

EXHIBIT A

Before the
Federal Communications Commission
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of)
)
)
Price Cap Performance Review)
for Local Exchange Carriers)
)
Access Charge Reform)
_____)

CC Docket No. 94-1

CC Docket No. 96-262

COMMENTS OF AT&T CORP.

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SUMMARY

AT&T, as part of the Coalition for Affordable Local and Long Distance Services (“CALLS”), has proposed a set of reforms that the Commission should adopt and which would obviate the need for most of the proposals in the *Further Notice*. If the Commission does not adopt the CALLS plan, however, or if it adopts it only for those LECs that have voluntarily agreed to its terms, this proceeding gives the Commission an ideal opportunity to respond persuasively to the D.C. Circuit’s remand decision in *USTA v. FCC* and to correct serious deficiencies that are inherent in the Commission’s current price cap regulatory system.

One of those, as recognized in the *Further Notice*, is the erroneous assumption that the enormous excess profits historically earned by the local exchange carriers (“LECs”) represent a legitimate part of the LECs’ required cost of capital. Another serious deficiency, also noted but not corrected in the *Further Notice*, is the Commission’s practice of calculating adjustments to the price cap system on the basis of the LECs’ total-company costs and revenues, rather than their interstate costs and revenues. AT&T’s comments demonstrate that the Commission can and should correct both of these deficiencies in this proceeding, even as the Commission responds to the specific issues raised by the Court in the *USTA* decision.

As the Commission is well aware, the price cap system is designed to stimulate, to the extent possible, the efficiency incentives of competitive markets. To do so, the system caps the LECs’ access rates, and the caps are adjusted each year by a measure of inflation minus a productivity offset, or “X-factor.” The X-factor represents the amount by which the LECs, in the provision of their interstate access services, can be expected to outperform economy-wide productivity gains. The X-factor currently has two parts: a “historical” component based on the LECs’ *prior* productivity growth, and an additional consumer productivity dividend (“CPD”). The latter component reflects an expectation that, because of efficiencies created by the price cap

regulatory scheme, LEC productivity would grow faster in the future than it had in the past. Prior to 1997, the price cap system also contained a mechanism under which, if a LEC's interstate rate of return exceeded a certain threshold, the LEC was required to make a one-time reduction in its rates the following year as a way of "sharing" those unanticipated productivity gains with consumers. In the 1997 order that was the subject of the *USTA* appeal, the Commission eliminated the sharing requirement, prescribed a new historical component of the X-factor of 6.0 percent, and retained the existing CPD of 0.5 percent.

The D.C. Circuit's decision remanding that order rejected most of the LECs' challenges and, indeed, left the Commission wide discretion to make the price cap system even more effective at replicating the incentives of a competitive market. As to the historical component of the X-factor, the court merely held that "[t]he Commission ha[d] failed to state a coherent theory supporting its choice of 6.0%" because of the way the Commission had analyzed the data on the LECs' average productivity. *USTA v. FCC*, 188 F.3d 521, 526 (D.C. Cir. 1999). The Court also found that the Commission had not provided a sufficient explanation for its decision to retain the 0.5 percent CPD, although the Court expressly acknowledged "that it is defensible to include a CPD corresponding to whatever productivity increase may be expected from the elimination of sharing." *Id.* at 527. Accordingly, the Court remanded the case to the FCC "for further explanation." *Id.* at 526.

In response to the D.C. Circuit's decision, the Commission's *Further Notice* requests comment on three principal issues pertaining to the X-factor used in the Commission's price-cap regulation of local exchange carriers. First, how should the historical component of the X-factor be determined, both for the 1997-2000 remand period and in the future? Second, at what level should the CPD be set? And third, how should the Commission correct for prior years when the X-factor was too low?

Historical Component. As to the first issue: of the three options described in the *Further Notice*, the Commission's "Option 2" is the best method for estimating the historical component of the X-factor. This method, based on calculations of the LECs' total factor productivity ("TFP"), corrects Option 1's erroneous calculation of capital inputs and the related, erroneous assumption that a LECs' excess earnings represent a legitimate cost of capital.

With little difficulty, Option 2 also can be modified to correct the other major deficiency that has infected prior estimates of the historical component of the X-factor: the Commission's reliance on total company data rather than interstate data. Because the price cap system regulates only *interstate* rates, it only makes sense, as a matter of law and policy, to base the X-factor on the LECs' *interstate* costs and revenues. The Commission has recognized this principle for years, but has been reluctant to follow it because of technical problems in the calculation of the relevant interstate inputs. AT&T has now found a compelling way to surmount these technical problems, and thereby allow the Commission, using Option 2, to compute a historical X-factor for the LECs' interstate services. The more indirect approach embodied in Option 3 simply confirms what the industry has known all along, namely, that historical X-factors based on total-company data seriously understate the LECs' true productivity in the provision of interstate services.

The Commission, therefore, should use the modified Option 2 methodology to calculate the X-factor for the remand period -- *i.e.*, 1997-2000 -- and the period from July 1, 2000 forward. Specifically, with respect to the remand period, the D.C. Circuit's objections can best be met by using the "rolling average" methodology used in the 1997 order, but without giving preference to any particular averages. The Commission has ample discretion to adopt this methodology for the remand period, and, when applied to the data from 1986-1995, it yields an X-factor of 10.1 percent.

With respect to the period from July 1, 2000 forward, the Commission should use the modified Option 2 methodology, but should add the 1996-98 data to each of the rolling averages. The addition of these data is appropriate because it continues to give greater weight to data from the more recent years governed by price caps. Application of this methodology yields an X-factor of 9.5 percent for the period from July 1, 2000 forward.

Consumer Productivity Dividend. To make the price cap system replicate more fully the incentives of a competitive market, the Commission should also adopt a CPD of at least 1.1 percent. As the D.C. Circuit observed, the LECs did not dispute the Commission's rationale for retaining a CPD in some amount, namely, that the newly adopted rule eliminating sharing requirements would further increase the price cap LECs' productivity. Because there is no dispute about the Commission's reason for retaining the CPD, the only question on remand is the level at which the CPD should be set to reflect the likely impact of eliminating sharing. To answer that question, the Commission must determine a reasonable estimate of the difference between the LECs' potential productivity gains in a sharing regime and the LECs' potential productivity gains in a non-sharing regime.

There are several reasonable approaches to calculating this difference, and all of them point toward a CPD of at least 1.1 percent. The most straightforward approach is to rely on the model developed by Strategic Policy Research and alluded to in the *Further Notice*. That model predicts that the elimination of sharing from the existing price-cap system would increase the LECs' productivity by approximately three times the productivity increase that was created by the adoption of the original price cap system.

Reasonable measures of the latter productivity increase range from the 0.5 percent predicted by the Commission itself in 1990 to approximately 0.66 percent, when the LECs' productivity is analyzed on an interstate-only basis. Combined with the SPR model, this analysis

thus suggests that the LECs' can eventually expect a productivity increase of 1.5 to 2.0 percent as a result of the Commission's decision to eliminate sharing. Taking the lowest of these numbers, and reducing it by 0.4 percent to reflect the fact that some portion of this productivity increase may already be reflected in the historical X-factors from 1996-1998 (when the LECs were given the option of eliminating sharing on their own), yields a very conservative CPD of 1.1 percent.

Correction for Prior Inaccuracies in the X-factor. Finally, the Commission should reinitialize the price caps to correct for prior years when the X-factor was set too low. The CPD has never been used solely to correct past mistakes, and it should not be used for that purpose now. The Commission, however, *should* correct for prior years by reinitializing the price caps to where they would have been if the historical component of the X-factor had been set at 10.1 percent during the period 1995-2000, with a CPD of 1.1 percent during 1997-2000. As the Commission has previously recognized, errors in the estimation of the X-factor are not self-correcting, but continue to infect the price cap system and may cause increasingly erroneous prices over time. Accordingly, the Commission should reinitialize the price caps to give consumers relief that is as complete as possible given the prohibition on retroactive rulemaking.

Collectively, these measures will go a long way to making the price cap system replicate the efficiency incentives of a competitive market. The Commission should adopt them as soon as possible.

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COMMENTS OF AT&T CORP.

Pursuant to section 1.415 and 1.419 of the Commission's rules, 47 C.F.R. §§ 1.415, 1.419, AT&T Corp. ("AT&T") respectfully submits these comments in response to the Commission's Further Notice of Proposed Rulemaking, FCC 99-345, released November 15, 1999 ("*Further Notice*"). That notice requests comment on how the "X-factor" that the Commission uses in regulating the LECs' interstate access rates should be re-prescribed for July 1, 1997 to June 30, 2000, and prescribed prospectively for July 1, 2000 forward, in light of the decision of the United States Court of Appeals for the District of Columbia Circuit in *USTA v. FCC*.¹

AT&T, along with Bell Atlantic, BellSouth, GTE, SBC, and Sprint, are part of the Coalition for Affordable Local and Long Distance Services ("CALLS") and have recently proposed a set of reforms that would obviate the need for the prospective rate adjustments proposed in the *Further Notice* for the LECs who are CALLS members. The CALLS Plan is a compromise plan, and therefore AT&T's positions in these comments differ from those of CALLS.

¹ *USTA v. FCC*, 188 F.3d 521 (D.C. Cir. 1999).

Because of its numerous public interest benefits, AT&T strongly supports the CALLS proposal and urges the Commission to adopt it for *all* price cap LECs. If the Commission does so, the CALLS Plan would resolve, in an equitable and sustainable manner, virtually all of the issues raised in the *Further Notice*. If the Commission adopts the CALLS proposal only for those LECs that have voluntarily agreed to it, then AT&T's positions in these comments would apply to the remaining price cap LECs, including but not limited to Ameritech and U S WEST, that are not members of CALLS. Although the Commission should adopt the CALLS Plan to rationalize the access and universal service regimes, if for any reason the Commission does not adopt the CALLS Plan, AT&T's positions here would apply to all price cap LECs.

INTRODUCTION AND SUMMARY

In 1990, the Commission developed an incentive-based price cap system to regulate the rates that certain incumbent local exchange carriers ("LECs") can charge for interstate access services.² The plan was designed to eliminate the perverse economic incentives created by rate-of-return regulation, and to simulate, to the extent possible, the efficiency incentives found in competitive markets.³ To achieve those goals, the price cap system caps the LECs' access rates, and the caps are then adjusted each year by a measure of inflation minus a productivity offset, or "X-factor."

The X-factor represents the amount by which price cap LECs can be expected to outperform economy-wide productivity gains.⁴ In the *LEC Price Cap Order* it consisted of two

² Second Report and Order, *Policy and Rules Concerning Rates for Dominant Carriers*, 5 FCC Rcd. 6786 (1990) ("*LEC Price Cap Order*").

³ First Report and Order, *Price Cap Performance Review for Local Exchange Carriers*, 10 FCC Rcd. 8961, ¶ 92 (1995) ("*1995 Price Cap Review Order*").

⁴ *LEC Price Cap Order*, ¶ 75.

parts. The first is a “historical” component based on the LECs’ *prior* productivity growth. The second component is an additional 0.5 percent consumer productivity dividend (“CPD”). This component of the X-factor reflects an expectation that, because of efficiencies created by the price cap regulatory scheme, LEC productivity would grow faster in the future than it had in the past.⁵

The Commission’s original price cap system also contained a “sharing” mechanism. If a LECs’ interstate rate of return exceeded a certain threshold, the sharing mechanism required the LEC to make a one-time reduction in its rates the following year as a way of “sharing” with consumers the benefits of those unanticipated productivity gains.⁶ The LECs consistently opposed the sharing mechanism and argued that it would severely dampen the price cap system’s incentives to enhance efficiency. Indeed, the LECs argued that sharing prevented them from realizing most of the efficiency gains promised by price cap regulation, and they submitted an economic study (by Strategic Policy Research or SPR) quantifying those effects.⁷

In 1997, the Commission revised the price cap plan by eliminating sharing requirements, prescribing a new historical component of the X-factor of 6.0 percent, and retaining the existing CPD of 0.5 percent.⁸ Several entities, principally price cap LECs, filed petitions with the D.C. Circuit for review of the Commission’s *1997 Price Cap Review Order*.

⁵ *Id.* ¶ 47.

⁶ *Id.* ¶¶ 7, 120-29.

⁷ *See Further Notice*, ¶ 44 n.57.

⁸ Fourth Report and Order in CC Docket No. 94-1 and Second Report and Order in CC Docket No. 96-262, *Price Cap Performance Review for Local Exchange Carriers*, 12 FCC Rcd 16642 (1997) (“*1997 Price Cap Review Order*”).

In its decision addressing these petitions, the D.C. Circuit, while generally rejecting the LECs' challenges, held that "the Commission ha[d] failed to state a coherent theory supporting its choice of [a] 6.0% [historical component of the X-factor]." *USTA v. FCC*, 188 F.3d at 526. Specifically, the Court found that the Commission had not adequately explained (i) its decision to accord less weight to certain data, *id.* at 525-26; (ii) its reliance on an upward trend in the X-factor since 1993, *id.* at 526; and (iii) its decision to give independent weight to the results of AT&T's X-factor analysis, *id.* at 526.

The Court also found that the Commission had not provided a sufficient explanation for its decision to retain the 0.5 percent CPD. *Id.* at 527. The Court expressly acknowledged (and petitioners did not dispute) "that it is defensible to include a CPD corresponding to whatever productivity increase may be expected from the elimination of sharing." *Id.* However, the Court found that retention of the prior CPD of 0.5 percent required the Commission to gauge the likely effects on productivity of eliminating sharing, and not just to assume that the magnitude of the changes would be the same as before. *Id.* Accordingly, the Court remanded the case to the FCC "for further explanation." *Id.* at 526.

Although the Commission's *Further Notice* asks for comment on a number of specific questions, those questions deal with three broad issues. First, how should the historical component of the X-factor be determined, both for the period covered by the remand (1997-2000), and for the future?⁹ Second, at what level should the consumer productivity dividend be set, both for the remand period and in the future?¹⁰ And third, how should the Commission

⁹ See *Further Notice* ¶¶ 20-42, 46-52.

¹⁰ *Further Notice* ¶¶ 43-45.

“correct for prior years when the X-factor may have been set too low.”¹¹ Each of these issues is addressed in turn below. To summarize, AT&T proposes an historical X-factor of 10.1 percent for the remand period; an historical X-factor of 9.5 percent for the future; a CPD of 1.1 percent; and full reinitialization of the LECs’ price cap indexes.

ARGUMENT

I. THE COMMISSION SHOULD ESTABLISH THE HISTORICAL COMPONENT OF THE X-FACTOR AT A LEVEL OF AT LEAST 9.5 PERCENT FOR 2000 FORWARD, AND 10.1 PERCENT FOR THE 1997-2000 REMAND PERIOD.

As to the first issue, the Commission seeks comment on three alternative methods -- which it calls Options 1, 2, and 3 -- for estimating the historical component for the X-factor. *Further Notice*, ¶ 20. As explained below, the Commission should adopt the Option 2 methodology, and modify it to calculate productivity on an interstate basis rather than a total company basis. The Commission should then separately calculate the X-factor applicable to the remand period -- *i.e.*, 1997-2000 -- and the X-factor to be applied beginning July 1, 2000 going forward. As AT&T shows below and in the attached Appendix A, the X-factor for the remand period should be 10.1 percent, and for the period 2000 going forward it should be 9.6 percent.

A. With Appropriate Modifications, The Staff’s Updated TFP Study (Option 2) Provides A Reasonable Methodology For Estimating An Interstate-Only X-factor, Which Can And Should Be Used Instead Of A Total Company X-factor.

Of the three alternative methods for estimating the historical component of the X-factor, two of them – Options 1 and 2 – use the TFP methodology that has previously been approved, in principle, by the D.C. Circuit. Of those two options, the Option 2 methodology (with one minor technical correction) is superior to Option 1 for calculating the historical productivity measure on a total company basis. *Further Notice* ¶¶ 21, 28-32. Option 2 is the best option because it takes

¹¹ *Further Notice* ¶¶ 45-46.

the Commission's 1997 methodology (*i.e.*, Option 1) and corrects that methodology's erroneous calculation of capital inputs.¹² It can also be easily modified to permit the calculation of a reasonable interstate-only X-factor. Option 3, by contrast, is useful primarily as a means of confirming the results obtained under the modified Option 2 methodology.

1. With A Minor Technical Correction, The Staff's Updated TFP Study Provides A Reasonable Estimate Of The LECs' Total Company X-factor, And Is Superior To The 1997 TFP Study For That Purpose.

The Commission should select the Option 2 method as superior to the Option 1 method. As Appendix B of the *Further Notice* acknowledges, and as AT&T has previously advocated, the Commission's 1997 methodology (Option 1) "made a conceptual error in using actual imputed cost of capital when measuring the productivity of regulated companies." *Further Notice* App. B at 45. The 1997 FCC staff study "subtract[ed] the cost of the labor and material inputs from revenues, and the residual revenue [was] *assumed* to be the cost of the capital input" (which is known as the residual value method). *Further Notice* ¶ 29 (emphasis added). In other words, the 1997 study "assumed that all of this residual was the required return to capital, *i.e.*, that no excess profit was earned." *Further Notice* App. B at 46. While that might be a "reasonable assumption for a competitive market," the staff properly recognizes that such an assumption is not warranted in the context of calculating the productivity gains of the price cap LECs. *Further Notice* App. B at 46 ("In a regulatory setting, however, the productivity gains are 'revealed' by the X-factor, not by market forces").

Moreover, this error in the Option 1 methodology is self-perpetuating. As the FCC staff acknowledges, "[b]y attributing all of the residual to the capital inputs, the residual value method

¹² The Option 2 methodology also makes other necessary corrections to the Option 1 method, especially the use of dial equipment minutes in calculating the local service output index. See *Further Notice*, ¶ 31.

tends automatically to define whatever profits or losses the LECs realized during the historical period as increases or decreases in the cost of capital inputs.” *Further Notice* App. B at 46. Thus, if the X-factor were too low, the LECs would earn excess profits. Yet, under the residual value method “the Commission would conclude that the historical cost of LEC capital rose more rapidly during this period than it actually did.” *Id.* The Commission would then use that erroneous conclusion as the basis for the X-factor for the subsequent period and “thus calculate an X-factor that was still too low.” *Id.* As the FCC staff aptly notes, the result would be that the “LECs’ profits would continue to increase despite no increase in LEC productivity.” *Id.*

The Option 2 methodology removes this inherent bias. It is based on a direct calculation of the LEC cost of capital that would prevail in a competitive market. *Further Notice* App. B at 46 (“In order to correct the miscalculation of the LECs’ cost of capital in the 1997 Staff TFP study, it is necessary to replace the TFP study’s cost of capital with a competitive cost for the inputs during the historical years”). For these reasons, the Option 2 methodology is far superior to the Commission’s 1997 methodology (Option 1) for calculating the LECs’ historical total company productivity gains.

AT&T has identified a minor technical error in the staff’s calculations, and the corrections, and the explanation of those corrections, are provided in Appendix A. However, these corrections do not materially alter the staff’s conclusion that, properly computed, the actual observed X-factors, calculated on a total company basis, have averaged approximately 5.8 percent for the period 1986-95 and 6.0 percent for the period 1986-98.¹³

¹³ *Further Notice*, App. B at 65-66.

2. The Staff's Updated TFP Study Can Easily Be Modified To Provide A Reasonable Interstate-Only X-factor.

Another virtue of the Option 2 methodology is that it can easily be modified to permit the Commission to base the X-factor on estimates of productivity gains in *interstate* services, rather than total company productivity. See *USTA*, 188 F.3d at 529. As a matter of both law and policy, the X-factor should be based, if possible, on estimates of productivity gains for interstate services. *Further Notice* ¶ 37 (“interstate data [is] conceptually more appropriate for representing the services regulated by the Commission under price caps”). Indeed, courts have long recognized that the Communications Act requires the Commission to regulate the rates for interstate services on the basis of *interstate costs*. *Smith v. Illinois Bell Tel.*, 282 U.S. 133, 148, 150-51 (1930); *Crockett Telephone Co. v. FCC*, 963 F.2d 1564, 1572-73 (D.C. Cir. 1992).

The D.C. Circuit did not hold otherwise in the *USTA* case. See *USTA*, 188 F.3d at 528-29. Rather, the Court merely upheld the Commission’s determination that the record before it did not allow it to quantify the difference between interstate and total company productivity growth. The Court upheld the use of total company data solely on that basis. *Id.*

In the view of both the Commission and the D.C. Circuit, the difficulty in calculating interstate productivity growth centers on the calculation of interstate inputs. *USTA*, 188 F.3d at 528; *1997 Price Cap Order*, ¶ 107-10. As the Court noted, intrastate and interstate services are generally provided over common facilities, and in the past there have been disputes about how best to segregate the interstate inputs from the intrastate inputs. *USTA*, 188 F.3d at 528. Although these analytical difficulties are by no means insoluble,¹⁴ in 1997 the Commission found the record inadequate to make such determinations in the context of the X-factor, and the

¹⁴ See, e.g., *Smith*, 282 U.S. at 150-51 (although apportioning costs between the jurisdictions is difficult, “extreme nicety is not required”).

Court accepted that finding. As the Court acknowledged, however, the Commission had expressly “declared itself ready to consider some adjustment if it were shown that inclusion of intrastate data systematically biased the X-factor estimate downward.” *USTA*, 188 F.3d at 528 (citing *1997 Price Cap Order* ¶ 109).

As AT&T shows in Attachment A, this supposed “analytical difficulty” in calculating interstate inputs does not in fact pose any bar to calculating the X-factor for interstate services under the Commission’s TFP methodology. The Commission’s formula for calculating the X-factor properly includes both a TFP measure and an input price differential. However, it can be shown mathematically that the input price and quantity terms of the Commission’s X-factor formula largely *cancel each other out*. See Appendix A, pp. 2-5; see also *Further Notice* App. B at 27 (“most measurement errors associated with the prices of the inputs will tend to cancel out so that the impact on the productivity offset will, in general, be minimal”). This mathematical fact suggests that the X-factor can be calculated by a simpler, more direct method. Under that method, the X-factor is almost entirely a function of changes in LEC revenues and LEC outputs, as well as the economy-wide measures of productivity growth and input price changes, and can be calculated without measuring the input price and quantity components of the X-factor. Although the Commission’s TFP analysis is useful for identifying major components of the X-factor, the X-factor can be calculated directly without separately identifying each of those components.

For present purposes, then, the important point is that this more direct measure permits the Commission to calculate the interstate-only X-factor without the analytical difficulties created by the question of how to segregate out interstate inputs. Thus, the principal objection to calculating the X-factor on the basis of interstate data essentially dissolves away. Because

changes in the LECs interstate revenues and interstate outputs are easily determined, the X-factor for interstate services can be calculated just as easily.

AT&T has provided the calculations in Appendix A. As shown in that appendix, X-factors calculated under this modified Option 2 methodology average approximately 10.1 percent over the period from 1986-1995, and approximately 9.6 percent over the period 1986-1998.¹⁵

Moreover, there can be no doubt that, to use the Court's words, the "inclusion of intrastate data systematically biase[s] the X-factor estimate downward." 188 F.3d at 528. As the staff states, "[t]here is every reason to expect that productivity enhancements experienced historically in the interstate access market would be substantially greater than the overall rate of productivity growth experienced by LECs in supplying all services." *Further Notice App. B* at 26. Indeed, as the staff explains, most of the productivity gains experienced in the telecommunications industry relate to reductions in the costs of switching and transmission, which would have a disproportionate impact on the productivity of interstate services. *Id.* As a result, the staff correctly concludes that the Commission's TFP methodology "*is biased downward.*" *Id.* (emphasis added).

¹⁵ As Appendix A also shows, these estimates are conservative. The estimated X-factors for recent years become even higher when the Option 2 methodology is also modified to reflect an alternative measure of inflation. That modification uses GDPPI as an inflation factor, rather than the difference between the U.S. nonfarm business sector TFP growth rate, and the U.S. nonfarm business sector input price growth rate. With this modification, the X-factors average approximately 10.1 percent over the 1986-1995 period, and 10.0 percent over the 1986-1998 period.

Similar results are obtained when this methodology is modified to use an alternative capital cost index that is somewhat more consistent with the direct estimation methodology. As shown in Appendix A, this approach removes excess earnings from interstate revenues for 1991 through 1998, based on information concerning the LECs' cost of capital.

This downward bias is enormous. As AT&T's calculations show, the historical interstate X-factor has been substantially higher than the X-factor based on total company data – an average of about 4.5 percentage points higher over the 1986-1995 period, and 3.7 percentage points higher over the 1986-98 period. This bias translates into billions of dollars annually in excessive access charges.

Now that the “systematic[] [downward] bias[]” of the total company X-factor has been unequivocally established, there is no valid basis for continued reliance on total company data. *See, e.g., USTA*, 188 F.3d at 528-29 (reversal would have been warranted if any party had made compelling showing that total company data created a systematic downward bias in the X-factor). The Commission should therefore modify its X-factor computations accordingly.¹⁶

3. The Staff's Imputed Productivity Study Is Useful As A Means Of Confirming The Accuracy Of The TFP Studies.

The Commission also seeks comment on a different approach to calculating the X-factor (Option 3), which is designed to calculate the X-factor that “yields the aggregate revenues that would have been generated in a competitive market.” *Further Notice* ¶ 35. This “imputed X” approach is valuable as a means of supporting the Commission's results under the TFP methodology.

¹⁶ The Commission also seeks comment on whether the proposed addition of a “q” factor to the price cap formula would necessitate changes in the X-factor, and whether changes to the X-factor might obviate the need for a “q” factor. *See Further Notice*, ¶ 49. If the Commission adopts a X-factor based on interstate data that adequately reflects the growth in interstate access minutes, as explained above, then a “q” factor would be unnecessary. If the Commission continues to determine the X-factor based on total company data, however, a “q” factor would be necessary, and certain adjustments to the X-factor may be warranted. For a fuller discussion, *see Access Charge Reform*, CC Docket Nos. 96-262 et al., AT&T Reply Comments on LEC Pricing Flexibility FNPRM, pp. 13-19 (filed November 29, 1999).

Indeed, as the Commission notes, the imputed X approach is very similar to the approach that AT&T proposed in 1995 in the original LEC Price Cap Performance Review proceeding. *Further Notice*, ¶ 38. AT&T continues to believe that the imputed X approach has substantial merit. As the Commission notes, the objections in 1995 to AT&T's "Historical Revenue Approach" went to the data that AT&T used, and not to the imputed X approach itself. *Further Notice* ¶ 39. Moreover, the imputed X approach has many advantages. It is inherently a measure of productivity gains in interstate services, rather than total company services. And, although it is not easier to administer than the "direct" TFP approach outlined above, it is somewhat easier to administer than the traditional TFP approach. *Further Notice* ¶ 35.

Despite the strengths of the Option 3 approach, AT&T does not believe the Commission should adopt an entirely new methodology for calculating X-factors in this proceeding. Instead, the best use for the imputed X approach at this time is as further support for the results derived from the Option 2 TFP approach, modified to reflect interstate rather than total company data. AT&T has made some corrections to the calculations contained in Appendix C of the *Further Notice*; those calculations, with an explanation of the corrections, are set forth in Appendix B. Those results are similar to the results under the TFP methodology (corrected to estimate interstate productivity only), and confirm that the X-factor has been grossly understated in previous years.

B. Based On The Modified Option 2 Methodology, The Commission Should Set The Historical Component Of The X-factor For The Remand Period (1997-2000) at 10.1 Percent.

Having established that the Commission should use the modified Option 2 methodology described above to calculate the LECs' historical productivity growth during the 1986-98 period, the next question is how to derive from these calculations X-factors to be used during the remand period (1997-2000) and prospectively. The D.C. Circuit's criticisms of the *1997 Price Cap*

Order were directed principally to this stage of the analysis. As shown below, however, the court's objections can easily be met by using the same "rolling average" methodology used by the Commission in that order, but without giving preference to any particular averages.

In 1997, the Commission determined the historical component of the X-factor in the following manner. First, the Commission used the Option 1 TFP methodology to calculate productivity growth for each year from 1986 through 1995. The Commission then constructed six "rolling averages" of these results, covering the periods 1986-95, 1987-95, 1988-95, 1989-95, 1990-95, and 1991-95. The Commission used rolling averages because of its desire to place somewhat greater weight on more recent years, which would likely be more representative of the LECs' current and potential productivity potential. The D.C. Circuit did not question either this general methodology or the Commission's rationale for it. *See USTA*, 188 F.3d at 524-26.

The final step in the Commission's analysis, however, was its decision to select the historical component of the X-factor from the high end of the range of rolling averages, rather than simply taking the mean or the median. The Commission gave three reasons for doing so, all of which were rejected by the D.C. Circuit. First, the Commission noted that four of the six averages were clustered at the top end of the range around 6.0 percent, and it decided to give less weight to the two lowest averages. The Court, however, found that the Commission had not given any statistically valid reason for discounting those two averages. *USTA*, 188 F.3d at 525-26. Second, the Commission found that there had been an upward trend in the X-factor in recent years. The Court, however, held that the Commission had not adequately explained either the trend itself, or why it could be expected to continue. *Id.* at 526. Third, the FCC gave "some weight" to AT&T's X-factor estimates as a confirmation of the Commission's choice. But the Court, mistakenly thinking that the Commission had rejected AT&T's study altogether, found that such a use of the AT&T estimate "appear[ed] irrational." *Id.* at 526.

To respond to the Court's remand, the Commission should therefore re-estimate the X-factor for the remand period as follows:

(1) Recalculate the X-factor for each year from 1986 through 1995 using the modified TFP methodology embodied in Option 2, further modified as explained above to estimate productivity growth in interstate services only;

(2) Calculate new rolling averages for the same sets of years that the Commission relied on in the *1997 Price Cap Order* (i.e., the average X-factor for the periods 1986-1995, 1987-1995, 1988-1995, 1989-1995, 1990-1995, and 1991-1995);

(3) Calculate the median of those six numbers. Basing the historical component of the X-factor on the median of the averages obviates the concerns expressed by the D.C. Circuit in *USTA*, 188 F.3d at 525-26. Indeed, the LEC petitioners argued to the Court that the Commission should have taken the median of the averages. *USTA v. FCC*, Nos. 97-1469 et al., Reply Brief for Local Exchange Carrier Petitioners, p. 8 ("if one truly fears that outliers may skew the results, the standard statistical solution is to calculate the median of the data set").

AT&T has set forth these calculations in detail in Appendix A. The six rolling averages, and the mean and median of the set, are as follows:

1986-95	10.057
1987-95	9.886
1988-95	9.835
1989-95	10.156
1990-95	10.826
1991-95	10.103
Mean:	10.144
Median:	10.080

When the mean and the median are rounded to the nearest tenth of a percent, they both become 10.1 percent. Therefore, the Commission should set the historical component of the X-factor for the remand period at 10.1 percent.

C. The Commission Should Set The Historical Component OF The X-factor For 2000 Forward At 9.5 Percent.

The Commission also seeks comment on whether it “should prescribe an X-factor that would apply as of July 1, 2000 that is different from the retrospective X-factor applicable to the period affected by the court’s remand.” *Further Notice* ¶ 46. Because the Commission now has data for the years 1996-98, it should use those data to estimate a new historical component of the X-factor that would apply on a going-forward basis.

Accordingly, to calculate that X-factor for the post-2000 period, the Commission should use the modified Option 2 methodology described above, but it should add the 1996-98 data to each of the rolling averages. This is appropriate because it continues to give greater weight to data from the more recent years governed by price caps. *See Further Notice* ¶ 33 (seeking comment on whether the Commission should continue to give more weight to more recent years). AT&T sets forth these calculations in Appendix A. The six rolling averages, and the median and mean of the set, are as follows:

1986-98	9.649
1987-98	9.488
1988-98	9.413
1989-98	9.596
1990-98	9.981
1991-98	9.423
Mean:	9.592

Median: 9.542

Rounding the mean to the nearest tenth of a percent yields 9.6 percent, but rounding the median to the nearest tenth of a percent yields 9.5 percent. Accordingly, taking the lower of these two amounts (and consistent with the LECs' arguments to the Court), the Commission should prescribe a new historical component of the X-factor of 9.5 percent, applicable from July 1, 2000 forward.

D. The Commission Has Ample Discretion To Use This Methodology To Establish The X-factor Governing Both The Remand Period And Future Periods.

In the *Further Notice*, the Commission also seeks comment on whether it "should use only the results from the 1997 staff TFP study in setting the historical component of the X-factor for the remand period," and whether the Commission is "precluded from revising the X-factor using any other methodology, or from supplementing the data in the 1997 staff TFP study." *Further Notice*, ¶ 24.¹⁷ The short answer is that the Commission has ample authority to consider new data and to develop new methodologies when prescribing an X-factor for the remand period, as well as for the future.

This is clearly established by, among others, the D.C. Circuit's decision in *Eastern Carolinas Broadcasting Co. v. FCC*, 762 F.2d 95, 98-104 (D.C. Cir. 1985) ("*Eastern Carolinas*"). There, the court expressly recognized the Commission's long-standing policy of allowing parties to submit updated data concerning remanded issues, and to make new

¹⁷ See also *Further Notice*, ¶ 34 (seeking comment on "whether additional years of data should be considered in the remand, or whether the X-factor [the Commission] select[s] should rely on the same years of data as used in the *1997 Price Cap Review Order*," and whether it would be "more responsive to the court's remand to prescribe an X-factor based on data available in 1997 or to consider the additional data that has become available in the interim in setting the X-factor on a going-forward basis.").

determinations based on those data.¹⁸ In that same decision, the court noted the Commission's decision in *United Community Antenna Systems*, 67 F.C.C.2d 1376 (1978), where, on remand from *KIRO, Inc. v. FCC*, 545 F.2d 204 (D.C. Cir. 1976), the Commission expressly requested updated data because it had "determined that it could not adequately explain its earlier decision without soliciting further comments and evidence from the parties." *Eastern Carolinas*, 762 F.2d at 99-100. In that case, the Commission held that "[I]t is essential in this case -- involving as it does a shifting of burdens between broadcasters and cable operators -- that the data forming the basis of our decision be *current and complete*. Since some of the data in the record are more than four years old, any ruling . . . should be made only after *updated data* are obtained." *United Community*, 67 F.C.C.2d at 1382 (emphasis added).¹⁹

This proceeding presents a similar situation in which updated data are not only permitted, but required. As in *United Cable*, this case involves a "shifting of burdens" between two major

¹⁸ 762 F.2d at 99 (citing *WSTE-TV, Inc.*, 75 F.C.C.2d 52, 53 n. 1 (1979) ("We shall grant all three unopposed requests to accept additional pleadings [after remand]. Good cause exists for acceptance of the pleadings inasmuch as they focus on the Commission's most recent views concerning the use of translator stations, a subject central to this proceeding upon remand."); *Lebanon Valley Radio, Inc.*, 50 F.C.C.2d 383, 384 (1974) ("We believe that the Court's opinion raises significant questions which have not heretofore been adequately addressed. Our deliberation on these questions will be enhanced by limited further participation of the parties."); *WAIT Radio*, 22 F.C.C.2d 934, 934 (1970) ("The court . . . directed the Commission to give the merits of the proposal a hard look and ' . . . state its basis for decision with greater care and clarity than was manifested on its disposition of WAIT's claims.' In line with that decision, this Commission invited any new evidence the parties might wish to submit."), *aff'd*, 459 F.2d 1203 (D.C. Cir.), *cert. denied*, 409 U.S. 1027, 93 S.Ct. 461, 34 L.Ed.2d 321 (1972); *American Television Relay, Inc.*, 95 F.C.C.2d 1089, 1089-90 (1983); *KDAB, Inc.*, 91 F.C.C.2d 277, 278-79 (1982); *Charles Jobbins*, 68 F.C.C.2d 46 (1978); *Gale Broadcasting, Inc.*, 19 F.C.C.2d 622, 623 (1969)).

¹⁹ The Court in *Eastern Carolinas* further recognized that although the "Commission has [occasionally] declined to consider additional arguments after remand, it has clearly done so [only] as an exercise of agency discretion after determining that the existing record enabled it to dispose of the remanded issue." *Eastern Carolinas*, 762 F.2d at 100.

Spectrum for and to Establish Other Rules and Policies Pertaining to the Use of Radio Frequencies in a Land Mobile Satellite Service for the Provision of Various Common Carrier Services, 7 FCC RCd. 266, ¶ 28 & n.68 (1992) (“*Spectrum Order*”) (citing *Eastern Carolinas*, 762 F.2d at 101 & n.8). Indeed, in light of the Commission’s recognition that “the 1997 staff TFP study methodology may fail to calculate an X-factor that is consistent with the objectives of [the Commission’s] price cap plan” (*Further Notice* ¶ 28), failure to consider new evidence or methodologies could itself provide a basis for reversal. See, e.g., *Eastern Carolinas*, 762 F.2d at 103-04 (the Commission’s refusal to consider relevant new data would have provided a “compelling” basis for reversal if the Commission had not had a separate, independent basis for rejecting the petitioner’s claim).

Nor does the D.C. Circuit’s remand decision preclude the Commission from considering new data or developing new methodologies to prescribe an X-factor for the remand period. The Court merely remanded the case to the FCC “for further explanation.” *USTA*, 188 F.3d at 526. As the Commission has previously recognized, this “language enables the Commission to examine in this rulemaking proceeding any public interest considerations that are relevant to the specific issues remanded by the court.” *Spectrum Order*, ¶ 28; see also *Eastern Carolinas*, 762 F.2d at 97, 101 n.8 (the Court’s remand order “for an explanation” of the Commission’s decision “simply cannot be read to foreclose the possibility of post-remand submissions”). In this case, that principle would obviously include a consideration of the relevance of updated data and the superiority of alternative methods of establishing the X-factor. Indeed, it would be entirely perverse and “contrary to the [Commission’s] obligations under the Communications Act” for the Commission to read the Court’s remand order as requiring blind adherence to outdated data and a flawed X-factor methodology. *Spectrum Order*, ¶ 29; see also *id.* ¶ 29 n.69 (an “inflexible

interpretation of Section 402(h) . . . could easily lead to absurd results which would deserve the public interest”).

II. THE COMMISSION SHOULD ADOPT A CONSUMER PRODUCTIVITY DIVIDEND OF AT LEAST 1.1 PERCENT.

The Commission should also adopt a CPD of 1.1 percent. As the Commission is aware, the D.C. Circuit remanded the Commission’s decision to retain the CPD solely on the ground that the Commission failed to explain its “choice of the amount -- 0.5%.” *USTA*, 188 F.3d at 527. As the Court observed, the LEC petitioners did not dispute the FCC’s underlying rationale, namely, that retention of the CPD in some amount was appropriate because the FCC’s newly adopted rule eliminating all sharing requirements would increase the price cap LECs’ productivity in the future. *Id.* Because there is no dispute about the Commission’s *reason* for retaining the CPD, the only legitimate question on remand is the level at which the CPD should be set to reflect the impact of this change on the LECs’ productivity.

To set the CPD at that level, the Commission must determine a reasonable estimate of the difference between the LECs’ potential productivity gains in a sharing regime and the LECs’ potential productivity gains in a non-sharing regime. As explained more fully in Appendix C, there are several possible approaches to calculating this difference, and all of them point toward a CPD of at least 1.1 percent.

One means of calculating the CPD can be derived from the multiple studies in the record that establish that the elimination of the sharing mechanism is likely to have dramatic effects on LEC productivity. The Commission specifically cites two such studies in the record -- one performed by Strategic Policy Research (“SPR”) on behalf of Southwestern Bell, and the other sponsored by the Ad Hoc Telecommunications Users Committee (“Ad Hoc”). *Further Notice* ¶ 44. These studies show that the imposition of sharing suppresses the LECs’ efficiency incentives

and, conversely, that the complete elimination of sharing would substantially increase the LECs' productivity.

To be sure, neither study attempts to measure directly the impact on productivity of the elimination of sharing. However, a rough estimate of that impact can be derived from the SPR study, combined with other data on the effect of the change from rate-of-return to price-cap regulation.

Specifically, the SPR study shows that the change from a price cap system with sharing to one without sharing should ultimately produce a much larger productivity increase -- about three times as much -- as the change from the rate-of-return system to price caps with sharing. See Appendix C (giving detailed explanation). The next task, then, is to estimate the productivity impact of the change from rate-of-return regulation to the 1990 price-cap system.

The most obvious estimate of this quantity is the Commission's original estimate of a 0.5 percent CPD when it established the price cap system. The Commission set the CPD at that level because it believed that the change from a rate-of-return system to the new price-cap system (even with sharing) would increase the LECs' productivity by at least that amount.²² Inasmuch as no party has challenged the Commission's original conclusion that moving from rate of return regulation to price caps (with sharing) would increase LEC productivity by at least 0.5 percent a year, the Commission can rely on that figure to establish a new CPD here.²³ The SPR model

²² *LEC Price Cap Order*, ¶¶ 74-102.

²³ *National Rural Telecom Ass'n. v. FCC*, 988 F.2d 174 (D.C. Cir. 1993) (upholding original order establishing price caps for interstate access services).

predicts that the change from the sharing system to a no-sharing system should produce productivity gains of about three times that amount -- *i.e.*, 1.5 percent.²⁴

Other sources suggest that an even higher CPD is appropriate. For example, in the Commission staff's TFP study (the Option 2 study) the average X-factor on a total company basis for 1986-1990 (prior to price caps) is approximately 5.5 percent, whereas the average X-factor for 1991-95 (after the 1990 price cap system was implemented) is approximately 6.1 percent -- a difference of 0.6 percent.²⁵ Thus, the SPR study suggests that the ultimate productivity gains from changing from a system with sharing to a system without sharing should be three times that difference -- *i.e.*, 1.8 percent.

This analysis can also be further refined to give a more accurate picture of the impact of the change in regulatory systems by isolating the impact of those changes on LEC productivity, and by using interstate data. As shown in Table A-9 of Appendix A, differential TFP growth (the best measure of LEC productivity growth compared with the economy as a whole) increased from 7.13 percent for the period 1986-1990, to 7.89 percent for the period 1991-95, a difference of 0.66 percent. Applying the SPR model (and rounding up to the nearest tenth of a percent) thus

²⁴ Although the revision of the SPR model suggested by Ad Hoc (and alluded to in the *Further Notice*) does not permit a similar calculation of the effect of eliminating sharing, that revision appears consistent with this conclusion. Indeed, the Ad Hoc study is quite similar to the SPR study, except that it assumes that, even without price regulation, the gains from efficiency enhancements are "transitory" rather than permanent, as in the SPR study. As a result of this assumption, Ad Hoc calculates that a price cap plan with 50/50 sharing would produce 45 percent of the efficiency incentives that full competition would produce, and that a pure price cap plan would produce about 86 percent of those efficiency incentives. See Reply Comments of the Ad Hoc Telecommunications Users Committee, CC Docket No. 94-1 (June 29, 1994) at 16. Although the predicted incentives are higher in absolute terms, the relationship between them is approximately the same as in the SPR study, so the impact of moving from one system to the other should be about the same as well.

²⁵ *Further Notice*, App. B, Table B-12.

suggests that the CPD going forward would be 2.0 percent. The Commission staff's results based on total company data, also shown on Table A-9, exhibit a similar pattern.²⁶

Another alternative is to rely on the LECs' own apparent valuations of the efficiency impact of the sharing mechanism. In the Commission's *1995 Price Cap Review Order* (§ 214), the FCC gave the price cap LECs three alternatives for selecting the X-factor: a minimum X-factor of 4.0 percent with full sharing requirements, a 4.7 percent factor with a less restrictive sharing mechanism, and a 5.3 percent factor with no sharing requirement. These alternatives were available to the LECs for their tariff filings on July 1, 1995. Significantly, the vast majority of the price cap LECs chose the 5.3 percent X-factor with its no-sharing condition: Five of the seven RBOCs elected the highest (5.3 percent) X-factor in return for the elimination of sharing, and most of the non-RBOC price cap LECs also chose the 5.3 percent/no sharing alternative.²⁷ Thus, most of the price cap LECs were willing to pay for the elimination of sharing by increasing their individual X-factor by 130 basis points.

This valuation by the price cap LECs themselves is strong evidence of the *minimum* increase in productivity that could be expected from the elimination of sharing. In other words, the LECs' own actions show that they believed that could achieve additional

²⁶ The staff's imputed X Study (Appendix C of the *Further Notice*) provides further corroborating evidence. That study calculates the X-factors required in each year to maintain the LECs' average rate of return at the level of the previous year (as shown in Table C-4 of that study). These calculations show an average X factor of 7.66 for the years 1996 to 1998 – more than two percentage points higher than the 5.59 average computed for 1992 to 1995.

²⁷ The five RBOCs selecting the 5.3 percent X-factor were Ameritech, Bell Atlantic, BellSouth, PacTel, and Southwestern Bell. See *Fourth Further Notice of Proposed Rulemaking, Price Cap Performance Review of Local Exchange Carriers*, 10 FCC Rcd. 13659, ¶ 8 n.17 (1995). The non-RBOC carriers selecting the 5.3 percent X-factor were United, Rochester, Lincoln, and GTE (38 out of 46 study areas). *Id.*

productivity gains in a no-sharing regime that would *more* than offset an additional 1.3 percent in the X-factor.

The final step in the analysis is to compute a CPD that can appropriately be added to the historical component of the X-factor. That step is arguably complicated by the fact that the historical component already reflects some years in which the LECs had no sharing obligations (either by election or by rule). Thus, the historical component may already reflect some of the efficiency gains associated with the elimination of sharing. As explained in Appendix C, however, any possibility of double counting can be eliminated by calculating the extent to which the historical component already reflects those gains, and then subtracting that amount from the amount by which the elimination of sharing is expected to increase realized X-factors in the future. When this procedure is applied to the most conservative estimate generated by the SPR model (i.e., based on the 0.5 percent CPD originally adopted by the Commission), the 1.5 percent estimate is reduced by an adjustment of 0.4 percent, for a CPD of 1.1 percent.²⁸

III. THE COMMISSION SHOULD REINITIALIZE THE PRICE CAPS TO CORRECT FOR PRIOR YEARS WHEN THE X-FACTOR WAS SET TOO LOW.

Finally, the Commission seeks comment on “whether a CPD should be included to reduce rates and correct for prior years when the X-factor may have been set too low.” *Further Notice* ¶ 45. The answer is a qualified “yes.” As explained above, the CPD itself should be used solely to compensate consumers for additional future productivity gains that are not captured in the historical measure of productivity gains. The CPD has never been used to correct past mistakes, and it should not be used for that purpose now.

²⁸ For the sake of simplicity, the Commission should apply that 1.1 percent CPD to future periods as well as to the remand period, even though a higher CPD would be justified for that period.

The Commission, however, *should* do something that is equivalent, at least in principle, to using the CPD to prevent past underestimations of the X-factor from continuing to affect (indeed, infect) the price cap indices in the future. That is to reinitialize the price caps and set them where they would have been if the historical X-factor had been 10.1 percent during the period 1995-2000, with a CPD of 1.1 percent during the period 1997-2000, after sharing was eliminated. In both of the Commission's previous price cap performance review proceedings, the Commission has reinitialized the caps to prevent earlier errors in the estimation of the X-factor from affecting future periods. In both cases, the Commission's reinitialization was upheld by the D.C. Circuit. *Bell Atlantic Tel. Cos. v. FCC*, 79 F.3d 1195 (D.C. Cir. 1996); *USTA*, 188 F.3d at 529-30.

Moreover, the Commission acknowledges again in the *Further Notice* that errors in the estimation of the X-factor are not self-correcting, but continue to infect the price cap system and "may cause increasingly erroneous prices over time." *Further Notice* ¶ 45. As shown above, that is certainly true here. The Commission should give consumers relief that is as complete as possible given the prohibition on retroactive ratemaking. Accordingly, the Commission should reinitialize the price caps in this proceeding as well.

CONCLUSION

For the reasons stated above, the Commission should prescribe historical X-factors of 10.1 and 9.5 percent for the remand and future periods, respectively; a CPD of 1.1 percent; and complete reinitialization.

Respectfully submitted,

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Appendix A
DIRECT CALCULATION OF INTERSTATE-ONLY X-FACTORS
BASED ON OPTION 2 METHODOLOGY

Stephen Friedlander, AT&T

This appendix sets forth a method for calculating the X-factor that is based solely on interstate data and that uses a more direct, simplified version of the Commission staff's total factor productivity (TFP) formula (Option 2). In this simplified, or "direct," method, the X-factor is calculated on the basis of the growth rates for LEC output and LEC revenue, as well as the economy-wide measures of productivity growth and input price changes. The Commission should use this "direct" method to generate interstate-only X-factors.

In the latter half of this appendix, AT&T also suggests a method to simplify the Commission's calculations further by replacing the series on economy-wide input price and TFP growth rates with growth rates for the GDP price index. Then AT&T sets forth an alternative method of adjusting the Commission's TFP formula for excess LEC earnings. This alternative method removes excess earnings from interstate revenues for 1991 through 1998, based on AT&T's estimate of the LECs' cost of capital.

In the final section, AT&T identifies and corrects a minor technical error in the Commission's spreadsheet calculations.

Based on this analysis, X-factors are calculated on the basis of interstate output and revenue, with average X-factors ranging from 9.5% to 11.6% for the periods 1986-1995 and 1986-1998. As explained herein, these X-factors reflect the extent to which changes in the LECs' unit costs have been less than the level of inflation and thereby serve to promote the Commission's objective of ensuring "that ongoing gains by the LECs in reducing unit costs are passed through to consumers."¹

Background

AT&T and other parties have long maintained that the X-factor should be determined on the basis of interstate data. The Commission appears to be in general agreement with this proposition, noting that interstate data is "conceptually more appropriate for representing the services regulated by the Commission under price caps" (*Further Notice* at 37). The Commission staff also observes that "[t]here is every reason to expect that productivity enhancements experienced historically in the interstate access market would be substantially greater than the overall rate of productivity growth experienced by the LECs in supplying all services." *Further Notice*, App. B at 26. Thus, the Commission staff's inescapable conclusion is "that TFP_{LEC} in interstate services has grown faster than company-wide (regulated) TFP_{LEC} " and "the average measure of TFP_{LEC} used in setting X and which should properly reflect productivity growth in the interstate

¹ FCC, *Fourth Further Notice of Proposed Rulemaking in CC Docket No. 94-1*, Sept. 27, 1995, Paragraph 16.

access market is biased downwards.” *Further Notice*, App. B at 26. This conclusion is confirmed by the results of the Commission’s imputed X study (*Further Notice*, App. C), in which X-factors based on interstate data range from 6.61% to 7.71% – significantly higher than the total company X-factors obtained from the TFP study.

Despite these findings, the staff has continued to use total company data in its recent TFP study “because of the difficulty of separating interstate and intrastate costs for the TFP calculations” (*Further Notice* at 37). Indeed, the Commission has long maintained that the difficulty in calculating an X-factor based on interstate-only TFP growth is quantifying the amount of inputs used to provide interstate services. As shown below, the “direct” method of calculating the X-factor eliminates this problem. Under the direct method, the X-factor is calculated on the basis of output and revenue growth, without separately calculating the TFP and input price components of the X-factor.²

This approach has many advantages. It makes calculating an interstate-only X-factor a simple matter, because measurement of LEC interstate outputs and LEC interstate revenues is easy. It properly focuses attention on those variables that actually determine the historical X-factor and eliminates the complex calculations needed to develop indices that have no real bearing on the results. Moreover, limiting the analysis to interstate services produces an X-Factor that is more appropriate for regulating these interstate services. It also has the virtue of avoiding the complications inherent in measuring output of other, non-interstate LEC services. Most of the LECs’ interstate output consists of wholesale access services provided to other carriers, which are more conducive to measurement in terms of relatively simple physical units.

Derivation of the Direct Method

We can derive a formula for calculating X-factors directly by examining the components of the Commission’s X-factor model. In the Commission’s TFP studies, the historically justified X-factor is calculated according to the following formula (*Further Notice*, App. B at 44):

$$(1) \quad X = (\% \Delta TFP_{LEC} - \% \Delta TFP_{US}) + (\% \Delta IP_{US} - \% \Delta IP_{LEC}),$$

where the X-factor is expressed in terms of two components: the historical growth in LEC productivity ($\% \Delta TFP_{LEC}$) relative to that of the entire U.S. economy ($\% \Delta TFP_{US}$), and the historical trend in LEC input prices ($\% \Delta IP_{LEC}$) relative to input prices for the entire economy ($\% \Delta IP_{US}$). Growth in TFP is defined as growth in an index of total outputs (Q) minus growth in an index of total inputs (N), so that equation (1) can be written as:

$$(2) \quad X = (\% \Delta Q_{LEC} - \% \Delta N_{LEC} - \% \Delta TFP_{US}) + (\% \Delta IP_{US} - \% \Delta IP_{LEC})$$

² This analysis was first presented in the paper “The Use of Productivity Studies in Price Cap Regulation: What do the FCC’s X-factor Calculations Really Measure?” Stephen Friedlander, 18th Annual Conference of the Center for Research in Regulated Industries, Rutgers University, May 27, 1999.

$$X = \% \Delta Q_{LEC} - (\% \Delta N_{LEC} + \% \Delta IP_{LEC}) - \% \Delta TFP_{US} + \% \Delta IP_{US}$$

The term in parentheses ($\% \Delta N_{LEC} + \% \Delta IP_{LEC}$) represents growth in LEC input costs or growth in factor payments. In the Commission's 1997 TFP study, this term is exactly equal to growth in total revenues. In the 1999 TFP study, it is approximately equal to growth in revenues adjusted for excess LEC earnings and excess employee benefits. This can be shown by examining how the input price and quantity indexes are developed.

The input quantity index (N) consists of a chained Fisher Ideal Index comprised of three factors: labor measured in terms of number of employees; materials measured in terms of materials expense deflated by a materials price index; and a capital stock based on the Perpetual Inventory Model. The growth in this index can be expressed as:

$$(3) \quad \% \Delta N_{LEC} = W1 * (\% \Delta NEM) + W2 * (\% \Delta (MAT/MATP)) + W3 * (\% \Delta K),$$

where:

N_{LEC} = index of total LEC inputs

NEM = number of employees

MAT = materials expense

$MATP$ = materials price index

K = capital stock

$W1, W2, W3$ = payments to each factor as a fraction of total factor payments.

The input price index is also a chained Fisher Ideal Index, with the price of labor measured in terms of average compensation per employee, the price of materials measured by the materials price index, and the price of a unit of capital measured as "property income" divided by the capital stock. Growth in the input price index is given by:

$$(4) \quad \% \Delta IP_{LEC} = W1 * [\% \Delta (TCOMP/NEM)] + W2 * [\% \Delta MATP] + W3 * [\% \Delta (PINC/K)],$$

where:

$TCOMP$ = total compensation

$PINC$ = property income

K = capital stock.

Note that several items that appear in the denominators of the terms in one index appear in the numerators of the other index. When equations (3) and (4) are added together, these terms effectively "cancel out":

$$\begin{aligned} \% \Delta N_{LEC} + \% \Delta IP_{LEC} &= W1 * (\% \Delta NEM + \% \Delta TCOMP - \% \Delta NEM) \\ &+ W2 * (\% \Delta MAT - \% \Delta MATP + \% \Delta MATP) + W3 * (\% \Delta K + \% \Delta PINC - \% \Delta K).^3 \end{aligned}$$

³ With growth rates expressed in terms of logarithmic first differences, the growth rate of a ratio (A/B) is equal to growth in the numerator (A) minus growth in the denominator (B).

$$(5) \quad \% \Delta N_{LEC} + \% \Delta IP_{LEC} = W1 * (\% \Delta TCOMP) + W2 * (\% \Delta MAT) + W3 * (\% \Delta PINC).$$

The growth in LEC inputs plus growth in input prices can thus be expressed as a weighted average of the growth rates of the payments to each factor. Similarly, the growth in total factor payments (TCOMP+MAT+PINC) can be expressed as a weighted average of the growth rates for each of its components, using the same revenue weights as above:

$$\% \Delta (TCOMP+MAT+PINC) = W1 * (\% \Delta TCOMP) + W2 * (\% \Delta MAT) + W3 * (\% \Delta PINC).$$

The growth in LEC inputs plus growth in input prices is thus equal to the growth in total factor payments.

In the 1997 TFP study, total factor payments equal total revenues because of the way property income is defined -- as total revenue *minus* compensation *minus* materials expense. In the 1999 TFP study, excess earnings are removed from property income, while excess benefits are removed from employee compensation. Total factor payments are thus equal to total revenues minus these adjustments, and the following equality holds:

$$(6) \quad \% \Delta REV_{LEC} = \% \Delta N_{LEC} + \% \Delta IP_{LEC},$$

where REV refers to LEC revenue and reflects whatever adjustments are made in the analysis. Substituting (6) into (2) shows that the X-factor can be calculated as:

$$(7) \quad X = \% \Delta Q_{LEC} - \% \Delta REV_{LEC} - \% \Delta TFP_{US} + \% \Delta IP_{US}.$$

The 1999 TFP study differs slightly from the 1997 study in its measurement of the capital quantity index. The capital quantity index in the 1997 study is based on the computed capital stock as of the end of the prior year. Since the capital price index - based on property income divided by the capital stock - is also calculated with respect to the prior year's capital stock, the capital stock numbers cancel out when the capital price and quantity indexes are combined. In the 1999 study, on the other hand, the capital quantity index is based on the computed capital stock for the current year, while the capital price index is calculated with respect to the prior year's capital stock. (It is not clear from Appendix B in the *Further Notice* whether this difference is intentional.) When the two indexes are combined, the capital stock numbers do not cancel out. That is,

$$(5') \quad \% \Delta N_{LEC} + \% \Delta IP_{LEC} = W1 * (\% \Delta TCOMP) + W2 * (\% \Delta MAT) \\ + W3 * [\% \Delta PINC + \% \Delta K(t) - \% \Delta K(t-1)],$$

and the X-factor is calculated as:

$$(8) \quad X = \% \Delta Q_{LEC} - \% \Delta REV_{LEC} - W3 * [\% \Delta K(t) - \% \Delta K(t-1)] - \% \Delta TFP_{US} + \% \Delta IP_{US}$$

As a result, direct calculation of the X-factor based on equation (7), yields numbers that differ slightly from the Commission's calculation, which is equivalent to equation (8). The differences can be fairly significant for individual years, but tend to average out over longer periods. For the 1991-98 period, for instance, the two calculations yield very similar results for total company X-factors: 6.336% using the direct calculation versus 6.334% with the FCC's calculation.

The implications of this analysis are clear. X-factors applicable to the LECs' interstate access services can be calculated directly on the basis of interstate output and interstate revenue using equation (7). There is no need to measure explicitly interstate inputs or interstate productivity. The principal difficulty in calculating an interstate-only X-factor dissolves away.

Indeed, the Commission staff has all but acknowledged these facts, by finding that "most measurement errors associated with the prices of the inputs will tend to cancel out so that the impact on the productivity offset will, in general, be minimal" (*Further Notice*, App. B at 27) and that "increasing (decreasing) the price of one of the factor inputs will lower (raise) TFP_{LEC} but it will reduce (raise) the input price differential resulting in little net change in X" (*Further Notice*, App. B at 31).⁴ Equation (5) shows that input prices and input quantities both "cancel out" when calculating the X-factor. The X-factor can thus be calculated directly without developing input price and quantity indexes.

Measurement of Inflation in the Commission's Study

AT&T also sets forth here an alternative method for accounting for inflation in the Commission's TFP methodology. A major objective in the TFP study is to determine "the expected amount that national output prices grow faster than industry input prices" (p. 42). In the Commission's X-factor equation (equation (26) or (27) in Appendix B), the change in output prices in the economy as a whole is represented by the change in U.S. input prices ($\% \Delta IP_{US}$) minus the change in U.S. productivity ($\% \Delta TFP_{US}$). That is, changes in economy-wide input prices and productivity act as a surrogate for economy-wide inflation in the X-factor equation.

There is no reason, however, why economy-wide inflation cannot be measured directly by using the GDP price index in place of the terms ($-\% \Delta TFP_{US} + \% \Delta IP_{US}$) in equations (26) and (27).⁵ Although output prices in the economy tend to be a function of input prices and productivity (at least in theory), it turns out that historical growth in the GDP price index has been somewhat greater than growth in U.S. input prices minus growth in U.S. productivity, particularly in recent years since 1995. Since the price cap rules utilize changes in the GDP price index (GDP-PI) to adjust rate levels, it is more

⁴ The Commission staff apparently intended to say "raise (lower) TFP" rather than "lower (raise) TFP."

⁵ Data on U.S. input prices and productivity may be useful for comparing the trends in LEC input prices and productivity to economy-wide trends, but these data are not needed for the purpose of calculating the X-factor.

appropriate to compare the trend in LEC input costs to the trend in GDP-PI. Equation (7) then becomes:

$$(9) \quad X = \% \Delta Q_{\text{LEC}} - \% \Delta \text{REV}_{\text{LEC}} + \% \Delta \text{GDP-PI},$$

which can also be written as:

$$(9') \quad X = \% \Delta \text{GDP-PI} - \% \Delta (\text{REV}_{\text{LEC}} / Q_{\text{LEC}}).$$

With excess earnings removed from LEC revenues, REV_{LEC} represents total LEC costs (i.e., factor payments) and the term $(\text{REV}_{\text{LEC}} / Q_{\text{LEC}})$ represents costs per unit of output. The X-factor is thus equal to the difference between the inflation rate and the trend in unit costs. Use of equation (9) to calculate the historically justified X-factor is fully consistent with the criteria established by the Commission in this proceeding:

“First, the X-Factor should be economically meaningful. That is, it should provide a reliable measure of the extent to which changes in the LECs’ unit costs have been less than the level of inflation. Second, the X-Factor should ensure that ongoing gains by the LECs in reducing unit costs are passed through to consumers. Third, calculation of the productivity offset should be reasonably simple and based on accessible and verifiable data.”⁶

By measuring the extent to which changes in the LECs’ unit costs have been less than the level of inflation, use of equation (9) or (9’) clearly promotes the Commission’s objective of ensuring “that ongoing gains by the LECs in reducing unit costs are passed through to consumers.” It also satisfies the criterion of using “accessible and verifiable data,” since use of the GDP price index as a benchmark avoids the need to forecast the last year of U.S. productivity growth, for which 1998 data is not yet available.

Cost of Capital Adjustment

In order to use equations (7) or (9) to calculate interstate X-factors, the revenue data needs to be adjusted to remove earnings in excess of the LECs’ cost of capital. The accompanying charts set forth AT&T’s calculations based on the Commission staff’s proposed cost of capital adjustment, as well as separate calculations based on AT&T’s alternative cost of capital adjustment.

The first approach uses the Commission’s adjustments for excess earnings and excess employee benefits. As shown on the right-hand side of Table A-1, “Adjusted total factor payments,” as calculated by the Commission in Table B-10, are divided by total revenue in Table A-1. (Table A-1 is a modified version of staff’s Table B-2.) The resulting ratio is then applied to interstate service revenue to obtain interstate revenue adjusted for excess earnings and employee benefits. These calculations have the effect of

⁶ FCC, *Fourth Further Notice of Proposed Rulemaking in CC Docket No. 94-1*, Sept. 27, 1995, Paragraph 16.

reducing interstate revenue by the same percentage as total revenue is reduced by the Commission's adjustments.

In order to confirm the reasonableness of these calculations, AT&T constructed an alternative methodology. The second approach removes excess earnings from interstate revenues for 1991 through 1998, based on AT&T's estimate of the LECs' cost of capital.

For 1998, an 8.63% rate of return on average net investment is used to represent the LECs' cost of capital. This figure represents the mid-point estimate of the RBOCs' weighted average cost of capital as of December 1997, as reported in AT&T's recent submission in Docket 98-166.⁷ The 8.63% figure is very close to the competitive rates of return for 1998 used by the Commission in its imputed X study (*Further Notice*, Appendix C), which consist of 8.68% for all LECs and 8.66% for the RBOCs.

The 11.25% rate of return prescribed by the Commission in 1990 is used as the cost of capital in 1990 and 1991. Competitive rates of return for the years between 1991 and 1998 are based on a straight-line interpolation of 11.25% in 1991 and 8.63% in 1998. The resulting downward trend from 1991 to 1998 is similar to the trend in corporate bond rates used by the Commission to develop its cost of capital index. For the years prior to 1990, it is assumed that interstate earnings were commensurate with the cost of capital, and no adjustment is made to interstate revenue. Although this assumption is made purely for the sake of simplicity, the assumption is reasonable because interstate access services were under rate of return regulation prior to 1991.

Adjustments to interstate revenue for the years 1991 to 1998 are shown on the right-hand side of Table A-2. Revenues are reduced by an *earnings adjustment* that represents the change in earnings needed to provide the *competitive ROR* and a *tax adjustment* equal to 39% of the earnings adjustment.⁸ No adjustment is made for excess employee benefits.⁹

Correction Of A Minor Error In The Staff's Calculations

Finally, the Commission's spreadsheets contained a minor error, whereby the growth rates in LEC input prices for 1986 through 1989 were incorrectly copied from Table B-13 to Table B-12. As shown in the corrected version of Table B-12 included here (Table A-3), this reduces the average 1986-1998 X-factor from 6.02% to 5.95%, but has no effect on the average 1991-98 X-factor.

⁷ Responsive Submission of AT&T Corp. to Prescription Proceeding Direct Case Submissions and Reply Comments on the Notice of Proposed Rulemaking (CC Docket No. 98-166), March 16, 1999. Attachment 10.

⁸ The Commission used a 39% marginal tax rate in its imputed X study.

⁹ An adjustment similar to that of the Commission could easily be made, but the adjustment has little effect on the X-factor for multi-year periods.

Results

X-factors for each year from 1986 through 1998 were calculated based on the modifications to the Commission's Option 2 methodology described above. These are presented in Table A-4, which uses the staff's capital cost index. Rolling averages, similar to those that the Commission relied on in the *1997 Price Cap Order*, were then calculated for the periods ending in 1995 and 1998.

Estimates utilizing the Commission's adjustments for excess earnings and excess employee benefits are presented in Table A-6. The first column shows Interstate X-factors based on equation (7) above, for which the median value is 10.1% for the 1986-1995 period and 9.5% for the 1986-1998 period. X-factors obtained using equation (9), in which growth rates for U.S. input prices and total factor productivity are replaced with growth in the GDP-PI, are shown in the second column, with median values of 10.1% for the 1986-1995 period and 9.9% for the 1986-1998 period. Because growth in the GDP price index has been somewhat greater than growth in U.S. input prices minus growth in U.S. productivity in the years since 1995, the use of GDP-PI causes the X-factors to be about 0.3 percentage points higher for the periods ending in 1998. For periods ending in 1995, there is little difference between the two measures of inflation.

Annual X-factor calculations based on AT&T capital cost index are presented in Table A-6, and rolling averages based on this approach are shown in Table A-7. Estimated X-factors are generally in the same range as those shown in Table A-5. The calculation of X-factors for individual years, from which the averages in Tables A-5 and A-7 are obtained, is shown in Tables A-4 and A-6 respectively. Column H shows interstate X-factors based on equation (7), while X-factors obtained using equation (9) are shown in Column J. Also shown in Tables A-4 and A-6 are total company X-factors based on direct calculation.

Comparison With Results Under the Staff's Option 2 Study

X-factors calculated in this manner, moreover, are very similar to those obtained under the Commission's Option 2 methodology, using interstate outputs rather than total-company outputs. This is essentially the approach previously used by AT&T in its "Performance-Based Model" to estimate interstate X-factors, based on the assumption that inputs grow at the same rates for interstate access as for the LECs' other regulated telephone services.¹⁰ Calculations are shown on Table A-8, which is basically the same as the Commission's Table B-12, except that growth rates for interstate output rather than total company output are used in Column B. The average X-factors are strikingly similar to those reported on Table A-5, with median values of 10.0% for the 1986-95 period and 9.5% for the 1986-98 period. Table A-9 reports average TFP growth rates for specified periods, based on the results from Table A-8.

Table A-1. LEC Revenue (\$) by Type of Service¹ - 1985-1998

Year	Local Service Revenue	Intrastate Toll and Intrastate Access Service Revenue	Interstate Service Revenue (A)	Total Revenue (B)
1985	\$26,960,554,164	\$13,047,095,682	\$14,366,305,727	\$54,373,955,573
1986	\$28,626,174,049	\$13,538,946,795	\$15,459,541,700	\$57,624,662,544
1987	\$29,150,842,991	\$14,166,723,124	\$15,360,313,555	\$58,677,879,670
1988	\$29,226,988,000	\$14,994,975,000	\$15,806,448,000	\$60,028,411,000
1989	\$29,973,157,000	\$14,868,219,000	\$15,745,189,000	\$60,586,565,000
1990	\$30,699,085,000	\$15,014,729,000	\$15,483,956,000	\$61,197,770,000
1991	\$32,059,008,000	\$14,522,276,000	\$15,461,344,000	\$62,042,628,000
1992	\$33,359,990,000	\$14,225,181,000	\$15,767,707,000	\$63,352,878,000
1993	\$34,598,957,000	\$14,496,831,000	\$16,341,156,000	\$65,436,944,000
1994	\$35,758,637,000	\$14,355,983,000	\$17,100,570,000	\$67,215,190,000
1995	\$37,684,860,000	\$13,123,225,000	\$17,632,821,000	\$68,440,906,000
1996	\$40,523,387,000	\$12,987,476,000	\$18,411,197,000	\$71,922,060,000
1997	\$42,460,592,000	\$12,308,613,000	\$18,882,869,000	\$73,652,074,000
1998	\$45,643,024,000	\$12,236,469,000	\$20,270,078,000	\$78,149,571,000

Adjusted Interstate Service Revenue based on FCC adjustments

Adjusted Total Factor Payments (C)	Adjusted Interstate Service Revenue (A*C/B)	Growth Rate (%)
\$53,150,159,615	\$14,042,962,930	
\$49,919,483,458	\$13,392,396,625	-4.74343
\$51,370,103,970	\$13,447,331,580	0.40936
\$55,341,418,635	\$14,572,287,377	8.03409
\$57,636,166,697	\$14,978,441,803	2.74904
\$59,829,528,203	\$15,137,770,252	1.05810
\$61,420,175,153	\$15,306,225,529	1.10667
\$59,267,469,536	\$14,750,901,992	-3.69554
\$58,867,197,742	\$14,700,534,633	-0.34204
\$62,959,202,419	\$16,017,781,816	8.58156
\$63,619,966,130	\$16,390,774,763	2.30192
\$63,537,350,717	\$16,264,810,559	-0.77147
\$66,361,588,503	\$17,013,739,251	4.50173
\$66,379,832,287	\$17,217,297,048	1.18933

¹This excludes miscellaneous services

Source: Federal Communications Commission, *Statistics of Communication Common Carriers* [various years]

Table A-2. LEC Revenue (\$) by Type of Service¹ - 1985-1998

Year	Local Service Revenue	Intrastate Toll and Intrastate Access Service Revenue	Interstate Service Revenue (A)	Total Revenue
1985	\$26,960,554,164	\$13,047,095,682	\$14,366,305,727	\$54,373,955,573
1986	\$28,626,174,049	\$13,538,946,795	\$15,459,541,700	\$57,624,662,544
1987	\$29,150,842,991	\$14,166,723,124	\$15,360,313,555	\$58,677,879,670
1988	\$29,226,988,000	\$14,994,975,000	\$15,806,448,000	\$60,028,411,000
1989	\$29,973,157,000	\$14,868,219,000	\$15,745,189,000	\$60,586,565,000
1990	\$30,699,085,000	\$15,014,729,000	\$15,483,956,000	\$61,197,770,000
1991	\$32,059,008,000	\$14,522,276,000	\$15,461,344,000	\$62,042,628,000
1992	\$33,359,990,000	\$14,225,181,000	\$15,767,707,000	\$63,352,878,000
1993	\$34,598,957,000	\$14,496,831,000	\$16,341,156,000	\$65,436,944,000
1994	\$35,758,637,000	\$14,355,983,000	\$17,100,570,000	\$67,215,190,000
1995	\$37,684,860,000	\$13,123,225,000	\$17,632,821,000	\$68,440,906,000
1996	\$40,523,387,000	\$12,987,476,000	\$18,411,197,000	\$71,922,060,000
1997	\$42,460,592,000	\$12,308,613,000	\$18,882,869,000	\$73,652,074,000
1998	\$45,643,024,000	\$12,236,469,000	\$20,270,078,000	\$78,149,571,000

¹This excludes miscellaneous services

Source: Federal Communications Commission, *Statistics of Communication Common Carriers* (various years)

Adjusted Interstate Service Revenue based on AT&T's capital cost Index

Interstate Earnings (B)	Interstate ANI (C)	Interstate ROR (B/C)	Competitive ROR (D)	Competitive Earnings (E=C*D)	Earnings Adjustment (F=E-B)	Tax Adjustment (G=0.39*F)	Adjusted Interstate Revenue (A-F-G)	Growth Rate (%)
							\$14,366,305,727	
							\$15,459,541,700	7.33408
							\$15,360,313,555	-0.64393
							\$15,806,448,000	2.86308
							\$15,745,189,000	-0.38831
\$3,252,800	\$25,752,912	12.63%	11.25%	\$2,897,203	-\$355,597	-\$138,683	\$14,989,675,614	-4.91732
\$3,065,010	\$25,191,906	12.17%	11.25%	\$2,834,089	-\$230,921	-\$90,059	\$15,140,364,401	1.00026
\$3,290,715	\$24,875,599	13.23%	10.88%	\$2,705,399	-\$585,316	-\$228,273	\$14,954,117,863	-1.23776
\$3,467,862	\$24,759,133	14.01%	10.50%	\$2,600,063	-\$867,799	-\$338,442	\$15,134,914,927	1.20176
\$3,446,525	\$24,779,745	13.91%	10.13%	\$2,509,480	-\$937,045	-\$365,447	\$15,798,077,694	4.28839
\$3,506,389	\$25,461,013	13.77%	9.75%	\$2,483,176	-\$1,023,213	-\$399,053	\$16,210,555,243	2.57743
\$3,756,542	\$26,132,272	14.38%	9.38%	\$2,450,834	-\$1,305,708	-\$509,226	\$16,596,262,596	2.35149
\$3,761,899	\$25,890,407	14.53%	9.00%	\$2,331,246	-\$1,430,653	-\$557,955	\$16,894,261,634	1.77965
\$3,731,385	\$25,229,123	14.79%	8.63%	\$2,177,273	-\$1,554,112	-\$606,104	\$18,109,862,758	6.94827

Source: ARMIS 43-01

Table A-3. Summary of the Components of the LECs' Price Cap X-Factor (excluding the Consumer Productivity Dividend) - 1985-1998
Based on FCC Cost of Capital Index

Year	U.S. Nonfarm Business Sector					U.S. Nonfarm Business Sector				
	TFP Growth Rate (%) A	LECs' Output Growth Rate (%) B	LECs' Input Growth Rate (%) C	LECs' TFP Growth Rate (%) D=B-C	TFP Differential (%) E=D-A	Input Price Growth Rate (%) F	LECs' Input Price Growth Rate (%) G	Input Price Differential (%) H=F-G	X-factor (%) I=E+H	Previous X-factor (%) J
1986	1.10166	3.20079	-3.47804	6.67883	5.57716	2.80830	-3.15211	5.96041	11.53757	-0.5
1987	-0.39920	3.76640	0.58715	3.17925	3.57845	2.53178	1.76258	0.76920	4.34765	5
1988	0.29955	6.51199	5.73029	0.78170	0.48215	3.72958	2.14711	1.58246	2.06461	5
1989	0.19920	4.38736	3.61531	0.77205	0.57285	3.03629	-0.22468	3.26096	3.83381	7.9
1990	-0.69895	4.76136	0.01899	4.74237	5.44133	3.30913	3.88344	-0.57432	4.86701	8.8
1991	-1.41274	2.61222	2.60077	0.01145	1.42418	2.05824	-0.13437	2.19261	3.61680	5.8
1992	1.61294	3.51156	-2.30554	5.81711	4.20417	2.88104	-1.36727	4.24830	8.45247	3.4
1993	0.09995	5.83136	-0.05132	5.88267	5.78272	3.71664	-0.66966	4.38631	10.16903	4.7
1994	0.39880	5.41556	4.36237	1.05319	0.65439	3.50341	2.21830	1.28511	1.93950	5.4
1995	0.29806	5.98474	0.29912	5.68562	5.38756	1.96268	0.84015	1.12253	6.51009	6.8
1996	1.47713	8.22067	-5.26234	13.48301	12.00588	1.38258	5.65415	-4.27157	7.73431	
1997	0.39024	9.46129	4.48479	4.97650	4.58626	1.89887	-0.22680	2.12567	6.71193	
1998	0.59259	5.37564	-0.22988	5.60552	5.01293	0.71810	0.18976	0.52834	5.54127	
				avg ² (86-98)	4.20846			1.73969	5.94816	
				var ³ (86-98)	8.97963			6.02245	8.02857	
				avg(91-98)	4.88226			1.45216	6.33442	
				var(91-98)	10.27623			6.39758	6.08167	
				avg(86-95)	3.31050			2.42336	5.73385	5.23
				var(86-95)	4.70821			3.58663	9.99729	5.93
				avg(91-95)	3.49060			2.64697	6.13758	5.22
				var(91-95)	4.33513			1.99491	9.14567	1.29

¹ X-factor reported in the 1997 Price Cap Review Order

² avg denotes the arithmetic mean of the series

³ var denotes the variance of the series.

Source: Bureau of Labor Statistics' Multifactor Productivity Table 2: Private Nonfarm Business: Productivity and Related Indexes (annual and quarterly tables), Table B-4, Table B-11, and Table B-13.

Table A-4. Direct Calculation of the LECs' Price Cap X-Factor (excluding the Consumer Productivity Dividend) - 1985-1998
Based on FCC Cost of Capital Index

Year	U.S. Nonfarm Business Sector TFP Growth Rate (%) A	U.S. Nonfarm Business Sector Input Price Growth Rate (%) B	LECs' Output Growth Rate (%) C	LECs' Adjusted Revenue Growth Rate (%) D	Total Company X-factor (%) E=C-D-A+B	LECs' Interstate Output Growth Rate (%) F	LECs' Adjusted Interstate Revenue Growth Rate (%) G	Interstate X-factor (%) H=F-G-A+B	GDPPi Growth (new series) I	Interstate X-factor (%) based on new GDPPi J=F-G+I	Interstate X-factor with CPD removed for 1996-98 K=H-1.5
1986	1.10166	2.80830	3.20079	-6.27097	11.17839	5.14068	-4.74343	11.59074	2.2	12.08411	11.59074
1987	-0.39920	2.53178	3.76640	2.86450	3.83288	7.78433	0.409356	10.30596	2.9	10.27497	10.30596
1988	0.29955	3.72958	6.51199	7.44652	2.49549	12.18682	8.034091	7.58276	3.4	7.55273	7.58276
1989	0.19920	3.03629	4.38736	4.06287	3.16158	6.04719	2.749035	6.13524	3.9	7.19816	6.13524
1990	-0.69895	3.30913	4.76136	3.73491	5.03453	11.49069	1.058101	14.44067	3.9	14.33259	14.44067
1991	-1.41274	2.05824	2.61222	2.62390	3.45929	9.83068	1.106668	12.19498	3.4	12.12401	12.19498
1992	1.61294	2.88104	3.51156	-3.56778	8.34744	5.95758	-3.69554	10.92122	2.2	11.85312	10.92122
1993	0.09995	3.71664	5.83136	-0.67766	10.12571	11.26657	-0.34204	15.22530	2.7	14.30861	15.22530
1994	0.39880	3.50341	5.41556	6.72029	1.79988	8.70504	8.581561	3.22809	2.1	2.22348	3.22809
1995	0.29806	1.96268	5.98474	1.04404	6.60532	9.58520	2.301919	8.94790	2.1	9.38328	8.94790
1996	1.47713	1.38258	8.22067	-0.12994	8.25606	9.62733	-0.77147	10.30426	1.8	12.19881	8.80426
1997	0.39024	1.89887	9.46129	4.34905	6.62087	10.28931	4.50173	7.29620	1.7	7.48758	5.79620
1998	0.59259	0.71810	5.37564	0.02749	5.47366	8.33142	1.189331	7.26759	1.2	8.34208	5.76759
				avg ² (86-98)	5.87624			9.64930		9.95104	9.30315
				var ³ (86-98)	8.10233			10.48687		10.63527	11.82778
				avg(91-98)	6.33603			9.42319		9.74012	8.86069
				var(91-98)	6.48045			11.51794		12.58994	13.32086
				avg(86-95)	5.60405			10.05729		10.13351	10.05729
				var(86-95)	9.82093			12.30262		12.42157	12.30262
				avg(91-95)	6.06753			10.10350		9.97850	10.10350
				var(91-95)	9.39435			15.97649		17.47236	15.97649

² avg denotes the arithmetic mean of the series

³ var denotes the variance of the series.

Source: Bureau of Labor Statistics' Multifactor Productivity Table 2: Private Nonfarm Business: Productivity and Related Indexes (annual and quarterly tables); U.S. Department of Commerce, Survey of Current Business, Table 6 (GDP-Pi); Table B-4, Table B-11, and Table B-13.

Table A-5. Average Interstate X-Factors
Based on Direct Calculation and FCC Cost of Capital Index
(From Table A-4)

	Interstate X- factor (%)	Interstate X- factor (%) based on GDPPI
1986 to 1995	10.057	10.134
1987 to 1995	9.887	9.917
1988 to 1995	9.835	9.872
1989 to 1995	10.156	10.203
1990 to 1995	10.826	10.704
1991 to 1995	10.103	9.979
Mean:	10.144	10.135
Median:	10.080	10.056
1986 to 1998	9.649	9.951
1987 to 1998	9.488	9.773
1988 to 1998	9.413	9.728
1989 to 1998	9.596	9.945
1990 to 1998	9.981	10.250
1991 to 1998	9.423	9.740
Mean:	9.592	9.898
Median:	9.542	9.859

Table A-6. Direct Calculation of the LECs' Price Cap X-Factor (excluding the Consumer Productivity Dividend) - 1985-1998
Based on AT&T Cost of Capital Index

Year	U.S. Nonfarm Business Sector TFP Growth Rate (%)	U.S. Nonfarm Business Sector Input Price Growth Rate (%)	LECs' Output Growth Rate (%)	LECs' Adjusted Revenue Growth Rate (%)	Total Company X-factor (%)	LECs' Interstate Output Growth Rate (%)	LECs' Adjusted Interstate Revenue Growth Rate (%)	Interstate X-factor (%)	GDPPI Growth (new series)	Interstate X-factor (%) based on GDPPI	Interstate X-factor with CPD removed for 1996-98
	A	B	C	D	E=C-D-A+B	F	G	H=F-G-A+B	I	J=F-G+I	K=H-1.5
1986	1.10166	2.80830	3.20079	5.80654	-0.89912	5.14068	7.334081	-0.48677	2.2	0.00660	-0.48677
1987	-0.39920	2.53178	3.76640	1.81122	4.88616	7.78433	-0.64393	11.35924	2.9	11.32826	11.35924
1988	0.29955	3.72958	6.51199	2.27551	7.66650	12.18682	2.863082	12.75377	3.4	12.72374	12.75377
1989	0.19920	3.03629	4.38736	0.92552	6.29892	6.04719	-0.38831	9.27259	3.9	10.33550	9.27259
1990	-0.69895	3.30913	4.76136	3.13619	5.63325	11.49069	-4.91732	20.41609	3.9	20.30801	20.41609
1991	-1.41274	2.05824	2.61222	0.69286	5.39033	9.83068	1.000264	12.30139	3.4	12.23041	12.30139
1992	1.61294	2.88104	3.51156	-1.54638	6.32604	5.95758	-1.23776	8.46344	2.2	9.39534	8.46344
1993	0.09995	3.71664	5.83136	3.74194	5.70611	11.26657	1.201762	13.68150	2.7	12.76481	13.68150
1994	0.39880	3.50341	5.41556	-0.44480	8.96497	8.70504	4.288395	7.52126	2.1	6.51665	7.52126
1995	0.29806	1.96268	5.98474	2.10969	5.53966	9.58520	2.577432	8.67239	2.1	9.10777	8.67239
1996	1.47713	1.38258	8.22067	1.90626	6.21986	9.62733	2.351494	7.18129	1.8	9.07584	5.68129
1997	0.39024	1.89887	9.46129	0.74811	10.22181	10.28931	1.779649	10.01828	1.7	10.20966	8.51828
1998	0.59259	0.71810	5.37564	3.07893	2.42222	8.33142	6.948268	1.50866	1.2	2.58315	0.00866
				avg ² (86-98)	5.72129			9.43562		9.73736	9.08947
				var ³ (86-98)	7.00535			25.65017		22.79569	28.26465
				avg(91-98)	6.34888			8.66853		8.98545	8.10603
				var(91-98)	4.90827			11.87292		9.19845	15.13677
				avg(86-95)	5.55128			10.39549		10.47171	10.39549
				var(86-95)	5.93934			25.59805		23.91079	25.59805
				avg(91-95)	6.38542			10.12800		10.00300	10.12800
				var(91-95)	1.76492			5.80713		5.18285	5.80713

² avg denotes the arithmetic mean of the series

³ var denotes the variance of the series.

Source: Bureau of Labor Statistics' Multifactor Productivity Table 2: Private Nonfarm Business: Productivity and Related Indexes (annual and quarterly tables); U.S. Department of Commerce, *Survey of Current Business*, Table 6 (GDP-PI); Table B-4, Table B-11, and Table B-13.

Table A-7. Average Interstate X-Factors
Based on Direct Calculation and AT&T Cost of Capital Index
(From Table A-6)

	Interstate X- factor (%)	Interstate X- factor (%) based on GDPPI
1986 to 1995	10.395	10.472
1987 to 1995	11.605	11.634
1988 to 1995	11.635	11.673
1989 to 1995	11.476	11.523
1990 to 1995	11.843	11.720
1991 to 1995	10.128	10.003
Mean:	11.180	11.171
Median:	11.540	11.579
1986 to 1998	9.436	9.737
1987 to 1998	10.262	10.548
1988 to 1998	10.163	10.477
1989 to 1998	9.904	10.253
1990 to 1998	9.974	10.244
1991 to 1998	8.669	8.985
Mean:	9.734	10.041
Median:	9.939	10.248

**Table A-8. Summary of the Components of the LECs' Price Cap Interstate X-Factor - 1985-1998
Based on FCC Cost of Capital Index**

Year	U.S. Nonfarm Business Sector					U.S. Nonfarm Business Sector				X-factor (%)
	TFP Growth Rate (%)	LECs' Output Growth Rate (%)	LECs' Input Growth Rate (%)	LECs' TFP Growth Rate (%)	TFP Differential (%)	Input Price Growth Rate (%)	LECs' Input Price Growth Rate (%)	Input Price Differential (%)		
	A	B	C	D=B-C	E=D-A	F	G	H=F-G		
1986	1.10166	5.14068	-3.47804	8.61872	7.51706	2.80830	-3.15211	5.96041	13.47746	
1987	-0.39920	7.78433	0.58715	7.19718	7.59638	2.53178	1.76258	0.76920	8.36558	
1988	0.29955	12.18682	5.73029	6.45653	6.15698	3.72958	2.14711	1.58246	7.73944	
1989	0.19920	6.04719	3.61531	2.43189	2.23268	3.03629	-0.22468	3.26096	5.49365	
1990	-0.69895	11.49069	0.01899	11.47170	12.17065	3.30913	3.88344	-0.57432	11.59634	
1991	-1.41274	9.83068	2.60077	7.22990	8.64264	2.05824	-0.13437	2.19261	10.83525	
1992	1.61294	5.95758	-2.30554	8.26313	6.65019	2.88104	-1.36727	4.24830	10.89849	
1993	0.09995	11.26657	-0.05132	11.31789	11.21794	3.71664	-0.66966	4.38631	15.60425	
1994	0.39880	8.70504	4.36237	4.34267	3.94387	3.50341	2.21830	1.28511	5.22898	
1995	0.29806	9.58520	0.29912	9.28608	8.98802	1.96268	0.84015	1.12253	10.11055	
1996	1.47713	9.62733	-5.26234	14.88968	13.41255	1.38258	5.65415	-4.27157	9.14098	
1997	0.39024	10.28931	4.48479	5.80452	5.41427	1.89887	-0.22680	2.12567	7.53994	
1998	0.59259	8.33142	-0.22988	8.56130	7.96871	0.71810	0.18976	0.52834	8.49705	

Average X-factors:	1986 to 1995	9.93500
	1987 to 1995	9.54139
	1988 to 1995	9.68837
	1989 to 1995	9.96679
	1990 to 1995	10.71231
	1991 to 1995	10.53550
	Mean:	10.06323
	Median:	9.95089
	1986 to 1998	9.57907
	1987 to 1998	9.25421
	1988 to 1998	9.33499
	1989 to 1998	9.49455
	1990 to 1998	9.93909
	1991 to 1998	9.73194
	Mean:	9.55564
	Median:	9.53681

Table A-9. Results for Specified Periods

Total company results(from Table A-3):

	TFP growth	TFP differential	X-factor
1986-90	3.23	3.13	5.33
1991-95	3.69	3.49	6.14
1996-98	8.02	7.20	6.66

Interstate-only results (from Table A-8):

	TFP growth	TFP differential	X-factor
1986-90	7.24	7.13	9.33
1991-95	8.09	7.89	10.54
1996-98	9.75	8.93	8.39

Appendix B
TECHNICAL CORRECTION TO THE STAFF IMPUTED X STUDY (OPTION 3)
Stephen Friedlander, AT&T

The Staff's imputed X study (Option 3) attempts to simulate the impact of alternative X-factors on interstate revenues and earnings with the purpose of determining the X-factors that result in local exchange carriers ("LECs") earning a "competitive" interstate rate of return in either 1995 or 1998. The purpose of this appendix is to identify and correct a minor flaw in the imputed X study that causes the imputed X-factor for the 1991 to 1998 period to be slightly understated.

The calculations in Table C-1 of the study improperly fail to account for the price cap "reinitialization" that occurred in July 1997. As a result of this reinitialization, price cap indexes as of July 1997 and thereafter were calculated based on an X-factor of 6.5%. Thus, the imputed X study's X-factor for 1996 (shown in the column labeled "Actual X-factor" in Table C-1) should be 6.5% rather than 5.3%.

The study's failure to account for the 1997 reinitialization has the effect of overstating the differential between revenues under existing X-factors and the revenues that would result under higher X-factors. As a result, the earnings associated with higher X-factors are understated, and the X-factors needed to produce a given level of earnings are understated.

This minor flaw is corrected in Table B-1 (attached hereto), which replicates the Commission's Table C-1 in Appendix C of the *Further Notice*, except that the "Actual X-Factor" for 1996 has been changed from 5.3% to 6.5%.

Once this correction is made, the X-factor that causes the LECs to earn a "competitive" interstate rate of return (*i.e.*, 8.68%) in 1998 increases from 7.71% to 7.87%. The impact of a 7.87% X-factor on LEC revenues, LEC rates of return, and consumer benefits is shown in Table B-2 (attached hereto).

Table B-1
Historic Price, Output, and Revenue Changes
Resulting from Hypothetical X-factor

Hypothetical X Factor 7.87%
End user price elasticity -0.5
Access price elasticity* -0.2

<u>YEAR</u>	<u>Actual X Factor**</u>	<u>New X Factor**</u>	<u>X Factor Change</u>	<u>Cumulative Price Index</u>	<u>Price Change</u>	<u>Calendar Year Output Change</u>	<u>Calendar Year Revenue Change</u>
Ameritech, Bell Atlantic, NYNEX, SBC, GTE, others							
1991	4.00%	7.87%	3.87%	0.961	-3.87%	0.39%	-1.75%
1992	4.00%	7.87%	3.87%	0.924	-7.58%	1.15%	-4.65%
1993	4.00%	7.87%	3.87%	0.888	-11.16%	1.87%	-7.67%
1994	4.00%	7.87%	3.87%	0.854	-14.59%	2.58%	-10.63%
1995	5.30%	7.87%	2.57%	0.832	-16.79%	3.14%	-13.04%
1996	6.50%	7.87%	1.37%	0.821	-17.92%	3.47%	-14.49%
1997	6.50%	7.87%	1.37%	0.810	-19.05%	3.70%	-15.47%
1998	6.50%	7.87%	1.37%	0.798	-20.15%	3.92%	-16.45%
BellSouth							
1991	4.00%	7.87%	3.87%	0.961	-3.87%	0.39%	-1.75%
1992	4.30%	7.87%	3.57%	0.927	-7.30%	1.12%	-4.53%
1993	4.00%	7.87%	3.87%	0.891	-10.88%	1.82%	-7.44%
1994	4.00%	7.87%	3.87%	0.857	-14.33%	2.52%	-10.40%
1995	5.30%	7.87%	2.57%	0.835	-16.53%	3.09%	-12.82%
1996	6.50%	7.87%	1.37%	0.823	-17.67%	3.42%	-14.26%
1997	6.50%	7.87%	1.37%	0.812	-18.79%	3.65%	-15.25%
1998	6.50%	7.87%	1.37%	0.801	-19.90%	3.87%	-16.23%
Pacific Telesis							
1991	4.30%	7.87%	3.57%	0.964	-3.57%	0.36%	-1.61%
1992	4.30%	7.87%	3.57%	0.930	-7.01%	1.06%	-4.29%
1993	4.00%	7.87%	3.87%	0.894	-10.60%	1.76%	-7.20%
1994	4.00%	7.87%	3.87%	0.859	-14.06%	2.47%	-10.17%
1995	5.30%	7.87%	2.57%	0.837	-16.27%	3.03%	-12.59%
1996	6.50%	7.87%	1.37%	0.826	-17.41%	3.37%	-14.04%
1997	6.50%	7.87%	1.37%	0.815	-18.54%	3.59%	-15.03%
1998	6.50%	7.87%	1.37%	0.803	-19.65%	3.82%	-16.01%
U S West							
1991	4.30%	7.87%	3.57%	0.964	-3.57%	0.36%	-1.61%
1992	4.30%	7.87%	3.57%	0.930	-7.01%	1.06%	-4.29%
1993	4.30%	7.87%	3.57%	0.897	-10.32%	1.73%	-7.08%
1994	4.30%	7.87%	3.57%	0.865	-13.52%	2.38%	-9.82%
1995	5.30%	7.87%	2.57%	0.843	-15.74%	2.93%	-12.13%
1996	6.50%	7.87%	1.37%	0.831	-16.89%	3.26%	-13.59%
1997	6.50%	7.87%	1.37%	0.820	-18.03%	3.49%	-14.58%
1998	6.50%	7.87%	1.37%	0.808	-19.15%	3.72%	-15.56%
Sprint							
1991	4.00%	7.87%	3.87%	0.961	-3.87%	0.39%	-1.75%
1992	4.00%	7.87%	3.87%	0.924	-7.58%	1.15%	-4.65%
1993	4.00%	7.87%	3.87%	0.888	-11.16%	1.87%	-7.67%
1994	4.07%	7.87%	3.79%	0.855	-14.53%	2.57%	-10.60%
1995	5.30%	7.87%	2.57%	0.833	-16.72%	3.13%	-12.99%
1996	6.50%	7.87%	1.37%	0.821	-17.86%	3.46%	-14.43%
1997	6.50%	7.87%	1.37%	0.810	-18.98%	3.68%	-15.42%
1998	6.50%	7.87%	1.37%	0.799	-20.09%	3.91%	-16.39%

* Assumes access = 40% of IXC costs and all price reductions passed on to end user customers.

** In effect 7/1 of each year.

*** Assumes "others" chose lowest X factor 1991-1994.

Table B-2
X Factor Required for Competitive Return
Calendar Year 1998
With Demand Stimulation

Modifications to FCC study:

Set 1996 X at 6.5% to reflect reinitialization in 1997.

X factor since 1991 7.87%

Revenue, Rate of Return, and Consumer Benefits

Price Cap Company	Actual Operating Revenue* (000)	Adjusted Operating Revenue (000)	Actual Operating Expense (000)	Adjusted Operating Expense* (000)	Actual Operating Income (000)	Adjusted Operating Income (000)	Average Net Investment (000)	Actual Rate of Return	Adjusted Rate of Return	Change in Consumer Surplus** (000)
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)
Ameritech	\$2,553,594	\$2,133,602	\$1,918,674	\$1,754,877	\$634,920	\$378,725	\$2,794,765	22.72%	13.55%	\$510,278
Bell Atlantic	\$6,453,096	\$5,391,748	\$5,378,333	\$4,964,407	\$1,074,763	\$427,341	\$8,380,851	12.82%	5.10%	\$1,289,505
BellSouth	\$3,794,553	\$3,178,817	\$2,842,101	\$2,601,964	\$952,452	\$576,853	\$4,578,390	20.80%	12.60%	\$748,364
PacTel	\$2,027,231	\$1,702,750	\$1,639,515	\$1,512,967	\$387,716	\$189,782	\$2,645,273	14.66%	7.17%	\$394,513
SBC	\$2,359,902	\$1,971,766	\$2,022,258	\$1,870,885	\$337,644	\$100,881	\$3,407,300	9.91%	2.96%	\$471,573
U S West	\$2,670,048	\$2,254,497	\$2,089,034	\$1,926,969	\$581,015	\$327,528	\$3,513,985	16.53%	9.32%	\$505,597
GTE	\$3,222,880	\$2,692,809	\$2,354,224	\$2,147,496	\$868,656	\$545,313	\$4,432,509	19.60%	12.30%	\$644,019
Sprint	\$1,130,092	\$944,827	\$857,222	\$784,969	\$272,870	\$159,858	\$1,400,433	19.48%	11.41%	\$225,110
Others *	\$939,899	\$785,313	\$739,759	\$679,470	\$200,140	\$105,842	\$1,241,895	16.12%	8.52%	\$187,817
All	\$25,151,295	\$21,056,129			\$5,310,176	\$2,812,124	\$32,395,401	16.39%	8.68%	\$4,976,776
Difference		-\$4,095,166				-\$2,498,052				
% change		-16.3%				47.0%				

Source: Columns B, D, H. Form 492-A

* Column Notes

(A) Assumes all chose lowest X factor 1991-94

(B) Interstate revenue

(E) Assumes fed + state tax rate = 39%

(K) Assumes all price reductions passed through to end user customers

** Depends on X factor chosen by carrier 1991-1994

Appendix C
CALCULATION OF A NEW CONSUMER PRODUCTIVITY DIVIDEND
Stephen Friedlander, AT&T

The D.C. Circuit remanded the FCC's 1997 decision retaining the Consumer Productivity Dividend ("CPD") on the ground that the Commission had failed to explain its "choice of the amount -- 0.5%." 188 F.3d at 527. As the Court observed, the LEC petitioners did not dispute the FCC's rationale that retention of the CPD in some amount was appropriate because the FCC's newly adopted rule eliminating all sharing requirements would increase the price cap LECs' productivity in the future. *Id.* Because there is no dispute about the Commission's *reason* for retaining the CPD, the only question on remand is the level at which the CPD should be set to reflect the likely impact of the elimination of sharing on the LECs' productivity.

To put the matter in mathematical terms, our task is to find a reasonable estimate of the difference, all else being equal, between the LECs' potential productivity gains in a sharing regime (which we will denote X_S) and the LECs' potential productivity gains in a no-sharing regime (X_{NS}). The CPD would then be calculated as the estimated difference between these two quantities, *i.e.*, $X_{NS} - X_S$, and this quantity would then be added to the historical component of the X-factor. This is consistent with the Commission's rationale in adopting the original CPD, namely, that it "assure[s] that the first benefits of price caps flow to customers in the form of reduced rates." 5 FCC Rcd. at 6799.

There are a number of possible approaches to calculating this difference. All of them point in the same direction -- toward a CPD of at least 1.5 percent.

1. One approach is suggested by the FNPRM's references to two studies in the record -- one performed by Strategic Policy Research ("SPR") on behalf of Southwestern Bell and the other sponsored by the Ad Hoc Telecommunications Users Committee ("Ad Hoc").¹ These studies show that the imposition of sharing suppresses the LECs' incentives for productivity growth and, conversely, that the complete elimination of sharing would substantially increase the LECs' productivity.

Neither study attempts to measure directly the impact on productivity of the elimination of sharing. But a rough estimate of that impact can be derived from the SPR study, when combined with other data regarding the impact on productivity of the Commission's move from rate-of-return regulation to a price cap system with sharing.

a. Both studies derive a measure of the efficiency incentives faced by a LEC under different regulatory regimes. If we denote this incentive as I , then I_C is the efficiency incentive faced in a fully competitive market, and is equal to unity.

SPR calculates that the efficiency incentive in a no-sharing regime is only about 35% of that prevailing in a competitive market; thus I_{NS} is 0.35. SPR further calculates that the incentive

¹ See Comments of Southwestern Bell Telephone Company, CC Docket No. 94-1, App. SPR (May 9, 1994) ("SPR study"); Reply Comments of Ad Hoc, CC Docket No. 94-1, 14-18 (June 30, 1994).

in a sharing scenario (I_S), where firms are required to share 50% of their additional earnings above a certain threshold, is 0.18. Thus, the efficiency incentive in a no-sharing regime is about twice what it is in a sharing regime. Moreover, the efficiency incentive in a rate-of-return regime (with a one-year lag) (I_{ROR}) is only slightly smaller, at 0.14, than the efficiency incentive in a sharing regime.

In this model, then, the adoption of a price cap system with sharing would be expected to increase a LEC's incentives for efficiency by about 29 percent ($.4/.14$) as compared with a ROR regime. And the move from a price cap system with sharing to one without sharing would increase a LEC's efficiency incentives by about 94 percent ($(.35-.18)/.18$).

If we further assume that the LEC's potential productivity gain, X , is a linear function of the incentive for efficiency, I , then these same relationships should hold among X_{NS} , X_S , and X_{ROR} . And if that is so, the change from a price cap system with sharing to one without sharing should ultimately produce a much larger productivity increase -- about three times as much ($94/29$) -- as the change from the old ROR system to price caps with sharing.²

b. By itself, this analysis does not give us an estimate of $X_{NS} - X_S$. To generate such an estimate based on the SPR study, we must first find an estimate of $X_S - X_{ROR}$. Fortunately, there are a number of potential sources for such an estimate.

The most obvious is the Commission's original choice of a 0.5 percent CPD when it first adopted the price cap plan for the LECs. That number was chosen because the Commission believed the change from ROR to price cap regulation (even with sharing) would produce a productivity increase of at least that amount, and the Commission wanted to "assure that the *first* benefits of price caps flow to customers . . ." 5 FCC Rcd. at 6799. Because no one challenged that judgment on appeal, we can assume that this decision represented a reasonable judgment about the likely effects on productivity of moving from ROR to price caps with sharing (*i.e.*, $X_S - X_{ROR} = 0.5$). Accordingly, applying the SPR model, we would expect to see the LECs' potential X -factor increased by an additional 1.5 percent (approximately) based on the elimination of sharing. In other words, if $X_S - X_{ROR}$ is at least 0.5, as the Commission has long maintained, the SPR model predicts that $X_{NS} - X_S$ would be at least 1.5.

²Although the revision of the SPR model suggested by Ad Hoc (and alluded to in the *Further Notice*) does not permit a similar calculation of the effect of eliminating sharing, that revision appears consistent with this conclusion. Indeed, the Ad Hoc study is quite similar to the SPA study, except that it assumes that, even without price regulation, the gains from efficiency enhancements are more transitory (as a result of competition) than is assumed in the SPA study. As a result of this assumption, Ad Hoc calculates that a price cap plan with 50/50 sharing would produce 45 percent of the efficiency incentives that full competition would produce (so that I_S is .45 rather than .18 as in the SPA study), and that a pure price cap plan would produce about 86 percent of the efficiency incentives (*i.e.*, I_{NS} is .86 rather than .35 as in the SPA study). See Reply Comments of The Ad Hoc Telecommunications Users Committee, CC Docket No. 94-1 (June 29, 1994) at 16. Although the predicted incentives are higher in absolute terms, the relationship between them is approximately the same as in the SPR study, so the impact of moving from one system to the other should be about the same as well.

Other sources generate somewhat higher values for $X_{NS} - X_S$, but are generally consistent with these results. For example, in the Commission's TFP study (based on total company data), the average X-factor for 1986-1990 -- prior to price caps -- is approximately 5.5 percent, whereas the average X-factor for 1991-95 -- after price caps were implemented -- is approximately 6.1 percent. By itself, this analysis suggests that the move from ROR to price caps with a sharing mechanism increased the LECs' *potential* productivity by 0.6 percent (*i.e.*, $X_S - X_{ROR} = .6$). Under the SPR model, then, the move from price caps with sharing to price caps without sharing would be expected to increase potential productivity by an additional 1.8 percent (*i.e.*, $X_{NS} - X_S = 1.8$).

This analysis, however, can be refined in two respects to give a more accurate picture of the impact of the change in regulatory systems on $X_{NS} - X_S$. First, as shown in Table [B-14] of Appendix A, we can adjust the data in the staff's TFP study to reflect only interstate inputs and outputs. Second, we can hold constant all of the elements of the X-factor other than LEC productivity. Obviously, the change in the regulatory system for the LECs would not be expected to have an impact on input prices, either for the LECs or for other industries. Nor would it be expected to have an immediate impact on productivity in other industries, or on the economic forces that are affecting the productivity of *both* the LECs and the economy as a whole. Thus, to obtain a first-order approximation of the impact of the regulatory system on LEC productivity, we can simply look at trends in interstate LEC TFP growth.

As shown in Table A-9 of Appendix A, LEC TFP growth increased from 7.24 percent for the period 1986-1990, to 8.09 percent for the period 1991-95, a difference of 0.85 percent. Applying the SPR model thus suggests that $X_{NS} - X_S$ would be 2.55 percent.³ The Commission staff's results based on total company data, also shown on Table A-9, exhibit a similar pattern.

2. Further corroborating evidence of the impact that the elimination of sharing had on the LECs' productivity is provided by the staff's imputed X Study (*Further Notice*, Appendix C). That study calculates the X-factors required in each year to maintain the LECs' average rate of return at the level of the previous year (as shown in Table C-4). These calculations show an average X factor of 7.66 for the years 1996 to 1998 -- more than two percentage points higher than the 5.59 average computed for 1992 to 1995.⁴

³Indeed, the average differential TFP growth for 1996-1998, after the LECs were given the option of accepting a higher X in exchange for the elimination of sharing, was 8.93 percent -- slightly more than one full percentage point above the 1991-95 level. This suggests that the Commission's limited efforts to move from price caps with sharing to price caps with sharing produced a further, *actual* increase in productivity of 1 percent. The latter figure, however, understates the *potential* increase from that change in regulatory regimes. Sharing was not eliminated for all LECs as of 1996 -- only those that thought they could profit substantially from the alternative regime. Thus, the complete elimination of sharing should produce an even larger efficiency gain. Moreover, the elimination of sharing was subject to legal challenge during that entire period, further dampening its impact on efficiency. And in all events, we have only three years of data since the LECs were given the option of avoiding sharing, as compared with five years' experience during the ROR period and the period in which sharing was mandatory.

⁴The 7.66 figure is a simple average of the X-factors calculated for 1996-1998: 7.90, 6.57, and 8.51. 5.95 is a simple average of the X-factors calculated for 1992-95: 5.50, 5.94, 5.51, and 6.83.

3. Another alternative is to rely on the LECs' own apparent valuations of the efficiency impact of the sharing mechanism. Indeed, although it is not mentioned in the *Further Notice*, one of the most obvious indicators of the likely impact of the elimination of sharing is the actions taken by the price cap LECs in response to the option they were given in 1995 to increase their X-factor in return for the complete elimination of the sharing requirement.

The Commission's 1995 Price Cap Review Order gave the price cap LECs three alternatives for selecting the X-factor: a minimum X-factor of 4.0 percent with full sharing requirements, a 4.7 percent factor with a less restrictive sharing mechanism, and a 5.3 percent factor with no sharing requirement. These alternatives were available to the LECs for their tariff filings on July 1, 1995. Significantly, the vast majority of the price cap LECs chose the 5.3 percent X-factor with its no-sharing condition: eventually, five of the seven RBOCs elected the highest (5.3 percent) X-factor in return for the elimination of sharing.⁵ And most of the non-RBOC price cap LECs also chose the 5.3 percent/no sharing alternative.⁶ Thus, the bulk of the price cap LECs were willing to pay for the elimination of sharing by increasing their individual X-factor by 130 basis points.

This valuation by the price cap LECs themselves is strong evidence of the *minimum* increase in productivity that could be expected from the elimination of sharing. In other words, the LECs' own "revealed preferences" show that $X_{NS} - X_S$ is at least 1.3. And given that the actual value is probably much higher (as indicated by the LECs' persistent profitability), it would be reasonable for the FCC to adopt a CPD of approximately that amount.

To be sure, not all of the LECs have been willing to make this bargain. But, as the Commission has emphasized many times, the X-factor is designed, not to reflect the LECs' actual productivity experience, but the potential productivity gains that a LEC might reasonably expect. Even if some LECs did not believe they could increase their productivity by more than enough to make up for the 1.3 reduction in their X-factors, that does not prove that they could not do so. And it certainly does not prove that LECs in general could not do so. Indeed, the record shows that the vast majority of them were willing and able, in exchange for the elimination of sharing, to increase their productivity by *at least* 1.3 percentage points. This provides strong support for the conclusion that they could have increased their productivity slightly more – by 1.5 percentage points.

4. The final step is to combine the CPD with the historical component of the X-factor. For the period through 2000, this is straightforward: a 1.5 percent CPD could simply be added to the 10.1 percent historical X-factor, which is based entirely on data through 1995,

⁵ The five RBOCs selecting the 5.3 percent X-factor were Ameritech, Bell Atlantic, BellSouth, PacTel, and Southwestern Bell. See Fourth Further Notice of Proposed Rulemaking, CC Dkt. No. 94-1, Sep. 27, 1995, FCC 95-406, ¶ 8 n.17.

⁶ The non-RBOC carriers selecting the 5.3 percent X-factor were United, Rochester, Lincoln, and GTE (38 out of 46 study areas). Id.

before the LECs had the option to eliminate sharing.

For the future, however, the analysis is arguably more complicated. While 1.5% represents the additional productivity growth that results from going from a sharing regime to a no-sharing regime, the historical X-factor (for 2000 forward) is based on periods characterized by both sharing and no-sharing options. Arguably, it may thus already reflect some of the additional productivity associated with the elimination of sharing.

However, the CPD can easily be adjusted to eliminate any risk of double-counting. If we assume, conservatively, that fully 1.5 percentage points of the X-factors for 1996, 1997, and 1998 are attributable to the (partial) elimination of sharing during that period, we get adjusted X-factors for those years of 8.8, 5.8, and 5.8, respectively. Using these values to calculate the rolling average X-factors as in Table A-5 yields an average X of 9.14 percent rather than 9.54 percent, suggesting that the X-factor during that period would have been 9.1 percent (after rounding) without the elimination of sharing. Because this is 0.4 percent less than the X-factor of 9.5 percent calculated in Table A-5 for future periods, we can eliminate any potential double-counting simply by reducing the CPD from 1.5 percent to 1.1 percent.

CERTIFICATE OF SERVICE

I hereby certify that on this 7th day of January, 2000, I caused true and correct copies of the foregoing Comments of AT&T Corp. to be served on all parties by mailing, postage prepaid to their addresses listed on the attached service list.

Dated: Washington, D.C.
January 7, 2000

/ s / Peter M. Andros

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