in the price cap plan.³³⁶

³²⁹ GSA Comments at 10-11.

³³⁰ BellSouth Comments at 8-9.

³³¹ Ameritech Reply at 5-6.

³³² TRA Comments at 7-8; Ad Hoc Comments, Att. at 68-69; TRA Reply at 8; Frontier Reply at 2-3.

³³³ AT&T Reply at 44-45, 47-48, 52 n.106. See also Ad Hoc Reply at 6.

³³⁴ Ad Hoc Comments at 7-8. Ad Hoc also maintains that it would be less concerned about the elimination of sharing if the X-Factor were sufficiently high and if the consumer productivity dividend were retained. Id.

³³⁵ MCI Comments at 20-21; Ad Hoc Comments, Att. at 60-62. Specifically, MCI argues that the sharing mechanism is necessary to force rates to economic costs. MCI Comments at 19.

³³⁶ ICA Comments at 7-8. See also LDDS Reply at 4.

76. USTA, Bell Atlantic and US West maintain that a moving average is adequate to replace the backstop function of sharing.³³⁷ Some commenters assert that, to the extent that parties advocate sharing to prevent overearnings, those arguments are inconsistent with the theory underlying price caps.³³⁸ These parties also argue that accounting rates of return are not an accurate reflection of performance, and that any measure of performance should be based on an "economic" rate of return.³³⁹ NYNEX maintains that the court has rejected contentions that sharing must be retained to ensure just and reasonable rates.³⁴⁰ Some parties reply that there is sufficient data in the record, and that the Commission has sufficient experience with price cap regulation, that a backstop mechanism is no longer necessary.³⁴¹ GTE argues that sharing is not necessary because TFP will produce accurate X-Factors.³⁴² BellSouth also argues that any further need for sharing as a backstop mechanism should be outweighed by concerns over blunting efficiency incentives.³⁴³ According to NYNEX, Congress identified price cap regulation as a mechanism to encourage infrastructure investment when it adopted the 1996 Act, and eliminating sharing would further encourage infrastructure investment.³⁴⁴

³³⁷ USTA Comments at 40; Bell Atlantic Comments at 5-6; US West Comments at 24-25; USTA Reply at 24.

³³⁸ USTA Reply at 4-6 and Att. C at 6-7; GTE Reply at 35-36; Bell Atlantic Reply at 8-9, 12, citing AT&T Performance Review, 8 FCC Rcd at 6970.

³³⁹ Bell Atlantic Reply at 9-10; GTE Reply at 36-37; USTA Reply, Att. C at 8-13. USTA claims that the Commission recognized the difference between economic and accounting costs when it revised the exogenous cost rules in the LEC Price Cap Performance Review. USTA Reply, Att. C at 12, citing LEC Price Cap Performance Review, 10 FCC Rcd at 9090-91 (para. 295). USTA also claims that the "economic" rate of return for the LECs from 1991 to 1994 was 8.94 percent. USTA Reply, Att. C at 13-14, 22-23.

³⁴⁰ NYNEX Reply at 21, citing National Rural Telecom Association v. FCC, 988 F.2d 174 (1993).

³⁴¹ USTA Reply at 24; BellSouth Reply, Att. at 39-40; GTE Reply at 37.

³⁴² GTE Comments at 40.

³⁴³ BellSouth Reply, Att. at 40-42.

³⁴⁴ NYNEX Reply at 21, citing Section 706(a) of the Telecommunications Act of 1996, 47 U.S.C. § 706(a).

3. Low-End Adjustment Mechanism

77. AT&T advocates eliminating the low-end adjustment mechanism because it has not proved necessary to protect LECs from underearnings.³⁴⁵ AT&T alleges that some LECs have abused the low-end adjustment mechanism by, for example, using it to recoup expenses incurred during voluntary corporate downsizing.³⁴⁶ A number of LECs advocate eliminating the low-end adjustment mechanism as an unneeded vestige of rate-of-return regulation.³⁴⁷ USTA and AT&T argue that LECs facing potential underearnings may make an above-cap tariff filing, or seek a waiver of the price cap rules, and so it is not necessary to retain the low-end adjustment mechanism.³⁴⁸

78. NYNEX and Bell Atlantic assert that, if we retain sharing, we should also retain the low-end adjustment mechanism for regulatory symmetry.³⁴⁹ NYNEX also denies that it has ever abused the low-end adjustment mechanism.³⁵⁰ Finally, NYNEX asserts that the Commission considered and rejected in the LEC Price Cap Performance Review contentions that above-cap filings make the low-end adjustment mechanism superfluous.³⁵¹

C. Number of X-Factors

79. Several parties recommend establishing multiple X-Factors, maintaining that one X-Factor would not adequately account for the fact

³⁴⁵ AT&T Comments at 39-40; AT&T Reply at 53-54.

³⁴⁶ AT&T Comments at 40; AT&T Reply at 53-54.

³⁴⁷ USTA Comments at 43; US West Comments at 25; Southwestern Bell Comments at 34-35; BellSouth Comments at 41; Frontier Comments at 10; US West Reply at 34.

³⁴⁸ USTA Comments at 43; AT&T Comments at 41; AT&T Reply at 54.

³⁴⁹ NYNEX Reply at 22; Bell Atlantic Reply at 11-12.

³⁵⁰ NYNEX Reply at 22-23.

³⁵¹ NYNEX Reply at 23, citing LEC Price Cap Performance Review, 10 FCC Rcd at 9058-59 (para. 223).

that LECs face different circumstances in their service regions.³⁵² Sprint argues that more than one X-Factor is necessary because not all LECs' productivity growth will meet or exceed the industry average.³⁵³ Lincoln asserts that a single X-Factor might discourage non-price cap LECs from adopting price caps.³⁵⁴ Cincinnati Bell agrees with Lincoln, and recommends establishing a separate set of X-Factor options for small and mid-sized LECs.³⁵⁵

80. NYNEX proposes multiple X-Factors and permitting carriers that lower barriers to competitive entry to use a lower X-Factor, arguing that this would encourage the development of competition.³⁵⁶ Ameritech and SNET make similar proposals.³⁵⁷ Because NYNEX believes that productivity growth is affected by competition, it also advocates permitting LECs to use different X-Factors in different parts of their service areas, and different X-Factors for switched and special access services.³⁵⁸ Pacific argues that requiring carriers to use the same X-Factor in both competitive and non-competitive parts of their service regions

³⁵² SNET Comments at 7, 9-11; Lincoln Comments at 11-12; AT&T Comments at 30-31; US West Comments at 8, 21-22; NYNEX Comments at 7; US West Reply at 14-15; Lincoln Reply at 3.

³⁵³ Sprint Comments at 10. See also US West Reply at 13-14 (a single X-Factor unfairly rewards or penalizes LECs at each end of the range).

³⁵⁴ Lincoln Reply at 3.

³⁵⁵ Cincinnati Bell Reply at 3-5.

³⁵⁶ NYNEX Comments at 4-5; NYNEX Reply at 28. Specifically, NYNEX recommends permitting carriers to use a lower X-Factor if they have met certain items listed in the "competitive checklist" on which we sought comment in the Second Further Notice. NYNEX Comments at 11, citing Second Further Notice, 11 FCC Rcd at 906 (para. 108). NYNEX would permit a LEC to use an X-Factor of 75 percent of the baseline X-Factor if it has met the checklist criteria in 75 percent of the service area, and at least one competitor is operational in the region. NYNEX would permit a LEC to use an X-Factor of 60 percent of the baseline X-Factor if there is a "competitive presence" in areas representing 40 to 50 percent of the LEC's business access lines. NYNEX Comments at 11.

³⁵⁷ SNET Comments at 6-9; Ameritech Comments at 10-12. Similarly, Pacific argues that it has already removed barriers to entry in its region, and argues that it should be permitted to choose a lower X-Factor now rather than delaying while it goes through some certification process. Pacific Comments at 8-9.

³⁵⁸ NYNEX Comments at 12. See also Pacific Reply at 6-7, citing California PUC Opinion at 40-41, 43, 48-49.

prevents LECs from lowering rates in their competitive regions and making up this revenue shortfall in non-competitive regions.³⁵⁹ MCI contends that there is no evidence that LECs' productivity varies by geographic area.³⁶⁰

81. A number of commenters support only one X-Factor because it would obviate the need for sharing as a matching mechanism.³⁶¹ Some LECs maintain that one X-Factor better replicates the incentives of a competitive market, because it gives everyone an incentive to achieve productivity growth higher than the industry average.³⁶² Similarly, Ad Hoc argues that permitting less productive LECs to choose a lower X-Factor enables those LECs to avoid the penalty that inefficiency would bring in a competitive market.³⁶³ BellSouth observes that variations in productivity growth among LECs may be caused by factors other than regional economic differences, and many of those factors are within the LECs' control.³⁶⁴ BellSouth assumes the purpose of multiple X-Factors would be to create an "equality of outcomes" among LECs, and argues that this could substantially decrease efficiency incentives.³⁶⁵ BellSouth maintains that developing a set of "economically meaningful" X-Factors other than the baseline X-Factor would be complex and controversial.³⁶⁶ GTE argues that one X-Factor would be consistent with the approach adopted by the ICC.³⁶⁷

³⁵⁹ Pacific Comments at 7-8; Pacific Reply at 5-6.

³⁶⁰ MCI Comments at 26.

³⁶¹ Southwestern Bell Comments at 25, 27, 33; BellSouth Comments at 40-41 and Att. 1 at 11; Bell Atlantic Reply at 12-13; BellSouth Reply, Att. at 42-43.

³⁶² GTE Comments at 37-39; Bell Atlantic Comments at 11-12; BellSouth Comments at 34, 37; Bell Atlantic Reply at 12.

³⁶³ Ad Hoc Comments at 8-9.

³⁶⁴ BellSouth Comments at 36-37.

³⁶⁵ BellSouth Comments at 36-37, Att. 1 at 22-24.

³⁶⁶ BellSouth Comments, Att. 1 at 11-20.

³⁶⁷ GTE Comments at 38.

V. UPDATING THE X-FACTOR

82. Several parties maintain that a moving average ensures that the X-Factor accurately reflects the LECs' potential productivity growth, and so eliminates the need for sharing as a backstop mechanism,³⁶⁸ and the need for scheduled performance reviews.³⁶⁹ Some commenters maintain that a moving average is useful for smoothing out volatility in TFP.³⁷⁰ Southwestern Bell and BellSouth contend that a moving average replicates the effects of a competitive market, in that it permits carriers to retain productivity benefits for a short period of time, and then flows through those benefits to consumers.³⁷¹ Bell Atlantic opposes performance reviews, arguing that as long as earnings are used to check the performance of price caps from time to time, the perverse incentives of rate-of-return regulation will not be eliminated completely.³⁷² Bell Atlantic argues that this blunts efficiency incentives, and tends to shift the risk of investment from shareholders to ratepayers.³⁷³

83. Some parties maintain that a moving average gives LECs an incentive to manipulate their costs to reduce their short-term measured productivity growth.³⁷⁴ Some parties argue that an X-Factor based on a moving average does not give LECs an incentive to lower rates to "economic costs," but merely measures how much the LECs have cut their rates in the past.³⁷⁵ USTA and a number of LECs assert that an

³⁶⁸ USTA Comments at 34-35; BellSouth Comments at 38-40; Bell Atlantic Comments at 9-10; SNET Comments at 12-13; Ameritech Comments at 10; US West Comments at 20; NYNEX Reply at 12-13.

³⁶⁹ USTA Comments at 34-35; GTE Comments at 44; Southwestern Bell Comments at 24, 40; Ameritech Comments at 13; BellSouth Comments at 30-31; US West Comments at 20; NYNEX Reply at 13-14; Bell Atlantic Reply at 3.

³⁷⁰ Bell Atlantic Comments at 9-10; Ameritech Comments at 6; GTE Comments at 28-31.

³⁷¹ Southwestern Bell Comments at 21-22; BellSouth Reply, Att. at 41-42.

³⁷² Bell Atlantic Comments, Kahn Aff. at 9-10.

³⁷³ Bell Atlantic, Kahn Aff. at 10-12.

³⁷⁴ AT&T Comments at 34; TRA Reply at 7.

³⁷⁵ MCI Comments at 11-12; TRA Comments at 6-7; LDDS Reply at 4; TRA Reply at 7.

individual LEC's behavior would have limited effect on a five-year moving average, and so the incentives for LECs to increase efficiency would outweigh any benefit that a LEC might achieve by limiting its productivity growth.³⁷⁶

84. AT&T contends that a moving average, with or without a lag, will understate the LECs' productivity in the current period, and so deprive consumers of some of the benefits of productivity growth.³⁷⁷ AT&T also opposes a moving average to the extent that the parties supporting it base their support on adopting USTA's method of calculating the X-Factor.³⁷⁸ USTA maintains that a moving average would flow through the benefits of productivity growth more quickly than performance reviews.³⁷⁹ BellSouth replies that updating the X-Factor only in periodic performance reviews would not necessarily result in an accurate X-Factor in any given tariff year.³⁸⁰ BellSouth also points out that a moving average would tend to understate productivity only while productivity growth continues to increase, and that a moving average would overstate productivity growth during declining periods.³⁸¹

85. MCI maintains that recalculating TFP annually is likely to be more administratively burdensome than conducting a performance review every four years, and asserts that reviewing annual TFP filings would as administratively burdensome as reviewing cost and demand projections in a rate-of-return filing.³⁸² GSA agrees that updating TFP studies on a moving average basis would be burdensome, and recommends using the moving average to update X-Factors based on

³⁷⁶ USTA Comments at 35; BellSouth Comments at 30; USTA Reply at 27; NYNEX Reply at 13; GTE Reply at 25; BellSouth Reply, Att. at 38.

³⁷⁷ AT&T Comments at 33-34.

³⁷⁸ AT&T Reply at 52.

³⁷⁹ USTA Reply at 26-27.

³⁸⁰ BellSouth Reply, Att. at 35-36.

³⁸¹ BellSouth Reply, Att. at 36-38.

³⁸² MCI Comments at 14-17. See also TRA Reply at 7-8; Ad Hoc Reply, Att. at 40.

the Historical Revenue Approach.³⁸³ Some parties contend that this performance review has been a long and burdensome proceeding, and doubt that a moving average mechanism would be more burdensome.³⁸⁴ USTA maintains that its TFP Review Plan simplifies calculating the moving average.³⁸⁵ USTA also supports updating the moving average annually.³⁸⁶

86. Sprint maintains that neither AT&T's nor USTA's models are sufficiently developed to ensure reasonable results or to flow through unit cost reductions when updated annually, and recommends adopting a fixed interstate productivity offset for the next four years.³⁸⁷ Sprint suggests that input prices are too volatile to give a five-year moving average a significant advantage over a fixed offset.³⁸⁸ Sprint also opposes a moving average because it argues that Commission review of access rates will be more important as LECs and IXCs enter each others' markets.³⁸⁹

87. AT&T recommends conducting "performance reviews" annually, and conducting a complete performance review every three years, to ensure that incentive regulation is still functioning properly in light of subsequent developments in the telecommunications industry.³⁹⁰ GSA would schedule the next performance review in 1998.³⁹¹ BellSouth maintains that there is no need to schedule another

³⁸³ GSA Reply at 8-10.

³⁸⁴ GTE Reply at 24-25. See also BellSouth Reply, Att. at 38.

³⁸⁵ USTA Reply at 7-8.

³⁸⁶ USTA Comments at 36.

³⁸⁷ Sprint Comments at 19-20, 26-27. See also Ad Hoc Reply at 6.

³⁸⁸ Sprint Comments at 20.

³⁸⁹ Sprint Reply at 27.

³⁹⁰ AT&T Comments at 46-48; AT&T Reply at 52 n.106. See also US West Reply at 36.

³⁹¹ GSA Reply at 12. GSA originally recommended scheduling the next performance review in 1997. GSA Comments at 9. GSA reasoned that the Commission might have to focus on implementing the 1996 Act in 1997, and so recommended scheduling the next performance review in 1998. GSA Reply at 12.

performance review now.³⁹² BellSouth expects the telecommunications industry to be competitive enough to warrant eliminating price caps before the next performance review might become necessary.³⁹³ Alternatively, US West recommends scheduling a performance review in three to five years, to assess the level of competition.³⁹⁴ US West maintains that a performance review is not necessary if we adopt its proposal to freeze the PCIs at their current levels.³⁹⁵

VI. COMMON LINE ISSUES

B. Reliance on Forecasted Data

88. Southwestern Bell recommends continuing to use forecasted data if we retain a separate common line formula, because historical data would be based in part on "Part 69 revenue requirement calculations."³⁹⁶ US West and USTA recommend using historical data, to make the common line formula consistent with the price cap formula for the other baskets.³⁹⁷ MCI does not oppose basing the hypothetical EUCL per minute charges on historical data, as long as the CCL rates continue to be based on the proposed EUCL rates.³⁹⁸ AT&T recommends basing carrier common line rates on historical growth rates of interstate access services for the previous eight years, extrapolated into the prospective price cap period by a linear trend.³⁹⁹ Pacific opposes this recommendation.⁴⁰⁰

VII. EXOGENOUS COST ISSUES

³⁹² BellSouth Comments at 33.

³⁹³ BellSouth Comments at 29, 44.

³⁹⁴ US West Comments at 28. See also NYNEX Comments at 23.

³⁹⁵ US West Reply at 36.

³⁹⁶ Southwestern Bell Comments at 37-38.

³⁹⁷ US West Comments at 26-27; USTA Comments at 45-46.

³⁹⁸ MCI Comments at 23-24.

³⁹⁹ AT&T Comments, App. B at 46.

⁴⁰⁰ Pacific Reply at 15.

89. MCI argues that the only cost changes warranting exogenous treatment are changes in separations rules and rules governing the allocation of costs between the regulated and non-regulated accounts. According to MCI, firms facing competition must determine how to face cost changes without changing their prices, and price cap regulation should reflect this.⁴⁰¹ MCI also argues that this rule change would conserve the administrative resources consumed by determining whether to treat a particular cost change exogenously or endogenously.⁴⁰² TRA supports MCI's recommendation.⁴⁰³ A number of commenters oppose MCI's exogenous cost suggestion.⁴⁰⁴ USTA notes that the Commission created a procedure in the LEC Price Cap Performance Review for considering whether to treat a cost change exogenously. Because of this, USTA maintains that restricting exogenous cost treatment as MCI proposes is not necessary.⁴⁰⁵ USTA and Pacific reply that it would be unreasonable to grant exogenous treatment to some cost changes beyond the carriers' control and not otherwise reflected in the price cap formula, but not other cost changes.⁴⁰⁶ According to US West, MCI assumes that prices remain static in competitive markets, and contends that this assumption is unreasonable.⁴⁰⁷ If the Commission does not adopt its TFP-based X-Factor method, NYNEX recommends retaining the existing exogenous cost rules.⁴⁰⁸

⁴⁰¹ MCI Comments at 25; MCI Reply at 17-18.

⁴⁰² MCI Comments at 25-26; MCI Reply at 17-18.

⁴⁰³ TRA Reply at 9-10.

⁴⁰⁴ USTA Comments at 46-47; Sprint Comments at 14-15; US West Reply at 34-35; Frontier Reply at 6; USTA Reply at 29-30.

⁴⁰⁵ USTA Comments at 46-47, citing First Report and Order, 10 FCC Rcd at 9099 (para. 316).

⁴⁰⁶ USTA Reply at 29-30; Pacific Reply at 16-17.

⁴⁰⁷ US West Reply at 35.

⁴⁰⁸ NYNEX Reply at 30.

APPENDIX C

AMENDMENTS TO THE CODE OF FEDERAL REGULATIONS

PART 61 -- TARIFFS

1. The authority citation continues to read as follows:

Authority: Secs. 1, 4(i), 4(j), 201-205, and 403 of the Communications Act of 1934, as amended; 47 U.S.C. 151, 154(i), 154(j), 201-205, and 403, unless otherwise noted.

2. Section 61.45(b)(1) and (2) are amended to read as follows:

§ 61.45 Adjustments to the PCI for Local Exchange Carriers

* * * * *

(b) * * *

(1) Notwithstanding the value of X defined in § 61.44(b), the X value applicable to the baskets specified in § 61.42(d)(2), (3), and (6) shall be 6.5%.

(2) For the basket specified in § 61.42(d)(4), the value of X, for all local exchange carriers subject to price cap regulation, shall be 3.0%.

3. Section 61.45(c) is amended by revising paragraph (c)(1) and adding new language at the end of paragraph (c)(2) to read as follows:

§ 61.45 Adjustments to the PCI for Local Exchange Carriers

* * * * *

(c)(1) Subject to paragraphs (c)(2) and (e) of this section, adjustments to local exchange carrier PCIs for the basket

designated in § 61.42(d)(1) shall be made pursuant to the following formula:

* * *

X = productivity factor of 6.5%,

* * *

(2) * * *

For the purposes of this paragraph, and notwithstanding the value of X defined in § 61.44(b), the X value applicable to the basket specified in § 61.42(d)(1), shall be 6.5%.

4. Section 61.45(d)(2) is redesignated as 61.45(d)(2)(i), and new subparagraph (d)(2)(ii) is added to read as follows:

§ 61.45 Adjustments to the PCI for Local Exchange Carriers

* * * * *

(d) * * *

(2) * * *

(ii) Local exchange carriers specified in § 61.41(a)(2) or (a)(3) shall not be subject to the sharing mechanism set forth in the Commission's Second Report and Order in Common Carrier Docket No. 87-313, FCC 90-314, adopted September 19, 1990, with respect to earnings accruing on or after July 1, 1997. This rule has no effect on any sharing obligation of any local exchange carrier relating to earnings accrued before July 1, 1997.

5. Section 61.45(h) is deleted and reserved.

Appendix D

Estimation of TFP Under FCC Rules

FCC Synthesis

C. Anthony Bush
and
Lori Huthoefer

I. INTRODUCTION

In this Appendix, we present the methodology used by the FCC's staff to estimate LEC Total Factor Productivity ("TFP") and input prices, and to calculate the LEC TFP and input price differentials used in the FCC's LEC price cap X-factor.¹ We calculate TFP based on the LEC regulated books of account, excluding miscellaneous services. Thus, our measure of total factor productivity is an approximation of the productivity of all LEC activities. Our calculations are for the period 1985 through 1995.

We largely base our calculations on a simplification and correction of AT&T's implementation of the Fisher Ideal Index methodology, but incorporate certain aspects of USTA's methodology as well. Our TFP estimates embody what we believe to be the best practices proposed by the parties in this proceeding. For example, we used a modification of USTA's method of calculating materials expense. We also employed the perpetual inventory model proposed by USTA, although our implementation differed from that of USTA. We chose to pair end user charges with access lines, as did USTA, instead of with CCL minutes, as did AT&T. As described below, we adjusted pre-1988 data for the effects of 1988 changes in accounting rules using a methodology consistent with that of USTA's Christensen.

Our study is based on data publicly available from the FCC, BEA, and BLS, and on Christensen's data on capital/expense shifts. All these data are part of the public record in this proceeding. Our data are for the seven Regional Bell Operating Companies (RBOCs). Our 1985 base year benchmark capital stock is the net book accounting value of total plant in service. The weights in our input index are based on the shares of total factor payments of capital, labor, and material. Capital's share of total factor payments is based upon the authorized rate of return, actual earnings in excess of that rate of return, and the authorized rates for depreciation.

II. INDICES USED

We constructed our input and output indices using the the Fisher Ideal Index. This index is the geometric average of the Laspeyres Index and the Paasche Index. For two periods ($t = 0,1$), the Fisher Ideal Quantity Index can be written as

¹ This paper benefitted from discussions with FCC Consultant Dr. P.J. Dhrymes, and from considerable assistance by FCC Staff members Jay Atkinson, Christopher Barnekov and Brad Wimmer.

$$I_{o,1} = \left[\left(\frac{\sum_{j=1}^n P_{o,j} Q_{1,j}}{n} \right) \times \left(\frac{\sum_{j=1}^n P_{1,j} Q_{o,j}}{n} \right) \right]^{\frac{1}{2}} \quad (1)$$

where $P_{t,j}$ and $Q_{t,j}$ are the price and quantity of good j , $j = 1, \dots, n$, at time t , $t=0,1$. In addition, it can be shown that the Fisher Ideal Quantity Index can be written as

$$I_{o,1} = \left[\left(\sum_{j=1}^n w_{o,j} \frac{Q_{1,j}}{Q_{o,j}} \right) \times \frac{1}{\left(\sum_{j=1}^n w_{1,j} \frac{Q_{o,j}}{Q_{1,j}} \right)} \right]^{\frac{1}{2}}, \quad (2)$$

where $w_{t,j}$ is commodity j 's share of revenue at time t , $t=0,1$.² If periods 0 and 1 are adjacent periods, Equation 2 is referred to as a Fisher Ideal Quantity Relative. Defining

$I_{o,o}$ to be 1, a chained Fisher Ideal Quantity Index between periods 0 and t is the product of each of the Fisher Ideal Quantity Relatives between 0 and t :

$$I_{o,t} = I_{o,o} \times I_{o,1} \times I_{1,2} \times \dots \times I_{t-1,t}$$

Both our output and input indices are chained Fisher Ideal Quantity Indexes.

We measure input prices by calculating a Fisher Ideal Price Relative, which compares aggregate input price levels to those for the previous period. The Fisher Ideal Price Relative is analogous to the Fisher Ideal Quantity Relative, and can be written as

$$I_{o,1}^P = \left[\left(\sum_{j=1}^n w_{o,j} \frac{P_{1,j}}{P_{o,j}} \right) \times \frac{1}{\left(\sum_{j=1}^n w_{1,j} \frac{P_{o,j}}{P_{1,j}} \right)} \right]^{\frac{1}{2}} \quad (3)$$

² Kali S. Banerjee, Cost of Living Index Numbers (New York: Marcel Dekker, Inc., 1975), pp.3-20.

In this case, the $w_{t,j}$ are shares of total payments to factors. Using this price index relative, the input price index is a chained Fisher Ideal Price Index.

III. CALCULATION OF OUTPUT INDICES

A. Data Sources

Our output indices are based on actual quantity measures from two Commission publications. Basic local service revenue, end user revenue, switched access revenue, special access revenue, state access revenue, and total long distance network revenue are taken from the Commission's Statistics of Communications Common Carriers ("SOCC") for 1985 through 1995. We also took the number of local calls, special access lines, business access lines, residential access lines, and public access lines from SOCC. We measure state toll and intrastate access volumes by state dial equipment minutes, taken from the FCC Monitoring Reports.³ Interstate switched access minutes are from the same Monitoring Reports.

B. Output Category Quantity Indices and Revenue Shares

We constructed an interstate quantity index to measure growth of interstate services. We constructed this index using the following three physical quantities: access lines, interstate switched access minutes, and interstate special access lines. We measured access lines by the sum of business, public, and residential access lines.

Service j 's share of total revenue is

$$w_{t,j} = \frac{R_{t,j}}{\left(\sum_{j=1}^n R_{t,j} \right)} \quad (4),$$

where $R_{t,j}$ is the revenue from interstate service j at time t .

We weighted growth in access lines by the End User Common Line revenue share of total interstate revenues. Growth in switched access minutes was weighted by the switched

³ In 1987 a Joint Board created a monitoring report to collect a variety of data, including dial equipment minutes (DEMs). We rely on the May 1993 through May 1996 Monitoring Reports for the intrastate DEMs and interstate switched access minutes (these reports include data for the prior years). See Amendment of Part 36 of the Commission's Rules and Establishment of a Joint Board, Establishment of a Program to Monitor the Impact of Joint Board Decisions, CC Docket Nos. 80-286 and 87-339, 7 FCC Rcd 4541.

access revenue share, and growth in special access lines was weighted by the special access revenue share. We then used equation 2 to construct Fisher Ideal Quantity Index Relatives. The composite Fisher Ideal Interstate Quantity Index is derived by chaining the Fisher Interstate index relatives.

We used a completely analogous procedure to construct revenue shares and quantity indices for total local service and state toll/access service. State toll/access revenues are total toll service revenues plus intrastate access revenues. The physical units associated with total local service are the number of local calls. For state toll/access service, the physical units are state dial equipment minutes from the Monitoring Report.

C. Total Output Index

We constructed the total company output index using the service quantity indices and revenue shares calculated as described above (for local service, intrastate toll/access, and interstate). We calculated interstate share of total revenue using the sum of end user revenue, switched access revenue (formerly called "carrier's carrier facilities revenues"), and interstate special access revenue. We then used Equation 2 to construct Fisher Ideal Quantity Index Relatives. Our total company output index is a chained Fisher Ideal Quantity Index.

IV. INPUTS

A. Labor

Our measure of the quantity and the cost of labor is based on annual accounting data for the number of employees and total labor compensation reported by the LECs in their ARMIS reports to the FCC. Our labor price index is created by dividing average compensation per employee for each year by the 1985 average compensation per employee .

We let $TCOMP_t$ denote total compensation to labor in year t and NEM_t denote the number

of employees in year t. Compensation per employee, $CPEM_t$, is $CPEM_t = \frac{TCOMP_t}{NEM_t}$. The

components of the labor price index are

$$1, \frac{CPEM_{1986}}{CPEM_{1985}}, \dots, \frac{CPEM_{1995}}{CPEM_{1985}} .$$

B. Materials

Our materials quantities are derived by dividing materials expense by a materials price index. Materials expenses for 1985 through 1987 must be adjusted for two accounting changes that became effective in 1988. First, beginning in 1988 all expenses from nonregulated services that had joint and common costs with regulated services were reported in operating expenses. Second, certain plant investments that formerly were capitalized began to be expensed in the year they were incurred. Accordingly we adjusted 1985 through 1987 expenses upward to put them on a basis comparable to the accounting expense recorded from 1988 onward.

Our adjustments of materials expense for 1985 through 1987 follow the work of USTA's Christensen. No party objected to or replicated Christensen's method of adjusting materials expense.⁴ Christensen's adjustment is based on data from a nine-company sample. We calculated our adjustment factor by dividing the sum of annual reported operating expense plus Christensen's adjustment by reported operating expenses for the years 1985-1987. These percentages are used to adjust 1985 through 1987 operating expenses of the RBOCs.

Mathematically, we can express our adjustment as follows: Let $OPREXP_t$ denote the composite (nine-company) operating expense in year t from the Revised Christensen Study (1995). We let $ADDEXP_t$ be the additional materials expense resulting from both the regulated/nonregulated change and the capital/expense shift (the data we used are shown in Chart D8a). The adjustment to RBOC operating expense is

$$RBOCEXP_t^{Adj} = \left(\frac{OPREXP_t + ADDEXP_t}{OPREXP_t} \right) \times RBOCEXP_t, \quad t = 1985, 1986, 1987$$

where $RBOCEXP_t$ is the unadjusted operating expense of the RBOCs at time t .

Materials expense is total adjusted operating expense minus the sum of total labor compensation, depreciation, and amortization expense.

⁴ USTA's updated study submitted in the Access Charge Reform, Notice of Proposed Rulemaking, CC Docket No. 96-262, began with 1988 and thus needed no adjustment.

$$MATERIALS_t = RBOCEXP_t^{Adj} - (Depreciation_t + Amortization_t) - TCOMP_t .$$

We deflate materials expense to derive materials quantities using the materials price index developed by AT&T's Norsworthy and placed in the record by AT&T.⁵ This index is based on those categories of expenditures from the BLS National Input/Output Tables that are more narrowly focused on materials purchases of communications industries than is the economy-wide GDP-PI measure of inflation. We replicated the index using the same BLS data AT&T used in an ex parte filing received on April 11, 1996.⁶ AT&T's materials price index is a Tornquist index calculation, where the logarithmic percentage changes are replaced by arithmetic percentage changes.⁷

C. Capital

We follow Ad Hoc, USTA's Christensen, and AT&T's Norsworthy in measuring capital based on the Perpetual Inventory Model. We use the Perpetual Inventory Model to remove embedded inflation that would distort the measurement of capital. We examine only one asset class because the record shows that the number of asset classes does not significantly affect estimated growth in TFP. Our application of the Perpetual Inventory Model relies on Commission depreciation rates, as do those of Ad Hoc and AT&T.

PERPETUAL INVENTORY MODEL

For a single asset class, the Perpetual Inventory Model is written as

$$K_t = (1 - \delta) \times K_{t-1} + I_t \quad (5)$$

where K_t is the capital stock quantity at the of end year t and δ is the average depreciation rate (calculated as discussed below). Investment, i.e. capital additions, measured in constant

⁵ Comments of AT&T, Price Cap Performance Review, CC Docket 94-1, Jan. 11, 1996, Appendix A: Statement of Dr. John R. Norsworthy.

⁶ AT&T Ex Parte Letter of April 11, 1996.

⁷ The most recent BLS Input/Output Table was for 1993. We determined the 1994 and 1995 materials price index data points by extrapolating based on average growth in prior years.

(inflation-adjusted) dollars is I_t . Following Christensen, Norsworthy, and Ad Hoc, we use book value of plant as the basis for calculating the benchmark (i.e. initial level) capital stock. In order to calculate constant dollar investment, we use chained Fisher asset prices from BEA to deflate capital additions.

CAPITAL ADDITION ADJUSTMENTS

Our benchmark capital stock is based on the end of year 1985 book value. Because of the 1988 capital/expense shift, we must adjust both end of year 1985 total plant in service less accumulated depreciation and 1985-1987 capital additions. We use Christensen's capital/expense shift factor to reduce capital additions for 1985 through 1987. For $t = 1985, 1986, 1987$, the adjusted capital additions, denoted CA_t^{Adj} , are

$$CA_t^{Adj} = CA_t \times F$$

where CA_t is the unadjusted capital additions and where $F = 0.888$ (taken from the Revised Christensen Study, 1995). We obtained unadjusted capital additions from FCC Form M.

ASSET PRICES

Since we have a single asset class, we construct a single composite asset price index. Following Ad Hoc, AT&T, and USTA, we obtained BEA asset prices. We obtained prices for three BEA asset categories: Communications Equipment (BEA's Table 7.8: Chained-Type Price indexes for Private Purchases of Producers' Durable Equipment by Type, Line 7); Telecommunication Structures (BEA's Table 7.7: Chained-Type Price Indexes for Private Purchases of Structure by Type, Line 12); and a composite asset price for Producer Durables (BEA's Table 7.1, Line 39). We grouped our capital additions data into categories that correspond with the BEA asset categories, and calculated each category's share. (The capital/expense shift adjustment factor discussed above has no effect on the shares because it is multiplicative in nature and applies equally to all categories.)

For our single asset, the Fisher Ideal Price Index Relative is

$$I_{o,1}^A = \left[\left(\sum_{j=1}^3 w_{o,j}^A \frac{P_{1,j}^A}{P_{o,j}^A} \right) \times \frac{1}{\left(\sum_{j=1}^3 w_{1,j}^A \frac{P_{o,j}^A}{P_{1,j}^A} \right)} \right]^{\frac{1}{2}} \quad (6),$$

is category j's share of the value of total capital additions. The price of category j at time t, $t=0, 1$, is $P_{t,j}^A$. From these relatives, we form a chained Fisher Price Index for our single asset. This price index is used to deflate adjusted capital additions in the Perpetual Inventory Model.

BENCHMARK CAPITAL STOCK

Our benchmark capital stock is derived using the FCC accounting relationship

$$TPIS.BOY_t + CA_t - Retires_t = TPIS.EOY_t$$

Beginning of year Total Plant in Service is $TPIS.BOY_t$ in period t, and end of year TPIS is $TPIS.EOY_t$.

We incorporated adjusted capital additions, which results in a revised $TPIS.EOY_t$, $t=1985, 1986, 1987$.

We then obtain our benchmark capital stock by subtracting accumulated depreciation from revised 1985 TPIS.

As is standard practice in TFP studies, we do not include land when forming the benchmark capital stock. We do not apply USTA's economic stock adjustment factors because such factors assume asset lives that are inconsistent with Commission depreciation rates.

DEPRECIATION RATES

Each Perpetual Inventory Model in this record used depreciation rates that are constant over time. In Christensen's model depreciation rates vary by asset class, but for each asset class the depreciation rate does not vary over time. The revised version of AT&T's Performance-Based Model relies on estimates of Commission depreciation rates for six asset classes, but for each asset class the depreciation rate is constant and obtained by averaging over time. Simplifying Norsworthy's approach, we calculated the Commission's time-invariant depreciation rate for our single asset class.

In year t, we calculated the average depreciation rate as

$$\delta_t = \frac{DEPR.ACRLS_t}{((TPIS.BOY_t + TPIS.EOY_t) / 2)}$$

where δ_t is the composite depreciation rate in period t. In year t, the depreciation accruals are $DEPR.ACRLS_t$. Our constant depreciation rate is

$$\delta = \frac{(\sum_{t=1}^{11} \delta_t)}{11},$$

which is the average depreciation rate for the period 1985 through 1995.

SERVICE FLOWS - CAPITAL INPUT QUANTITIES

Following Christensen, we compute a quantity index of capital services. At time t, the capital input quantity is denoted

*Capital Input Quantity*_t, and

$$Capital\ Input\ Quantity_t = \frac{Capital\ Stock\ Quantity_{t-1}}{Capital\ Stock\ Quantity_{t-1984}}, \quad t=85', \dots, 95'$$

The 1984 capital stock is calculated from the 1985 benchmark, as

$$Capital\ Stock\ Quantity_{84} = \frac{Capital\ Stock\ Quantity_{85} - Investment_{85}}{1 - \delta},$$

where $Investment_{85} = \frac{Current\ Dollar\ Investment_{85}}{Asset\ Price\ Index_{85}},$

This calculation follows the practice of Christensen in his Revised Study (1995) and AT&T's April 16, 1997 Study.

D. AGGREGATE INPUT INDEX

Having constructed input indices for all three factors of production, we use equation 2 to aggregate them into an aggregate input index. In order to use equation 2, we need each factor's share of total costs. The payment to labor is total compensation, the payment to materials is materials expense, and following AT&T, the payment to capital is property income. At time t , property income is denoted $PINC_t$, and is calculated as

$$PINC_t = Revenue_t - MATERIALS_t - TCOMP_t$$

The sum of total payments to each of the factors of production is denoted by TPAY. For each factor of production, we calculate shares of TPAY as follows. At time t , labor's share is

$$w_{t,1}^* = \frac{TCOMP_t}{TPAY_t} . \text{ Materials' share is } w_{t,2}^* = \frac{MATERIALS_t}{TPAY_t} . \text{ Capital's share is}$$

$$w_{t,3}^* = \frac{PINC_t}{TPAY_t} . \text{ Our aggregate input index relative is}$$

$$I_{o,1}^* = \left[\left(\sum_{j=1}^3 w_{o,j}^* \frac{Q_{1,j}^*}{Q_{o,j}^*} \right) \times \frac{1}{\left(\sum_{j=1}^3 w_{1,j}^* \frac{Q_{o,j}^*}{Q_{1,j}^*} \right)} \right]^{\frac{1}{2}} \quad (7) ,$$

For labor, $Q_{t,j=1}^*$ is the number of employees, and for materials, $Q_{t,j=2}^*$ is deflated materials expense. For capital, $Q_{t,j=3}^*$ is the capital input quantity. The aggregate input index is a chained Fisher Ideal quantity index.

V. MEASURED TFP

We calculated the percentage change in measured TFP based on our total output and total input chained-linked Fisher Ideal Indices. For a given year, the percentage change in TFP is simply the percentage change in output minus the percentage change in input, where all percentage changes are logarithmic percentage changes. We report our FCC synthesis percentage changes in TFP in Chart D1.

To obtain the TFP Differential, we subtracted TFP growth in the general economy from LEC TFP growth. We used the BLS estimate of Nonfarm Business Sector Multifactor

Productivity⁸ as our measure of general TFP growth. The most recent published data in this series is for 1994. We estimated the 1995 growth as the average of the five most recent years.

VI. INPUT PRICE DIFFERENTIALS

Our X-Factor includes both the difference between LEC TFP and TFP for the entire economy and an Input Price Differential. We calculated a RBOC input price index using our labor price index, AT&T's materials price index, and a capital price index based on the methodology proposed by AT&T. With only one asset, the rental price is property income divided by the real capital stock used in that period., i.e., the capital stock quantity.⁹ The resulting data is normalized, with 1985 as the base year.

Let v_t be the rental price of capital in period t .

$$v_t = \frac{PINC_t}{K_{t-1}}$$

The price index for capital is $P_{t,3}^*$, $t = '85, \dots, '94$ which is

$$1, \frac{V_{86}}{V_{85}}, \dots, \frac{V_{95}}{V_{85}}$$

Using our factor shares of total payments and equation 3, the Fisher Ideal Input price relative is

⁸ Bureau of Labor Statistics, Office of Productivity and Technology, Net Multifactor Productivity and Costs, Nonfarm Business Sector (Excluding Government Enterprises), Table NFB4a, January 17, 1996.

⁹ Calculating an implicit price (rental) of capital by dividing returns to capital by the real capital stock, is undertaken by Dhrymes (1990). See Phoebus J. Dhrymes, "The Structure of Production Technology: Evidence from the LED Sample I," in Bureau of Census 1990 Annual Research Conference - Proceedings, U.S. Department of Commerce, Bureau of the Census, 1990.

$$I_{o,1}^{**} = \left[\left(\sum_{j=1}^3 w_{o,j}^* \frac{P_{1,j}^*}{P_{o,j}^*} \right) \times \frac{1}{\left(\sum_{j=1}^3 w_{1,j}^* \frac{P_{o,j}^*}{P_{1,j}^*} \right)} \right]^{\frac{1}{2}} \quad (8)$$

The price index of factor j , $j = 1, 2, 3$, is $P_{t,j}^*$. From these relatives, we derive our chained Fisher Ideal Input Price Index.

Our Input Price Differential is obtained by subtracting growth in our Input Price Index from growth in general input prices. As our measure of general input price growth, we used the BLS Nonfarm Business Sector Input Price Index. This is from the same source as, and is developed in conjunction with, BLS's measure of general TFP growth. Again, the most recent published data is for 1994 and we estimated 1995 input price growth as the average of the five prior years.

Results

The attached charts present our TFP and Input Price Differential calculations, and the development of our underlying input, output, and input price indices.

May 7, 1997

Statement of
Commissioner James H. Quello

RE: FEDERAL-STATE JOINT BOARD ON UNIVERSAL SERVICE
(CC Docket No. 96-45),

ACCESS CHARGE REFORM (CC Docket No. 96-262), and

PRICE CAP PERFORMANCE REVIEW FOR LOCAL EXCHANGE
CARRIERS (CC Docket No. 94-1).

Today, the Commission has established rules to implement the Universal Service provisions of the Telecommunications Act of 1996, as well as rules to restructure the access charge system while also initiating reductions in the levels of those access charges. I have believed throughout my participation in the debates regarding universal service and access reform that, as much as possible, we should seek to ensure that consumers experience the benefits of our actions. To this same end, we should try to avoid the possibility that total bills for groups of consumers could increase as a result of implementing new universal service programs and moving into a new access charge regime.

Universal Service

This Commission now has taken steps to establish processes for the administration of universal service funds in a way that allows the commitments represented in this section of the 1996 Telecommunications Act to be fulfilled. We have labored to develop a reasonable plan that will provide necessary and sufficient funds for schools and libraries as well as other universal service programs. We also have sought to avoid collection of funds beyond those legitimately needed to help make new and important services available to students and teachers in inner city, suburban and rural schools from Takoma Park, D.C., to Tacoma, Washington, from McAllen, Texas to Mackinac Island on the Upper Peninsula of Michigan.

We have achieved this balance by establishing funding necessary to begin the program at a reasonable level, with a provision that allows schools and libraries to begin the program January 1, 1998. By this time, we would hope that participating groups will have had the opportunity to develop their plans. Our decision to start the program with lower funding in the first six months, increasing in the following years, gives the program early constraint, with flexibility at later periods when greater demand is likely to develop. As a result, I believe this decision provides for new universal service funding within the limits of what consumers around the country are willing to pay.

The issue of what consumers are prepared to pay has been a very difficult one. The need for our attention to the issue, however, has been clearly expressed in many ways. It has required the Commission to balance the need for programs involved in universal service that are critically

important to the future of this country with their cost. In this respect, this universal service proceeding is one of the most important decisions in this agency's history. At the same time, we have heard a consistent message from around the country that consumers and businesses are not necessarily willing to pay for these services through higher total bills for telecommunications services.

With respect to funding for health care subsidies, we have endeavored to make sure that rural, non-profit health care facilities have sufficient funding to meet the needs for providing services in communities that otherwise might not have the same resources that are available in urban communities.

There also are many other policy and market issues that will need to be resolved in a new universal service environment. For instance, I believe it remains to be seen how cable and wireless industries will continue to develop to play a greater role in the telecommunications services that will meet future universal service needs. As these developments occur, the Commission may continue to monitor the equity of contribution and recovery of universal service funds by paging services as well as the extent to which wireless services in general should contribute for intrastate services.

Access Reform

The Commission's actions today on access reform involve two components: (1) several structural changes that will cause access components to move to more reasonable categories and to become subject to competition where possible; and (2) reductions in the current level of access charges, largely accomplished through revision of the productivity and sharing mechanism in LEC price caps.

Where this decision changes the structure of end user charges, as in our treatment of business and residential customers, and consumers with second or multiple lines, I believe our decisions should be -- and are -- characterized by balance. As a result of this necessary reform of the access payment structure, charges should remain within reasonable bounds and should help to promote the development of competition and consumer benefits.

I also believe this Commission would be remiss in our regulatory duties to the American public and responsibilities to our licensees if we were to restructure universal service without concurrently engaging in access charge reform. We have talked about this step for quite some time. Many parties have expressed their views in a very public fashion as to whether or not this step is warranted, or to what degree access charges should be reduced. I believe that this step to restructure and reduce the level of access charges is the right thing to do and this is the right time to do it.

The consumers and users of telecommunications services are the intended beneficiaries of today's actions regarding access reform. Now that these decisions are adopted, I believe it will become clear that we have done our best to ensure that consumers do not bear the burden of

implementing the new universal service program and access charge reform. Our actions also represent a fundamental part of the Commission's effort to facilitate competition in the local exchange marketplace, in this case by reducing access charges paid to LECs by interexchange carriers.

The primary vehicle for this reduction is the decision to change the existing combinations of productivity factors, or "x-factors", and sharing options to a single productivity factor of 6.5% accompanied by no sharing obligation. As a result, this decision continues the Commission's efforts to move away from the lingering remnants of rate of return regulation for local exchange carriers. Today's decision will complete the movement of price cap LECs away from the sharing obligations that were part of the past system.

Looking to the Future

I want to emphasize that today's actions represent a first step in many respects.

Concerning universal service, this is not a day to declare victory. There is much left to be done by the Commission, the states, temporary and permanent fund administrators, school districts, libraries, health care facilities, parties developing cost models, and telecommunications companies seeking to provide services and enter new markets. This is definitely an important day, but the real effort is just beginning. That effort will require investment, planning, training in using services, and community, professional, and corporate involvement, and it will only be successful after the continuing involvement, in community after community, by the many parties who have so diligently participated in this proceeding.

The Commission's action to increase the productivity factor not only results in reduced access charges in the first year, but also in further reductions in access charges in subsequent years. In another respect, it may very well become necessary very soon for the Commission to consider how to supplement today's decision to allow for pricing flexibility by LECs as competition develops to a greater level in the local marketplace. One possible way to provide that flexibility might be through relaxing the 6.5% productivity factor where LECs can meet criteria to demonstrate sufficient competition.

At the same time, later steps might also include the potential for checks and balances in the event that competition in the local exchange marketplace does not develop as soon as some seem to expect. Once again, down the road the Commission may need to consider more specific measures to ensure that the platforms necessary for competition truly are available. It is my hope that those steps won't be necessary.

Finally, some parties have warned recently that any actions by this Commission to lower access charges may cause LECs to seek to raise local phone rates. That matter will become an issue for state commissions, and it is my hope that they will respond to any efforts to raise local rates by ensuring that consumers ultimately benefit from federal and state actions to implement the Telecommunications Act of 1996 and any related decisions.

May 7, 1997

Separate Statement
of
Commissioner Susan Ness

Re: Universal Service; Access Reform; Price Cap Review

Today we reach another milestone in our efforts to secure for consumers the myriad benefits made possible by the Telecommunications Act of 1996. We are steadfastly fulfilling the tasks assigned to us by Congress in a manner that will prove the wisdom -- and realize the vision -- of this landmark legislation.

Our pursuit has many facets. We must eliminate impediments to competition, ensure fair rules of engagement for all market participants, safeguard the interests of residential consumers, especially those with limited incomes and those in high cost areas, promote economic efficiency, and lower prices to consumers. Today's orders represent substantial progress on all these fronts.

Much of what we are doing is driven by law and by economics. But the results of our decisions have a human face:

Will a poor family in Appalachia be able to summon the police or fire department in an emergency?

Will a critically ill patient in a remote region of Montana have her tumor quickly and accurately diagnosed?

Will a curious high-school freshman have an opportunity to view Thomas Jefferson's valedictory letter, in his own aged but still powerful hand?

Will an elderly widow be less hesitant to break her loneliness with longer and more frequent calls to her great-grandchildren?

Today brings us closer to a day when these questions can all be answered "yes."

Fifteen months after enactment of the Telecommunications Act, the transition to a new industry paradigm remains far from complete. The road is not straight, or smooth, or free from peril. But a steady course -- and a shared determination -- can bring us to the desired destination.

We still have far to travel to resolve issues of support for high-cost areas. I believe we have a sound plan and a clear timetable for implementation, but we still face two main

obstacles. The proxy models, already impressive feats of cost engineering, still require further refinement before they can reliably be used to target federal cost support. And a new consensus must be achieved before support essential to maintain affordable telephone service in high-cost states can be drawn from states with lesser need, as I believe the Congress of the United States clearly intended. In the meantime, we can make only incremental changes in the implicit subsidies that currently support the high-cost services provided by large price cap telephone companies.

For the smaller rural companies, change will come even more gradually. This is consistent with Congress's expectation that competition would arrive more quickly in the cities and the suburbs. In the interim, we recognize that rural economies must not face unnecessary dislocations.

The need to avoid harmful dislocations, while also encouraging beneficial change, is crucial to much of what we are doing in the access reform and price cap orders. We are implementing many changes that will help to ensure an orderly transition from monopoly to fair and efficient competition.

In particular, the recovery of more costs through flat-rated charges instead of usage-sensitive charges will reduce the exposure of incumbent telephone companies to "cherry-picking" by new entrants, even as they also expand the range of customers likely to be offered competitive alternatives. Completion of the conversion to a three-part rate structure for tandem-switched transport will eliminate a historical artifact, but allow time for affected carriers to adjust. The new X-factor more accurately reflects the productivity gains that can reasonably be expected from price cap carriers, while avoiding radical reduction of telephone company access revenues and proposals that would have unfairly penalized those companies that have most assiduously conducted themselves in accordance with the incentives we deliberately created.

We prefer to rely on marketplace forces rather than regulation to drive investment decisions and price reductions. Some will fault us for not acting more aggressively; others will complain that we are too heavy-handed. My own view is that each decision, and all of the many issues in these orders, has been approached with balance and sensitivity, fairness and principle.

Not everyone will be satisfied. But no one can say that we have not read the law, considered economic theories and business realities, consulted our consciences, and sought to achieve as much fairness as is humanly possible.

I readily confess that I cannot muster the same passion for restructuring the arcane and impenetrable Transport Interconnection Charge as for devising a completely new regime to provide discounts for schools and libraries to access telecommunications and information services. Though I am fully committed to full realization of all of the universal service provisions, the Snowe-Rockefeller-Exon-Kerry provisions reflect an especially bold vision.

For our part, we have used our creativity to harness the magic of competition to reduce the costs of the support program, created incentives to ensure only prudent use of supported services, targeted discounts to minimize the danger of a widening gap between information haves and have-nots, and sought at every turn to maintain our commitment to competitive neutrality.

Even more important, we have sought to leave crucial decisions in the hands of educators and librarians, scattered throughout the country, rather than in the hands of Washington-based administrators. And, best of all, we have arranged a smooth take-off that will avoid creating unsustainable financial burdens on carriers and consumers, allowing competition and growth and declining prices -- rather than rate increases -- to supply the necessary funds.

In this area, as in the others addressed by today's orders, we have applied all our energy, and all our skill, to make the best decisions, based on our current knowledge and the law. A continuing commitment to constructive dialogue by all interested parties -- telephone companies, long distance companies, wireless companies, small businesses, large businesses, residential consumers, state regulators, and members of Congress -- is critical to continued progress. At the end of the day, fairness to all parties and demonstrable benefits to consumers are the standards by which we will all be judged.

May 7, 1997

SEPARATE STATEMENT OF
COMMISSIONER RACHELLE B. CHONG

Re: Price Caps Performance Review for Local Exchange Carriers, Fourth Report and Order, CC Docket 94-1.

Along with the Access Charge Reform and Universal Service orders, today's Price Caps decision adopts much-needed reforms which I believe to be very important to the progressive deregulation of incumbent LECs as competition increases. I write separately to express my strong support for this item, and to highlight some of the key aspects of the decision.

In this decade, price cap regulation has been an effective tool to ensure that rates are just, reasonable and not unduly discriminatory. Price caps will continue to keep access charges in check as we transition towards an access charge regime based on forward-looking economic costs. As competition develops, however, we will gradually deregulate incumbent LEC interstate access services by removing services from price caps where actual competition has arisen.

The price cap plan we adopt today contains a challenging unitary X-factor of 6.5 percent annually. While picking an X-factor is not an exercise that brings one to a state of metaphysical certitude, I feel confident that the X-factor we have chosen is a reasonable one and well-supported by the record. We have selected this X-factor after very careful analysis of the growth rate of incumbent LEC total factor productivity (TFP) and the rate of change of LEC input prices. I believe the new X-factor of 6.5 will be a more reliable measure of incumbent LEC potential productivity gains than our interim price cap plan, which offered three X-factors, some with sharing obligations. In the unlikely event we have made the X-factor too challenging for some LECs, we retain our low end adjustment mechanism. I view this mechanism as a wise safety net.

To ensure that consumers share in LEC efficiency increases, we have added a 0.5 Consumer Productivity Dividend (CPD) to the X-factor. I recognize that some have argued that the CPD was initially adopted as a way to flow through the first benefits of the price cap plan to access charge customers, and that it may be time to bid the CPD a fond farewell. Given the current state of competition in most price cap LEC markets, we have decided to continue use of the CPD as a way to ensure that productivity gains realized by the LEC will be shared between ratepayers and shareholders. In the future, however, a Commission may decide that competition has progressed to the stage where a CPD mechanism could be safely discarded because market forces will provide consumers with the benefit of the LEC's productivity.

Finally, I am particularly pleased that this Report and Order puts a stake through the heart of "sharing," the requirement that incumbent LECs earning more than specified rates-of-return must "share" half or all of the amount above those rates-of-return with their access customers in the form of lower rates the following year. Since sharing continues the

inefficiencies of a rate-of-return era, I have long believed that a system of pure price caps without sharing would be preferable.¹⁰ I believe that we have correctly found today that sharing tends to blunt the efficiency incentives we sought to create through the price cap plan.

¹⁰ See, e.g., In the Matter of Price Cap Performance Review for Local Exchange Carriers, Separate Statement of Commissioner Rachelle B. Chong, First Report and Order, 10 FCC Rcd 8961, 9251 (1995).